

**SYMPOSIUM ON UNIDENTIFIED
FLYING OBJECTS**

HEARINGS

BEFORE THE

**COMMITTEE ON SCIENCE AND ASTRONAUTICS
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STATEMENT BY DR. ROBERT M. L. BAKER, JR.

1. Biography
2. Oral Statement
3. Attachments & Appendices

(The biography of Dr. Baker, Jr., is as follows:)

DR. ROBERT M. L. BAKER, JR.

Dr. Baker is a 36 year old scientist who received his BA with Highest Honors in Physics and Mathematics at UCLA in 1954, and was elected to Phi Beta Kappa. In 1956 he was granted a MA in Physics, and was the recipient of the UCLA Physics Prize. In 1958 Dr. Baker received a PhD in Engineering, which was the first of its kind to be granted in the nation with a specialty in Astronautics.

With respect to his academic background. Dr. Baker was on the Faculty of the Department of Astronomy at UCLA from 1959 to 1963. Since that time he has been on the Faculty of the Department of Engineering at UCLA where he currently offers courses in astronautics, fluid mechanics, and structural mechanics.

Dr. Baker is an internationally recognized expert in various fields of science and engineering. He was a research contributor to .the development of preliminary orbit determination procedures utilizing radar data, astrodynamic constants, near free-molecular flow drag—all utilized in the nation's space programs. He has also developed unique theories in the area of hydrofoil marine craft design.

In private industry Dr. Baker has initiated, supervised, and conducted research programs in astronautics, physics, fluid mechanics, mathematics, and computer program design. He has contributed to problem definition and analysis of scientific and engineering problems in both industrial and military projects.

Dr. Baker's industrial career began in 1954 as a consultant to Douglas Aircraft Company. Between 1957 and 1960 he was a Senior Scientist at Aeronutronic-Philco-Ford. While in the Air Force during 1960 and 1961, he was a project officer on a number of classified Air Force projects. Between 1961 and 1964 he was the head of Lockheed's Astrodynamics Research Center, where he directed the efforts of approximately 25 scientists in various scientific areas. In 1964 Dr. Baker joined the Computer Sciences Corporation (CSC), first as Associate Manager for Research and Analysis, and later as the Senior Scientist of CSC's System Sciences subdivision. In this latter capacity he is currently involved in several Air Force, Navy, and NASA projects.

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Dr. Baker represented the United States Air Force at the International Astronautical Federation meeting in Stockholm, Sweden in 1961, represented the United States at the International Union of Theoretical and Applied Mechanics European Conferences in 1962 and in 1965 and was an invitee to the Astronomical Council [sic] of the Academy of Sciences of USSR in Moscow in 1967. He was voted an Outstanding Young Man of the Year by the Junior Chamber of Commerce in 1965. From 1963 to 1964 he was the National Chairman of the Astrodynamics Technical Committee of the American Institute of Aeronautics and Astronautics and is currently a member of Computer Sciences Technical Committee.

Dr. Baker has been the Editor of the Journal of the Astronautical Sciences since 1968. He was the joint editor of the Proceedings of the 1961 International Astronautical Federation Congress and the senior author of the first textbook on astrodynamics: An Introduction to Astrodynamics published in 1960. Dr. Baker is the author of four books and over 70 technical papers (see Appendix 2).

Dr. Baker's professional society memberships include the American Association for the Advancement of Science, Phi Beta Kappa, Sigma Xi, Sigma Pi Sigma, American Astronautical Society (Fellow), British Interplanetary Society (Fellow), American Institute of Aeronautics and Astronautics (Associate Fellow and member of the Computer Sciences Technical

Committee), British Astronomical Society (Fellow), American Astronomical Society, American Physical Society, and Meteoritical Society.

His active security clearance is top secret.

STATEMENT OF DR. ROBERT M. L. BAKER, JR., SENIOR SCIENTIST, COMPUTER SCIENCES CORP., EL SEGUNDO, CALIF., AND FACULTY, DEPARTMENT OF ENGINEERING, UCLA

Dr. Baker. Fine, thank you, Mr. Roush.

I should like to preface my remarks by stating my preference for the term "anomalous observational phenomena," as opposed to the term "unidentified flying objects."

Mr. Roush. I observed you were going to say that and I wonder about some of my Hoosiers back home using those terms.

Dr. Baker. It comes trippingly off the tongue.

Mr. Roush. It might not only cause some Hoosiers but some laymen some problems. It might be easier to say UFO's. You may go ahead.

Dr. Baker. I call it AOP.

From the data that I have reviewed and analyzed since 1954, it is my belief that there does exist substantial evidence to support the claim that an unexplained phenomenon -- or phenomena -- is present in the environs of the earth, but that it may not be "flying," may not always be "unidentified," and, perhaps, may not even be substantive "objects." In the following statement I will --

- (1) Present a summary of the analyses that I have accomplished to date -- those that have led me to believe that anomalous phenomena exist;
- (2) Explain the probable inadequacy of our current terrestrial sensors in observing and/or defining the characteristics of the anomalous phenomena;
- (3) Suggest a number of tentative hypothetical sources for the phenomena, and the justification for their scientific study;
- (4) And, finally, I will make specific recommendations concerning the necessity for new types of closely related observational and study programs which might be implemented in a fashion that would permit the detection and quantitative analysis of the anomalous phenomena.

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Several appendices accompany this report. The first two are in response to Congressman Roush's invitational letter of July 10, 1968, and consist of my biographical sketch and a listing of my bibliography, respectively. The third appendix relates directly to my specific recommendations, and was included with the kind permission of Dr. Sydney Walker III. The fourth appendix presents three reprints of articles (Baker (1968a) and (1968b) and Walker (1968)) that are pertinent to the subject matter of this report.

PART 1. ANALYSES OF ANOMALISTIC OBSERVATIONAL PHENOMENA

UTAH AND MONTANA FILMS

My initial contact with anomalous observational phenomena -- AOP -- came in 1954 when I was a consultant to Douglas Aircraft Co. in Santa Monica, Calif., serving as special assistant to Dr. W. B. Klemperer, director of Douglas' research staff. The data consisted of two short film clips: one taken in Montana -- termed by us as the Montana film -- and one taken in Utah -- called by us the Utah film. These films were provided to us by the Air Technical Intelligence Center -- ATIC,

now the Foreign Technology Division -- FTD -- at Wright-Patterson Air Force Base; 35-millimeter prints were furnished by Green-Rouse Productions of Samuel Goldwyn Studios.

Both films had been taken by apparently reliable and unbiased men using amateur movie cameras and, in each case, there was a credible, substantiating witness present. The films exhibited the motion of rather fuzzy white dots, but the Montana film was remarkable in that foreground was visible on most of the frames.

Preliminary analysis excluded most natural phenomena. More detailed study indicated that the only remaining natural phenomenon candidate for the Utah film was birds in flight, and for the Montana film it was airplane fuselage reflections of the sun. After about 18 months of rather detailed, albeit not continuous, study using various film-measuring equipments [sic] at Douglas and at UCLA, as well as analysis of a photogrammetric experiment, it appeared that neither of these hypothesized natural phenomena explanations had merit, and a report was published by me (Baker (1956)) and forwarded to Brig. Gen. Harold E. Watson, commander, ATIC. Since the description of the circumstances of the filmings and the analyses of the data provided on the films is rather lengthy, and have since been published in the open literature,¹ it does not seem unreasonable to repeat the analyses here. [*NCAS Editor's note:* This last sentence appears to be a mis-transcription; the two analyses were not presented in Dr. Baker's statement.]

FLORIDA FILM

During the course of this study we also had the opportunity to view some gun-camera photographs taken over Florida. Unfortunately, we could not retain this film, and did not have time available to accomplish a comprehensive analysis. Like the Montana and Utah films, this film also exhibited only white-dot images; however, since a foreground was present, a competent study could have been carried out. Dr. Klemperer and I agreed on the preliminary conclusion -- not supported by detailed analyses -- that, again, no natural phenomenon was a likely source for the images.

¹For the Utah film, see Baker and Makemson (1967); for the Montana film, see Baker (1968a). This latter reference is included in app. 4 to this paper.

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VENEZUELA FILM

In June of 1963 I received a movie film clip from a Mr. Richard Hall that had purportedly been taken from an aircraft (DC-3) near Angel Falls, Venezuela, at about 12:15 p.m. This film clip was 8-millimeter color film, exposed at 16 frames per second and showed a very bright yellow, slightly pear-shaped object that disappeared in a cloud bank after about 60 or 70 frames. At the time I was the head of the Lockheed Aircraft Co.'s Astrodynamics Research Center. We had developed a small group of photogrammetrists consisting of Dr. P. M. Merifeld and Mr. James Rammelkamp, and were able to undertake a study of the film. Initially, Merifeld and Rammelkamp found little of interest on the film. After their preliminary examination, I expended considerable effort in further analysis. Again, I was only able to draw the conclusion that the yellow object was no known natural phenomenon; but [before] we could make a quantitative determination of angular rates and accelerations, and the bounds of distance, linear velocity, and acceleration, the film was lost (except for a microphotograph exhibiting the object on one frame). There was, however, no question in my mind as to the anomalistic character of the images.

CALIFORNIA FILM

In January 1964, Mr. Zan Overall showed me three cinetheodolite films which had been taken simultaneously by three different cameras of a Thor-Able Star launching at Vandenberg AFB (project A4/01019). These films depicted a white object moving vertically (relative to the film frame) against a clear, blue-sky background. The object was about as bright as the booster's second-stage exhaust, and passed the booster at about one-third degree per second. Rough estimates of the direction of the Sun -- based on shadows on early frames -- and the winds aloft -- indicated by the motion of the rocket's exhaust plume) -- were made. These, together with the brightness of the object and its rate of ascent, seemed to rule out balloons, airplanes, lens flare, mirages, et cetera. Since one of the cinetheodolites was at a site some distance from the other two, a parallax determination of the actual distance and speed of the object could be determined rather easily. Because the films were on loan from the Navy, I was unable to carry out the necessary study and a determination of the precise character of the phenomenon (natural or anomalistic) could not be made. In 1967, I discussed the matter with Prof. William K. Hartmann of the University of Arizona, and Prof. Roy Craig of the University of Colorado. At that time, they were involved in the Colorado UFO Study Group, and indicated that they would attempt to obtain the film for further analysis.

Although I am confident that they made a conscientious effort to obtain the films, apparently they were unsuccessful (as of 6 months ago, at least).

PROBABLY NONANOMALISTIC FILMS

In addition to the foregoing film clips -- which seemed to involve data that were the result of anomalistic phenomena -- the Montana film in my opinion, certainly was anomalistic and all of the other

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films except for the California film, most probably were anomalistic -- I have also had the opportunity to view approximately a half dozen other films, purportedly of "UFO's." The images on these films appeared possibly to be the result of natural phenomena, such as reflections on airplanes, atmospheric mirages, optical flares, birds, balloons, insects, satellites, et cetera. For example, a recent (February 1968) set of two films were taken, using professional motion picture equipment, by a Universal Studio crew on location. Although rather peculiar in appearance, the objects thus photographed could have conceivably been the result of airplane reflections.

To this date my analyses of anomalistic motion picture data have been rather ungratifying. Although I am convinced that many of the films indeed demonstrated the presence of anomalistic phenomena, they all have the characteristic or rather ill-defined blobs of light, and one can actually gain little insight into the real character of the phenomena. For example, linear distance, speed, and acceleration cannot be determined precisely, nor can size and mass. As I will discuss in a moment, this situation is not particularly surprising, since, without a special-purpose sensor system expressly designed to obtain information pertinent to anomalistic observational phenomena, or a general-purpose sensor system operated so as not to disregard such data, the chance for obtaining high-quality hard data is quite small.

PART 2. INADEQUACIES OF EXISTING SENSOR EQUIPMENT AND SYSTEMS

The capabilities of astronomical optical sensors have been dealt with in a thorough fashion by Page in 1968. The Prairie Network for Meteor Observations (McCrosky and Posen (1968)) is a good example of a wide-coverage optical system, but as is so often the case, and as Page (1968) pointed out. "**** K E. McCrosky of the Smithsonian Astrophysical Observatory informed me that no thorough search (for anomalistic data) has been carried out." Even so, some astronomical photographs are bound to exhibit anomalistic data. Again quoting from Page (1968), "**** W. T. Powers of Northwestern University Astronomy Department informed me that 'several' of the Smithsonian-net photographs show anomalous trails." As I have already pointed out (Baker (1968b) to be found in appendix 4), the majority of our astronomical equipment (e.g., conventional photographic telescopes, Baker-Nunn cameras, meteor cameras, Markowitz Dual-Rate Moon Cameras, et cetera) are special purpose in nature, and would probably not detect the anomalous luminous phenomena reported by the casual observer if they were indeed present. Their photographic speed, field of view, et cetera, impose severe restrictions on their ability to collect data on objects other than those they have been specifically designed to detect. As already noted in the quotes from Page (1968), even if such data were collected, the recognition of their uniqueness or anomalous character by an experimenter is improbable. Examples abound, in the history of celestial mechanics, of minor planets being detected on old astronomical plates that had been measured for other purposes, and then abandoned.

Our radar and optical space surveillance and tracking systems are even more restrictive and thus, even less likely to provide information on anomalistic phenomena than are astronomical sensors. The Signal Test Processing Facility (STPF) radar at Floyd, N.Y. is a high-performance

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performance experimental radar having a one-third degree beam width. For lockon and track, an object would have to be pinpointed to one-sixth degree, and even if the radar did achieve lockon, an erratically moving object could not be followed even in the STPF radar's monopulse mode of operation. For this reason only satellites having rather well-defined paths (i.e., ephemerides), which have been precomputed, can be acquired and tracked.

Our three BMEWS radars propagate fans of electromagnetic energy into space. If a ballistic missile or satellite penetrates two of these fans successively, then it can be identified. Since astrodynamical laws govern the time interval between detection fan penetrations for "normal" space objects, all other anomalistic "hits" by the radar are usually neglected, and

even if they are not neglected, they are usually classified as spurious images or misassociated targets, and are stored away on magnetic tape, and forgotten.

One space surveillance site operates a detection radar (FPS-17) and a tracking radar (FPS-79). If a new space object is sensed by the detection radar's fans, then the tracking radar can be oriented to achieve lockon. The orientation is governed by a knowledge of the appropriate "normal" object's astrodynamical laws of motion, or by an assumption as to launch point. Thus, if an unknown is detected, and if it follows an unusual path, it is unlikely that it could, or would, be tracked. Furthermore, the director of the radar may make a decision that the unknown object detected is not of interest (because of the location of the FPS-17 fan penetration or because of the lack of prior information on a possible new launch). In the absence of detection fan penetration (the fan has a rather limited coverage), the FPS-79 tracking radar is tasked to follow other space objects on a schedule provided by the Space Defense Center, and again there is almost no likelihood that an anomalistic object could, or would, be tracked.

The NASA radars, such as those at Millstone and Goldstone, are not intended to be surveillance radars, and only track known space objects on command. Again the chances of their tracking anomalistic objects are nearly nil. The new phased-array radar at Eglin AFB (FPS-85) has considerable capability for deploying detection fans and tracking space objects in a simultaneous fashion. Such versatility raises certain energy-management problems -- that is, determining how much energy to allocate to detection and how much to tracking -- but this sensor might have a capability (albeit, perhaps, limited) to detect and track anomalistic objects. The problem is that the logic included in the software associated with the FPS-85's control computers is not organized in a fashion to detect and track anomalistic objects (I will indicate in a moment how the logic could be modified). Furthermore, the FPS-85, like the other surveillance radars is usually tasked to track a list of catalogued space objects in the Space Defense Center's data base and the opportunity to "look around" for anomalistic objects is quite limited.

There are a number of other radar surveillance systems such as a detection fence across the United States. In the case of this fence, we have a situation similar to BMEWS, in which the time interval between successive penetrations (in this case separated by an orbital period for satellites) must follow prescribed astrodynamical laws. If they do not, then the fence penetrations are either deleted from

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the data base or classified as "unknowns" or "uncorrelated targets," filed, and forgotten.

There is only one surveillance system, known to me, that exhibits sufficient and continuous coverage to have even a slight opportunity of betraying the presence of anomalistic phenomena operating above the Earth's atmosphere. The system is partially classified and, hence, I cannot go into great detail at an unclassified meeting. I can, however, state that yesterday (July 28, 1968) I traveled to Colorado Springs (location of the Air Defense Command) and confirmed that since this particular sensor system has been in operation, there have been a number of anomalistic alarms. Alarms that, as of this date, have not been explained on the basis of natural phenomena interference, equipment malfunction or inadequacy, or manmade space objects.

PART 3. HYPOTHETICAL SOURCES FOR ANOMALISTIC OBSERVATIONS AND JUSTIFICATION FOR THEIR STUDY

In Baker and Makemson (1967), I discussed the usual candidates for the natural sources of anomalistic observations. For example, some scanning radars -- such as airport radars -- pick up anomalistic returns termed "angels." A variety of explanations have been proposed, variously involving ionized air inversion layers, etc. (see Tacker (1960) and even insects (see Glover, et al. (1966)). With respect to human observation of anomalistic luminous phenomena, some rather strong positions have been taken by such authorities as Menzel (1953), who feels that the predominant natural phenomenon is atmospheric mirages; by Klass (1958a), who feels that the predominant natural phenomenon is related to ball lightning triggered by high-tension line coronal discharge, jet aircraft, electrical storms, etc.; by Robey (1960), who feels that the observations are of "cometoids" entering the earth's atmosphere, etc. The list of hypothetical sources for anomalistic observational phenomena is long indeed, but from the photographic data that I have personally analyzed, I am convinced that none of these explanations is valid.

The analyses that I have carried out to date have dealt with observational evidence that I term "hard data" -- that is, permanent photographic data. Although I will not discuss in detail the analyses of eyewitness reports (which I term "soft

data"),¹ Powers (1967), McDonald (1967), Hynek (1966), and others have concluded that overwhelming evidence exists that a truly anomalistic phenomenon is present.

Of course, there are numerous others who have come to a completely opposite conclusion; in fact, it becomes almost a matter of personal preference: it is possible for one to identify all of the anomalistic data as very unusual manifestations of natural phenomena. No matter how unlikely it is, anything is possible -- even a jet plane reflecting the sun in direct opposition to the laws of optics. I'm sometimes reminded of the flat earth debates that I organized 10 years ago in my elementary astronomy courses at UCLA. Some students became so involved in justifying their positions-- either flat or spherical -- that they would grasp at even the most improbable argument in order to rationalize their stand.

¹Except in app. 3 to this report -- a paper supplied by Dr. Sydney Walker III, concerning a hypothetical case.

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Mr. Roush. Dr. Baker, I'm sorry to interrupt, but I'm going to have a brief recess here.

Dr. Baker. Certainly.

Mr. Roush. There is a motion to recommit the military construction bill, and I would like to vote on it. None of my colleagues are here right now, so we will declare a very brief recess, and I shall return as quickly as I can.

(Whereupon a short recess was taken for a floor vote.)

Mr. Roush. The committee will be in order.

Dr Baker, you may proceed.

Dr. Baker. Thank you.

Personally, I feel that it is premature for me to agree that the hard and soft data forces the scientific community to give overriding attention to the hypothesis that the anomalistic observations arise from manifestations of extraterrestrial beings. On the other hand, I strongly advocate the establishment of a research program in the area of anomalistic phenomena -- an interdisciplinary research effort that progresses according to the highest scientific standards; that is well funded; and that is planned to be reliably long term. The potential benefit of such a research project to science should not hinge solely on the detection of intelligent extraterrestrial life; it should be justified by the possibility of gaining new insights into poorly understood phenomena, such as ball lightning, cometoid impact, and spiraling meteorite decay.

There is practical value in such research for the Military Establishment, as well. Let us suppose that something similar to the "Tunguska event" of 1908 occurred today, and that it was Long Island in the United States, rather than the Podkamenaiia Tunguska River Basin in Siberia that was devastated by a probable comet impact. Would we misinterpret this catastrophic event as the signal for world war III? What if another "fireball procession," such as occurred over Canada on February 9, 1913, repeated itself today, and the low-flying meteors were on nearly polar orbits that would overfly the continental United States. Would we interpret the resulting surveillance data as indicating that a fractional orbital bombardment system (FOBS) had been initiated in Russia? My knowledge of our Air Force sensors, both current and projected (see Baker and Ford (1968)), indicates that they are sufficiently sophisticated so that they would probably not react prematurely and signal a false alarm -- although a careful study of this point should be made. On the other hand, there may exist other anomalistic sources of data that might give rise to a false alarm and perhaps provoke us either to deploy our countermeasures, or even to counterattack.

Before I enumerate the specific benefits this research might confer upon various scientific disciplines, allow me to digress briefly on the subject of soft data. The primary reason that I have avoided the introduction of soft data into my photographic studies and have not involved myself in the analysis of eyewitness reports (such as the excellent ones given by Fuller (1966)), is that I have been unable to develop a rational basis for determining the credibility level for any given human observer. Although they lie outside the field of my own scientific competence, I feel that credibility evaluations of witnesses

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would form an important adjunct to any serious study of anomalistic phenomena (see Walker (1968) included in app. 4 of this report). The soft data must involve some useful information content, and it would be extremely unrealistic to neglect it entirely. For this reason, I have included appendix 3 by Dr. Walker, which presents a logical procedure for establishing a credibility level for observers. Walker's report of a hypothetical case integrates the results of general medical, neuroophthalmologic, neurologic, and psychiatric evaluations, and develops a logical basis for assigning an overall credibility score.

Dr. Robert L. Hall is, of course, eminently qualified to comment on the question of eyewitness testimony at this seminar.

If serious studies can be initiated, with the objectives of detecting, analyzing, and identifying the sources of anomalistic observational phenomena, then I feel that the following scientific benefits can be expected:

(1) *Meteoritics*. -- Although there are a number of excellent meteor observation nets operating today, data collected on erratically moving phenomena (including rapid determination of the location of any "landings" or impacts) would add significantly to the coverage and analyses of meteorites and, possibly, entering comets. Furthermore, the timely recovery of meteoritic debris at the subend point of fireballs would be most valuable.

(2) *Geology*. -- It has been pointed out by Lamar and Baker (1965), that there exist residual effects on desert pavements that may have been produced by entering comets. Furthermore, any geological or material evidence of the impact or "landing" of extraterrestrial objects would be of great interest. As Dr. John O'Keefe (1967), Assistant Chief, Laboratory for Theoretical Studies of NASA GSFC indicated "Would it not be possible to get some scraps of these ("UFO") objects for examination? For instance, a scrap of matter, however small, could be analyzed for the kind of alloys in terrestrial foundries.

A piece of a screw, however small, would be either English, Metric, or Martian. I am impressed by this because I looked at some tens of thousands of pictures of the Moon and found that the very small amount of chemical data has more weight in interpreting the past history of the Moon than the very large amount of optical data. It doesn't seem possible that objects ("flying saucers") of this size can visit the Earth and then depart, leaving nothing, not even a speck, behind. We could analyze a speck no bigger than a pinhead very easily." I concur with O'Keefe's remarks, and if there exist "landings" associated with the anomalistic phenomena, then a prompt and extremely thorough investigation of the landing site must be accomplished before geological/material evidence is dispersed or terrestrialized.

(3) *Atmospheric physics*. -- One of the great mysteries today is the formation, movement, and explosion of ball lightning. As Singer (1968) noted:

The specific properties of ball lightning, which present particular difficulty in experimental duplication, are formations of the sphere in air (at near-atmospheric pressure and at a distance from the source of energy) and its extensive motion. It is evident that additional clarification of both theoretical and experimental aspects is needed.

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With respect to "plasma UFO's" Mr. Philip J. Klass(1968b) comments that:

If conditions -- all of the conditions -- needed to create plasma-UFO's near high-tension lines or in the wake of jet aircraft occurred readily we should have millions of UFO reports and the mystery would have been solved long ago. But the comparative rarity of legitimate UFO sightings clearly indicates that the ball-lightning related phenomenon is a very rare one.

Even if ball lightning is not the primary source of anomalistic data (and I am not at present convinced that it is), any program investigating anomalistic observational phenomena would surely shed significant light on the ball-lightning problem.

(4) *Astronomy*. -- I have already noted the possibility of cometary entry, a study of which would be valuable to the astronomer. If as some respected astronomers believe, the anomalistic observational phenomena (including perhaps, "intelligent" radio signals from interstellar space) are the results of an advanced extraterrestrial civilization, then the study of the phenomena would become a primary concern of the entire human race. The implications for astronomy are overwhelming.

(5) *Psychiatry and psychology.* -- Since bizarre events have been reported, the study of eyewitness credibility, under stressful circumstances of visual input, if possible. As I will recommend later: if a competent, mobile task force of professionals could be sent into action as soon as anomalistic events are detected, then reliable evaluation of eyewitness reports (soft data) in relation to the actual hard data obtained, could be accomplished. Even if the event was only a spectacular fireball, or marsh gas, the psychiatric/medical examination of eyewitnesses would still be more informative.

(6) *Social science.* -- Although not classified as a physical science, there appears to be a challenge here for the social sciences. It has been my contention throughout this report that it is not a prerequisite to the study of anomalistic observational phenomena to suppose that they result from extraterrestrial intelligence.

Nevertheless, it still is an open possibility in my mind. It seems reasonable, therefore, to undertake a few contingency planning studies. In order to extract valuable information from an advanced society, it would seem useful to forecast the approximate characteristics of such a superior intelligence—or, if not necessarily superior, an intelligence displayed by an industrial, exploratory culture of substantially greater antiquity. There exist dozens of treatises on technological forecasting; one can key estimates of technological advancement to speed of travel, production of energy, productivity, ubiquity of communications, etc. There have been many debates on the technical capabilities or limits on the capabilities of advanced extraterrestrial societies (for example, see Markowitz (1967) and Rosa, et al. (1967). Often intermixed with these technological capabilities arguments, however, are very dubious comments concerning the psychological motivations, behavioral patterns, and unbiased projections of the social motivations of an advanced society. Hypothetical questions are often raised such as, "**** if there are flying saucers around, why don't they contact us directly? **** I would if I were investigating another civilization." Such comments are made on extremely thin ice, for, to my knowledge, no concerted study has been carried out in the

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area of forecasting the social characteristics of an advanced extraterrestrial civilization. Philosophers, social scientists, and others usually undertake studies of rather theoretical problems. (See Wooldridge (1968) and Minas and Ackoff (1964). If only a quantitative index or indices of social advancement could be developed that, say, would differentiate us from the Romans in our interpersonal and intersociety relationships (for example, tendencies toward fewer crimes of violence, fewer wars, etc.), then we might be better equipped to make rational extrapolations from our own to an advanced society. In fact, such an index, if it could be developed might even be beneficial in guiding our existing earth-based society.

(7) *Serendipity.* -- In addition to the value of anomalistic phenomena studies to these specific scientific disciplines, there is always serendipity. Any scientific study of this nature is potentially capable of giving substantial dividends in terms of "spin-off." For example: in improved techniques in radar and optical sensor design and control; in giving a reliable quantitative credibility level to witness' statements in court; or in deciphering and/or analyzing anomalistic radio signals from interstellar space.

PART 4. CONCLUSIONS AND RECOMMENDATIONS

For the past 16 years I have seriously (albeit sporadically) followed the analyses of "UFO" or "flying saucer" reports -- both scientific and quasi-scientific. It is my conclusion that there is only so much quantitative data that we can squeeze out of vast amounts of data on anomalistic observational phenomena that has been collected to date. I believe that we will simply frustrate ourselves by endless arguments over past, incomplete data scenarios; what we need is more sophisticated analyses of fresh anomalistic observational data. We must come up with more than just a rehash of old data.

I emphasize that it is very unlikely that existing optical and radar monitoring systems would collect the type of quantitative data that is required to identify and study the phenomena. Moreover, we currently have no quantitative basis upon which to evaluate and rank (according to credibility) the myriad of eyewitness reports. Thus continuing to "massage" past anomalistic events would seem to be a waste of our scientific resources. In balance, then, I conclude that:

(1) We have not now, nor have we been in the past, able to achieve a complete -- or even partially complete -- surveillance of space in the vicinity of the earth, comprehensive enough to betray the presence of, or provide quantitative information on, anomalistic phenomena.

(2) Hard data on anomalistic observational phenomena do, in fact exist, but they are of poor quality, because of the inadequacies of equipment employed in obtaining them.

(3) Soft data on anomalistic phenomena also exist, but we have no quantitative procedure to evaluate their credibility and develop clear-cut conclusions on the characteristics of the anomalistic phenomena.

(4) It follows from the scientific method that an experiment or experiments should be devised, and closely related study programs be initiated expressly to define the anomalistic data better.

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(5) In order to justify such an experiment and associated studies, it is not necessary to presuppose the existence of intelligent extraterrestrial life operating in the environs of the earth, or to make dubious speculations either concerning "their" advanced scientific and engineering capabilities or "their" psychological motivations and behavioral patterns.

In the light of these conclusions, I will make the following recommendations:

(1) In order to obtain information-rich hard and soft data on anomalistic phenomena, an interdisciplinary, mobile task force or team of highly qualified scientists should be organized. This team should be established on a long-term basis, well funded, and equipped to swing into action and investigate reports on anomalistic phenomena immediately after such reports are received. Because of the relatively low frequency of substantive reports (see p. 1968), immediate results should not be anticipated, but in the interim periods between their investigations in the field, their time could be productively spent in making thorough analyses of data collected by them previously, and in "sharpening up" their analysis tools.

(2) In concert with the aforementioned task force, a sensor system should be developed expressly for detecting and recording anomalistic observational phenomena for hard-data evaluation. The system might include one or more phased-array radars (certainly not having the cost or capability of the FPS-85, but operating in a limited fashion that would be similar to the FPS-85). A phased-array radar would have the advantage over a conventional "dish" radar in that it could track at high rates and divide its energy in an optimum fashion between detection and tracking. The control system would be unique, and would necessitate the development of a sequential data-processing controller that would increase the state variables describing the object's path from a six-dimensional position and velocity estimation to a 12-dimensional acceleration and jerk estimation (Baker (1967)) in order to follow erratic motion.

In addition, the data base would have to be especially designed, to avoid manmade space objects and (if possible) airplanes, birds, common meteors, etc. It should, however, be designed to detect and track nearby cometoids, macrometeorites (fireballs), ball lightning, and any other erratic or anomalistic object within its range. Optical cameras (including spectrographic equipment) should be slaved to the radar, in order to provide more comprehensive data. Because of the aforementioned low frequency of anomalistic data, alarms from the system should not occur very frequently and could be communicated directly to the recommended task force.

(3) A proposed new-generation, space-based long-wave-length infrared surveillance sensor system should be funded and the associated software should be modified to include provisions for the addition of anomalistic objects in its data base. The specific sensor system cannot be identified for reasons of security, but details can probably be obtained from the Air Force. This sensor system, in particular, could provide some data (perhaps incomplete) on anomalistic, objects which exhibit a slight temperature contrast with the space background, on a basis of noninterference with its military mission. The system represents a promising technological development, and no other novel

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technique introduced in recent years offers more promise for space surveillance. In my view, the scientific principles underlying the proposed surveillance system are sound, and a developmental measurements program should be initiated.

(4) The software designed for the FPS-85 phase-array radar at Eglin Air Force Base be extended in order to provide a capability to detect and track anomalistic space objects. The relatively inexpensive modification could include the implementation of tracking techniques such as those outlined in Baker (1967). It should, however, be clearly borne in mind that only a limited amount of tracking time (about 30 percent) could be devoted to this endeavor, because of the overriding importance of the surveillance of manmade space objects which is the basic responsibility of this radar.

(5) Various "listening post" projects should be reestablished (using existing instruments) in order to seek out possible communications from other intelligent life sources in the universe. See, for example, Shklovskii and Sagan (1966), chapters 27, 28, 30, and 34.

(6) Technological and behavioral pattern forecasting studies should be encouraged in order to give at least limited insight into the gross characteristics of an advanced civilization. These studies (probably not Government funded) should include the social-psychological implications of anomalistic observational phenomena, as well as the psychological impact upon our own culture that could be expected from "contact" with an advanced civilization. (See ch. 33 of Shklovskii and Sagan (1966).)

(7) Studies should be initiated in the psychiatric/medical problems of evaluating the credibility of witness' testimony concerning bizarre or unusual events. (See app. 3 of this report.)

PART 5. AFTERWORD

All of the foregoing recommendations involve the expenditure of funds, and we are all well aware of the severe limitations on the funding of research today. On the other hand, I feel that one of the traps that we have fallen into, so far, is reliance on quick-look, undermanned and underfunded programs to investigate a tremendous quantity of often ambiguous data. I would discourage such programs as being diversionary, in regard to the overall scientific goal.

The goal of understanding anomalistic phenomena, if attained, may be of unprecedented importance to the human race. We must get a positive scientific program off the ground; a program that progresses according to the highest scientific standards, has specific objectives, is well funded, and long term.

Thank you.

(The appendixes and attachments to Dr. Baker's statement follow:)

1. Film Analysis, Part 1
2. Film Analysis, Part 2
3. References
4. Appendix 1: Bibliography
5. Appendix 2: Eyewitness Assessment
6. Appendix 3: Article Reprints

PART 1

ABSTRACTS FROM BAKER (1956) RELATED TO THE UTAH FILM -- ANALYSIS OF PHOTOGRAPHIC MATERIAL

PHOTOGRAMMETRIC ANALYSIS OF THE "UTAH" FILM TRACKING UFO'S

Several Unidentified Flying Objects (UFO's) were sighted and photographed at about 11:10 MST on July 2, 1952 by Delbert C. Newhouse at a point on State Highway 30, seven miles north of Tremonton, Utah (latitude 41° 50", longitude

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112° 10'). Mr. Newhouse, a Chief Warrant Officer in the U.S. Navy,* was in transit from Washington, D.C. to Portland, Oregon.

He, his wife and their two children were making the trip by car. Shortly after passing through the city of Tremonton, his wife noticed a group of strange shining objects in the air off towards the eastern horizon. She called them to her husband's attention and prevailed upon him to stop the car. When he got out, he observed the objects (twelve to fourteen of them) to be directly overhead and milling about. He described them as "gun metal colored objects shaped like two saucers, one inverted on top of the other." He estimated that they subtended "about the same angle as B-29's at 10,000 feet" (about half a degree -- i.e., about the angular diameter of the moon). (Next, he ran to the trunk of his car, took out his Bell and Howell

Automaster 16mm movie camera equipped with a 3" telephoto lens, loaded it, focused it at infinity and began shooting. There was no reference point above the horizon so he was unable to estimate absolute size, speed or distance. He reports that one of the objects reversed its course and proceeded away from the rest of the group; he held the camera still and allowed this single object to pass across the field of view of the camera, picking it up later in its course. He repeated this for three passes.

During the filming, Newhouse changed the iris stop of the camera from f/8 to f/16. The density of the film can be seen to change markedly at a point about 30% through the sequence. The camera was operated at 16 fps.

The color film (Daylight Kodachrome) after processing was submitted to his superiors. The Navy forwarded the film to the USAF-ATIC where the film was studied for several months. According to Al Chop (then with ATIC and presently with DAC) Air Force personnel were convinced that the objects were not airplanes; on the other hand the hypothesis that the camera might have been out of focus and the objects soaring gulls could neither be confirmed nor denied. Mr. Chop's remarks are essentially substantiated by Capt. Edward Ruppelt, reference (1) then head of Project "Blue Book" for ATIC.

A 35mm reprint of the Newhouse "Utah" film was submitted to Douglas Aircraft Company for examination. Visual study of the reprints on the Recordak and astronomical plate measuring engine revealed the following: The film comprises about 1,200 frames; on most of the frames there appear many round white dots, some elliptical. The dots often seem clustered in constellations, or formations which are recognizable for as long as seventeen seconds. A relative motion plot (obtained from an overlay vellum trace on the Recordak) of two typical formations are presented. The objects seem to cluster in groups of two's and three's. On some frames they flare up and then disappear from view in 0.25 seconds or less and sometimes they appear as a randomly scattered "twinkling" of dots. The dot images themselves show no structure; they are white and have no color fringes. *Examination under a microscope shows the camera to be well focused as the edges of the images are sharp and clear on many of the properly exposed frames (of the original print).* Angular diameters range from about 0.001,6 to 0.000,4 radians. Their pattern of motion is essentially a curvilinear milling about. Sometimes the objects appear to circle about each other. There are no other objects in the field of view which might give a clue as to the absolute motion of the cluster.

In the overlay trace, the frame of reference is determined by a certain object whose relative motion during a sequence of frames remains rather constant. This object is used as a reference point and the lower edge of the frame as abscissa. Assuming the camera to have been kept reasonably uncanted, the abscissa would be horizontal and the ordinate vertical. In the overlay trace, the particular frame itself is used as the reference. Assuming the camera was held steady (there is an unconscious tendency to pan with a moving object) the coordinate system is quasi-fixed. It is realized that both of these coordinate systems are in actuality moving, possibly possessing both velocity and acceleration.

No altitude or azimuth determination can be made because of lack of background. The only measurable quantities of interest are therefore the relative angular distances between the objects and their time derivatives. Graphs of two typical time variations of relative angular separation and velocity are included (in Baker and Makemson (1967)). The relative angular velocity is seen to vary from zero to 0.006,5 radians per second. The relative angular acceleration had a maximum value of 0.003,6 radians per second squared. Supposing the

*At the time he had already logged some 2,200 hours as a chief photographer with the Navy.

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camera was kept stationary the average angular velocities for the object moving across the field are 0.039 and 0.031 radians per second. The angular velocities in these sequences sometimes vary erratically from 0.07 to 0.01 radians per second. This variation may be attributed in part to camera "jiggling" and in part to the object's motion. The decrease in average angular velocity could be due to the object's having regressed between filmings just as was reported by Newhouse. Also the average image diameter decreases about 30% over the entire film, indicating a possible over-all regression of the objects.

The following tabulation indicates the hypothetical transverse component of relative velocities and accelerations at various distances. It is noted that the transverse velocity may be only a fraction of the total velocity so that the numbers actually indicate minimum values.

If the object's distance was-	Its transverse velocity was-	Its transverse acceleration was-	Velocity of single object was-
100 ft.	0.65 ft./sec. or 0.44 m.p.h.	0.36 ft./sec ² or 0.011g.	3.8 ft./sec. or 2.7 m.p.h.
1,000 ft.	6.5 ft./sec. or 4.4 m.p.h.	3.6 ft./sec ² or 0.11 g.	39 ft./sec. or 27 m.p.h.
2,000 ft.	13 ft./sec. or 8.8 m.p.h.	7.2 ft./sec ² or 0.22g.	78 ft./sec. or 54 m.p.h.
1 mile.	23 m.p.h.	0.56 g	135 m.p.h.
5 miles.	115 m.p.h.	2.8 g	670 m.p.h.
10 miles.	230 m.p.h.	5.6 g	1,300 m.p.h.

The objects in the "Utah" and "Montana" films can only be correlated on the basis of two rather weak points. First, their structure, or rather lack of it, is similar. Thus as shown, in the "blow-ups" there are no recognizable differences between them*. Second, the objects on the "Montana" film are manifestly a single pair; on the "Utah" film perhaps 30% of the frames show clusters of objects seemingly also grouped in pairs.

The weather report was obtained by the author from the Airport Station at Salt Lake City. The nearest station with available data is Corinne which reported a maximum temperature of 84°, a minimum of 47° and no precipitation. A high pressure cell from the Pacific Northwest spread over Northern Utah during July 2, the pressure at Tremonton would have a rising trend, the visibility good, and the winds relatively light. The absence of clouds and the apparently excellent visibility shown on the films would seem to be in agreement with this report. Through use of References (2) and (3), the Sun's azimuth N132°E altitude 65° was computed. No shadows were available to confirm the time of filming.

The image size being roughly that of the Montana film (a few of the objects being perhaps 10% larger than the largest on the Montana) the same remarks as to airplane reflections apply, i.e., they might have been caused by Sun reflections from airplanes within one to three miles to the observer, although at these distances they should have been identified as conventional aircraft by the film or the observer. No specific conclusions as to Sun reflection angles can be drawn since the line of motion of the objects cannot be confirmed. However, the reported E to W motion of the UFO's and their passing overhead coupled with the SE azimuth of the Sun would make the achievement of optimal Sun reflections rather difficult.

That the images could have been produced by aluminum foil "chaff"*** seems possible, at least on the basis of the images shown, as very intense specular Sun reflections from ribbons of chaff might flare out to about the size of the UFO's.

Examination of film frames obtained from the photogrammetric experiment -- reference Analysis of Photographic Material, Serial 01, Appendix II -- show that no significant broadening is produced by flat white diffuse reflectors such as birds, bits of paper, etc. at f/16 under the conditions of the filming. Actual measurements show a slight "bleeding" or flaring of about 10% to 20%.

The rectangular flat white cardboards of the aforementioned experiments represented very roughly the configuration of birds. The light reflected by such a surface is probably greater than that from a curved feather surface of a bird.

*The images on the "Utah" film appear to be a little brighter. However, possible variations in development techniques would not allow quantitative analysis in this regard.

***Bits of aluminum foil dumped overboard by planes, often utilized as a countermeasure against anti-aircraft radar. This material might possibly be in the form of large ribbons several feet long and several inches across.

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One figure shows the appearance of one and two foot birds* as they might appear on a 16 mm frame taken with a 3" telephoto lens f/16 at a distance of 1,200', at 3,000' and at 3,300'. Many of the images on the "Utah" film have an angular diameter of 0.001,2 radians (some as large as 0.001,16 radians), thus they might be interpreted as one foot (wing span) birds at 600' to 800', two foot (wing span) birds at 1,200' to 1,600' or three foot (wing span) birds at 2,400' to 3,200'. *At these distances, it is doubted if birds would give the appearance of round dots; also they would have been identifiable by the camera if not visually.* However, actual movies of birds in flight would have to be taken to completely confirm this

conclusion. The following type of gulls have been known to fly at times over this locality: California Herring Gull (a common summer resident), Ring-Billed Gull and the Fork-Tailed Gull, see Reference (4).

The images are probably not those of balloons as their number is too great and the phenomenon of flaring up to a constant brightness for several seconds, and then dying out again cannot well be associated with any known balloon observations.

Certain soaring insects -- notably "ballooning spiders" (References (5) and (6)) produce bright-moving points of light. The author has witnessed such a phenomenon. It is produced by Sun reflections off the streamers of silken threads spun by many types of spiders. Caught by the wind, these streamers serve as a means of locomotion floating the spider high into the air. They occasionally have the appearance of vast numbers of silken flakes which fill the air and in some recorded instances extend over many square miles and to a height of several hundred feet. The reflection, being off silk threads, is not as bright as diffuse reflection from a flat white board. Thus no flaring of the images could be expected. The author noted that the sections of the "web" that reflected measured from $\frac{1}{4}$ " to $\frac{1}{2}$ " for the largest specimens. Thus the images might be attributed to ballooning spiders at distances of 50 to 100 feet. However, these web reflections ordinarily show upon only against a rather dark background and it is doubted if their intensity would be great enough to produce the intense UFO images against a bright sky.

Besides the above remarks, pertinent to the actual images, several facts can be gleaned from the motion of objects. The observations are not apt to support the supposition that the objects were conventional aircraft as the maneuvers are too erratic, the relative accelerations probably ruling out aircraft at distances of over five miles. Several observers familiar with the appearance of chaff have seen the film and concluded that the persistence of the nontwinkling constellations, their small quantity, and the reported absence of aircraft overhead makes chaff unlikely. Furthermore, the single object passing across the field of view would be most difficult to explain on the basis of chaff. These same remarks would apply also to bits of paper swept up in thermal updrafts.

The relative angular velocity might be compatible with soaring bird speeds at distances of less than one mile, the angular velocity of the single object could be attributed to a bird within about one thousand feet. There is a tendency to pan with a moving object -- not against it -- so the velocities in the table probably represent a lower bound. *The motion of the objects is not exactly what one would expect from a flock of soaring birds (not the slightest indication of a decrease in brightness due to periodic turning with the wind or flapping) and no cumulus clouds are present which might betray the presence of a strong thermal updraft.* On the other hand the single object might represent a single soaring bird which broke away in search of a new thermal -- quite a common occurrence among gulls -- see Reference (7).

That the air turbulence necessary to account for their movement if they were nearby insects (even the single object's motion!) is possible, can be concluded from examination of Reference (8). However, if the objects were nearby spider webs the lack of observed or photographed streamers is unusual. Furthermore, the fact that they were visible from a moving car for several minutes is hard to reconcile with localized insect activity.

The phenomenon of atmospheric mirages, Reference (9), might conceivably account for the images. Such a hypothesis is hampered by the clear weather conditions and the persistence and clarity of the images. Also no "shimmering" can be detected and the motion is steady. Again the object which breaks away would be difficult to explain.

*The dimensions refer to wing spread. The actual exposed white area of a bird is usually less and depends upon the perspective of the observer. This difference has been roughly accounted for in the data given, however, if the body were the principal reflector the distance given should be reduced by a factor of 2 or 3.

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It has been suggested that spurious optical reflections or light leaks in the camera might be responsible. Examples of such effects have been examined and found to be quite different from the UFO's (in the Utah Film).

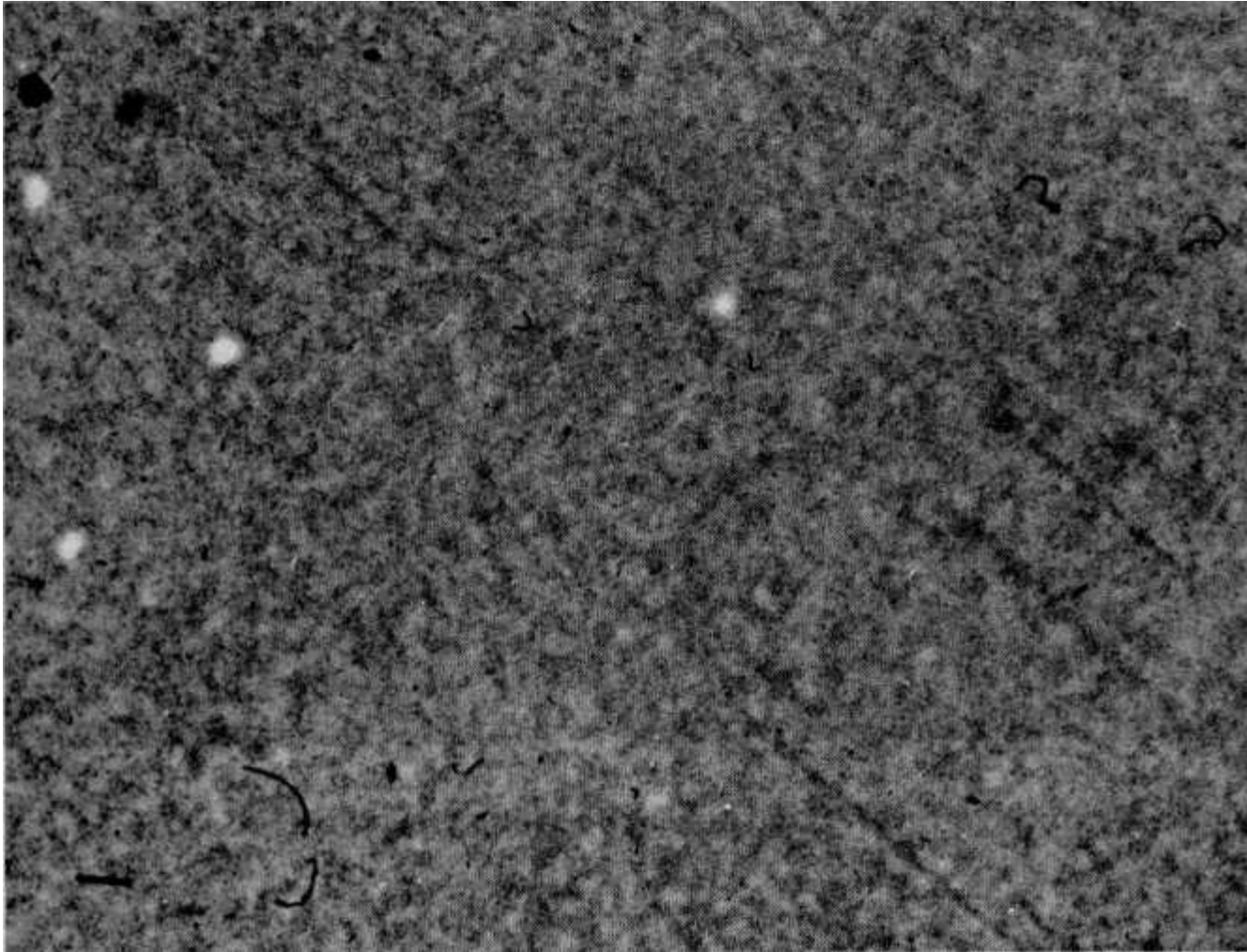
The evidence remains rather contradictory and *no single hypothesis of a natural phenomenon yet suggested seems to completely account for the UFO involved.* The possibility of multiple hypotheses, i.e. that the Utah UFO's are the result of two simultaneous natural phenomena might possibly yield the answer. However, as in the case of the "Montana" analysis, no definite conclusion (as to a credible natural phenomenon) could be obtained.

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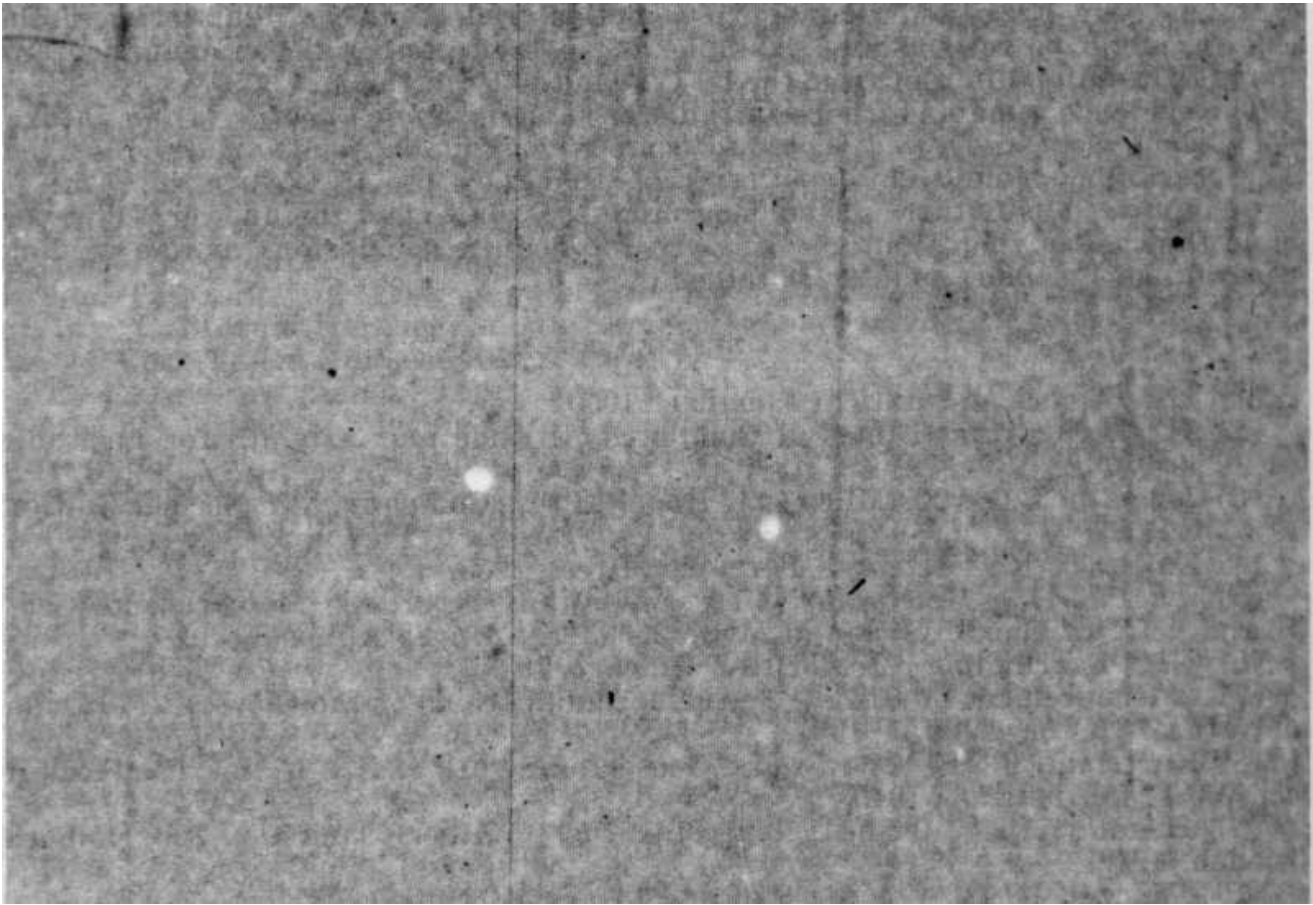
PART 2

PHOTOGRAPHS OF FRAMES FROM THE MOVIE FILMS THAT DR. BAKER ANALYZED



Blow Up of a frame from the Utah Film Showing a Typical Formation of the Objects

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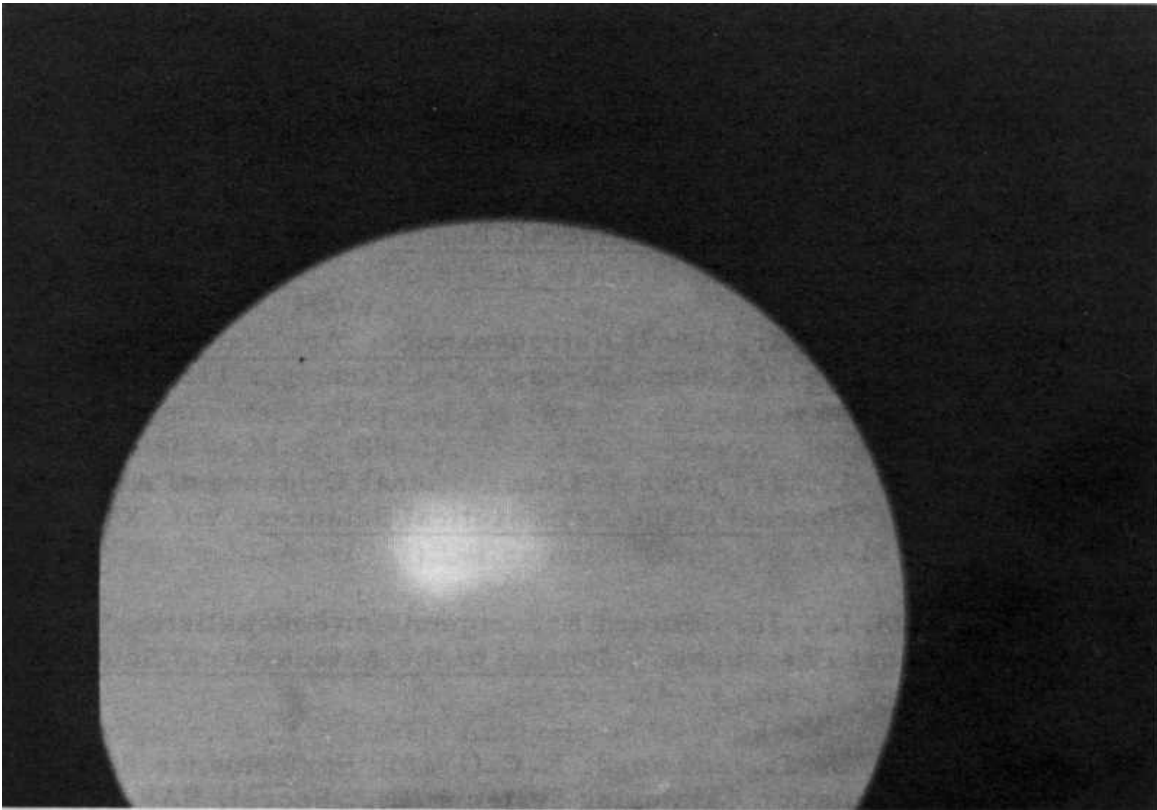


Blow Up of a frame from the Utah Film Depicting One of the Pairs of Objects



Blow Up of a Frame from the Montana Film Depicting the Two Objects

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Microphotograph of One of the Frames of the Argentina Film that Exhibits the Luminosity of the Yellow, Pear-Shaped Anomalistic Object

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APPENDIX 2

THE APPLIED ASSESSMENT OF CENTRAL NERVOUS SYSTEM INTEGRITY; A METHOD FOR ESTABLISHING THE CREDITABILITY OF EYE WITNESSES AND OTHER OBSERVERS

by

Dr. Sydney Walker III

THE APPLIED ASSESSMENT OF CENTRAL NERVOUS SYSTEM INTEGRITY; A METHOD FOR ESTABLISHING THE CREDITABILITY OF EYE WITNESSES AND OTHER OBSERVERS

- I. Statement of Reason(s) for Evaluation of the Subject
- II. General Medical Evaluation
 - A. Past History (medical, family, social)
 - B. Review of Systems (i.e. cardiovascular, gastrointestinal, etc.)
 - C. Physical Examination
 - D. Selected Laboratory Studies (hematologic, urinary, biochemical)
 - E. Summary of Positive Findings
 - F. Probability (discussion plus creditability score) of Influence of General Medical Status on Observer Creditability
- III. Neuro-ophthalmologic Evaluation
 - A. "Eye" History
 - B. Qualitative Ophthalmologic Examination: detailed, descriptive report
 - C. Quantitative Neuro-ophthalmologic Investigation
 - 1. Photographs (color) of exterior eyes (gross)
 - 2. Goniometry
 - 3. Visual Acuity (quantitated)
 - 4. Color Vision (quantitated)
 - 5. Photographs (color) of the fundi (retina, optic nerve, etc.)
 - 6. Visual Fields by perimetry (quantitated)
 - 7. Ophthalmodynamometry (quantitated)
 - 8. Opticokinetic examination
 - D. Summary of Positive Findings
 - E. Probability (discussion plus score) of Influence of Neuro-ophthalmologic Status on Observer Creditability
- IV. Neurologic Evaluation
 - A. Neurologic History
 - B. Neurologic Examination
 - C. Pertinent Laboratory Studies (biochemical, toxic metals, etc.)
 - D. Summary of Positive Findings
 - E. Probability (discussion plus score) of Influence of Neurologic Status on Observer Creditability
- V. Psychiatric Evaluation
 - A. Anamnesis: Detailed History plus Exploration of Attitudes and Feelings (via interview)
 - B. Mental Status Examination
 - C. MMPI Testing (for corroboration and additional information about personality)
 - D. Summary of Positive Findings: Psychiatric Evaluation and Character Assessment (with supportive data)
 - E. Probability (discussion plus score) of Influence of Psychiatric Status on Observer Creditability
- VI. Integration of Findings and Composite Assessment of Central Nervous System Functioning

A. Summary of Specific Abnormalities with a Discussion of Their Relation to Each Other and Their Multifactorial Contribution to Observer Creditability (plus an Overall Creditability Score)

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I. Statement of Reason(s) for Evaluation of the Subject

The subject, Mr. C. F. McC. (Project #704), is a 37 year-old white Catholic single male who is a Tucson bank official. He was referred to us for screening on 17 November 1967 by the Tucson Police Department, following his 17 November 1967 (AM) report that he had seen a large, luminous disc in the northeastern sky for several minutes at 3 AM, the same date. His evaluation took place on 18 and 19 November 1967 as part of the Research Project on Anomalistic Phenomena.

II. General Medical Evaluation

A. Past History

Medical History: The subject says his general state of health has always been good, that he has no current physical complaints and has not seen a physician in the past five years.

Childhood diseases: Measles, mumps, chicken pox before the age of six. No complications.

Hospitalizations and Operations: a) Tonsillectomy in 1938 with a two day hospitalization, and no complications; b) Appendectomy in 1943 with four day hospitalization, and no complications.

Past illnesses: He denies having had a) tuberculosis b) venereal diseases c) pneumonia d) heart, kidney, and gastrointestinal problems e) neurologic or psychiatric difficulties.

Drugs: Only medication at the present time are non-proprietary sleeping pills ("Sleep Eze"). He has not ever been exposed to any toxic substances has never had to take any medication over a long period, and has never used any of the popular addicting drugs.

Family History: Father died in 1947 at age 58 from a "stroke". Mother died in 1959 at age 70 of unknown causes. She had had "asthma" for a number of years. There are six siblings, ranging in age from 29 to 43 (two older brothers and four sisters). All are alive and in good health. There is no family history of diabetes, hypertension, malignancy, epilepsy, migraine headache, psychosis, or tuberculosis. All of the males in the subject's immediate family (father, brothers, and subject himself) have been heavy drinkers.

Social History: Mr. McC. presently works forty-four hours per week as a junior executive for a local bank where he has been for the past five years. He lives alone in a boarding house. He has never married and presently doesn't date. His present residence in Arizona started approximately twelve years ago following his honorable discharge from the Army. During his two years in the Military Service, he worked in the finance office and achieved the rank of Corporal. The patient has smoked from one to two packs of cigarettes per day for the past twelve years and admits to daily "social drinking" (for clarification, see Section V, Psychiatric Anamnesis).

B. Review of Systems

Head: No history of trauma, loss of consciousness, headaches, or light-headedness.

Eyes: No double vision, blurred vision, flashing lights, spots, or halos around lights. No history of trauma or previous infection or excessive tearing. Recent onset of photophobia so troublesome that he wears sunglasses all the time on bright days.

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Ears: No pain or discharge. No previous infections or trauma. No ringing, dizziness, or decrease in acuity.

Mouth: No difficulty with chewing or swallowing; no burning or biting of the tongue. No history of dental problems.

Nose: No nosebleeds, trauma, difficulty with smelling or post-nasal discharge.

Neck: No history of trauma, difficulty swallowing; no limitation of motion, no pain, sense of fullness, uncontrolled movements, or stiffness,

Cardiorespiratory: No difficulty breathing, shortness of breath or chronic cough, no bloody sputum, night sweats, palpitation, or exertional dyspnea. No lightheadedness on getting up, no chest pain.

Gastrointestinal: No nausea, vomiting, constipation, or diarrhea. No abdominal pain, no history of bloody stools or changes in color of stool. No history of hemorrhoids or rectal surgery.

Genitourinary: No dysuria, pyuria, or hematuria. No nocturia, no costovertebral angle tenderness. No penile discharge or sores.

Endocrine System: No polydipsia or polyuria. Recent waning of appetite, however, associated with his depression of the past two months. No history of increase of hat, shoe, or ring size. No excessive sweating, heat intolerance, or loss of hair. Sexual difficulties described in Section V (Psychiatric Anamnesis).

Allergic and Immunologic: The subject denies sensitivity to any foods or drugs. He has had no rashes of a protracted nature. He has been immunized for smallpox, tetanus, diphtheria, and polio (without adverse reactions).

C. General Physical Examination

General Appearance: The subject is of medium build, weighs 149 lbs. and is five feet eleven inches tall. He has dark brown hair, is light-complexioned, appears well-nourished and hydrated.

Vital Signs: Blood pressure; 140/80 right arm, 145/85 left arm. (On standing the pressure in each arm dropped 10 mmHg. immediately and then returned to normal). Temperature: 98.6; Respirations; 20 per minute; Pulse; 90 per minute and regular.

Skin: His face is ruddy with mild malar telangiectasia bilaterally. There is no evidence of jaundice, cyanosis, or pallor. Hair distribution and texture is normal. His nails are of good texture and clean. No scars or other skin lesions are present.

Head: Normocephalic; no exostoses, tenderness, or bruits.

Eyes: No ptosis, exophthalmous, enophthalmous or scleral pigmentation. Mild conjunctival injection bilaterally (for detailed examination and review, see Section III, Neuro-ophthalmology).

Nose: No inflammation or discharge; both nostrils patent; no sinus tenderness.

Ears: Normal external configuration, no tophi discharge or tenderness. Both external canals clear; tympanic membranes are glistening.

Mouth: No fissures, inflammation or ulceration around the lips. Oral mucosa is clear and pink. Teeth are in good repair. Tongue shows moderate degree of cigarette stain. Papillae appear normal.

Throat: No ulceration; moderate injection of posterior pharynx (consistent with heavy smoking). No tonsils present.

Neck: Supple; trachea midline; carotids of good quality bilaterally without thrills or bruits. No venous distension, masses, or tenderness.

Thorax: Symmetrical; breasts normal for male without masses or axillary adenopathy. No increase in A-P diameter; fair diaphragmatic excursion.

Lungs: Few dry, basilar rales which cleared upon coughing. Otherwise, clear. No fremitus, ronchi, or hyperresonance.

Heart and Vessels: Maximum pulse at 5th intercostal space; regular rhythm; no murmurs. There is no evidence of varicosities, stasis, or ischemia.

Abdomen: Moderate protrusion of abdomen with liver edge felt in right upper quadrant, 2 cm. below the costal margin (sharp edge, non-tender, non-nodular). No other organomegaly or masses. No rebound or direct tenderness. Normal bowel sounds. No ascites or costovertebral angle tenderness.

Rectal: No hemorrhoids or masses, or tenderness. Good sphincter tone; stool guaiac negative.

Genitourinary: Normal uncircumcized male phallus; no evidence of scars or chancres Testes are descended bilaterally, of normal consistency and non-tender.

Extremities: No limitation of motion or deformity. No inflammation or ulceration. No clubbing or peripheral edema.

Neurological: See Section IV. (Neurologic Evaluation).

D. Selected Laboratory Studies

	Normal	Subject
Hematology:		
Hematocrit	40 - 54%	42%
Hemoglobin	14 - 18 Gm. %	14.50%
RBC	4.5 - 6.2 mill/cu.mm	5.5 mil/cu.mm
Sed. Rate	less than 10mm/hr. Wintrobe	18 mm/hr.
White blood cell count	5 - 10,000 cu./mm.	12,000 cu/mm
Segmented neutrophils	40 - 60%	45%
Band neutrophile	0 - 5%	4%
Lymphocytes	20 - 40%	40%
Monocytes	4 - 8%	7%
Eosinophiles	1 - 3%	4%
Basophiles	0 - 1%	0
Myelocytes	0	0
Non-specific Chemistries:		
Sodium	136 - 145 mEq/L.	135 mEq./L.
Potassium	2.5 - 4.5 mEq/L.	3.0 mEq./L.
Chloride	100 - 106 mEq/L.	98 mEq./L.
Carbon Dioxide content	24 - 29 mEq/L.	29 aEq./L.
Liver Function Tests:		
Bilirubin (Van den Bergh)		
Direct	0.1 - 0.4 mg./100 ml.	0.7 mg./100 ml.
Indirect	0.2 - 0.7 mg./100 ml.	0.9 mg./100 ml.
Alkaline phosphatase	2 - 4.5 (Bodansky units)	5.8
Albumin/Globulin	3.5 - 5.5Gm%/1.5 - 3Gm%	3.2/3.6Gm. %
Endocrine Studies:		
PBI	4 - 8 microgram/100ml.	6.2
T-3 Uptake	10.3 - 14.3 units	11.9 units
Glucose (Polin)	80 - 120mg./ml.	100mg./ml.
Cholesterol	150 - 280mg./100ml.	205mg./100ml.
Renal:		
Blood Urea Nitrogen	8 - 20 mg./100ml.	11mg./100ml.

Urinalysis:

Grossly amber and clear. Specific gravity: 1.015. pH: 5.5; albumin: negative; glucose: negative; acetone: negative.

Microscopic:

WBC/HPF - 0-2

RBC/HPF - 0-1

No casts seen. Amorphous urates (moderate amount) present.

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E. Summary of Positive Findings

1. History of chronic alcoholism and heavy smoking.
2. Recent photophobia.
3. Hepatomegaly, with ruddy complexion with malar telangiectasia.
4. Effects of smoking: tobacco-stained teeth, injected posterior pharynx, and basilar rales.
5. Abnormal liver function studies: Bilirubin elevated in both direct and indirect fractions; elevated alkaline phosphatase; decreased albumin and elevated globulin (reversed A/G ratio).

F. Discussion and Creditability Score

The subject has definite changes of early alcoholic cirrhosis. At this point in time the toxic effects of his liver pathology would be expected to be exerting only a mildly adverse influence on overall central nervous system functioning.

Such effects, however, would serve to aggravate any already existing neurological and/or psychological problems.

Creditability Score 75%.

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III. Neuro-ophthalmologic Evaluation

A. "Eye" History

Subject denies previous history of transient blindness, blurred vision, double vision, spots or shadows before his eyes or protracted pain in his eyes. His last eye evaluation was 20 years ago. This was during high school and was prompted by headaches when reading. Reading glasses were prescribed at that time and he wore them for approximately eight months and then discarded them. He denies any eye problems since that time. He states that both his parents wore glasses only for reading and that none of his siblings wear glasses. He states also that his father developed glaucoma at age 55 and was required to use eye drops to keep it under control.

There is no history of trauma or infection in the past five years. On questioning, the patient acknowledges a mildly irritating tearing which he has noticed for six to eight weeks, associated with a slight mistiness of his vision. He also has been wearing sunglasses on bright days for the same period because the sunlight hurts his eyes.

B. Qualitative Ophthalmologic Examination

Subject is right eye dominant. There is no evidence of structural abnormality, trauma, or ptosis (see photo in Section III C 1). The palpebral fissure is of normal shape and size. The cornea is clear bilaterally but the conjunctivae show a moderate degree of injection, without discoloration. The sclerae are also clear without abnormal vessels or pigmentation. The iris is bilaterally brown. The pupils are symmetrically round, equal, and both 4mm. in diameter. They reacted to light sluggishly and responded to accommodation directly and consensually (see Fig. #1). The extra-ocular muscles function normally. There is no image separation upon red glass testing. There was no nystagmus either horizontally or vertically.

Fundusoscopic examination reveals a poor red reflex bilaterally. There are no apparent floaters or other opacities in the vitreous. The disc shows sharp margins bilaterally but the normal physiologic cupping is absent. There is a pale quality to

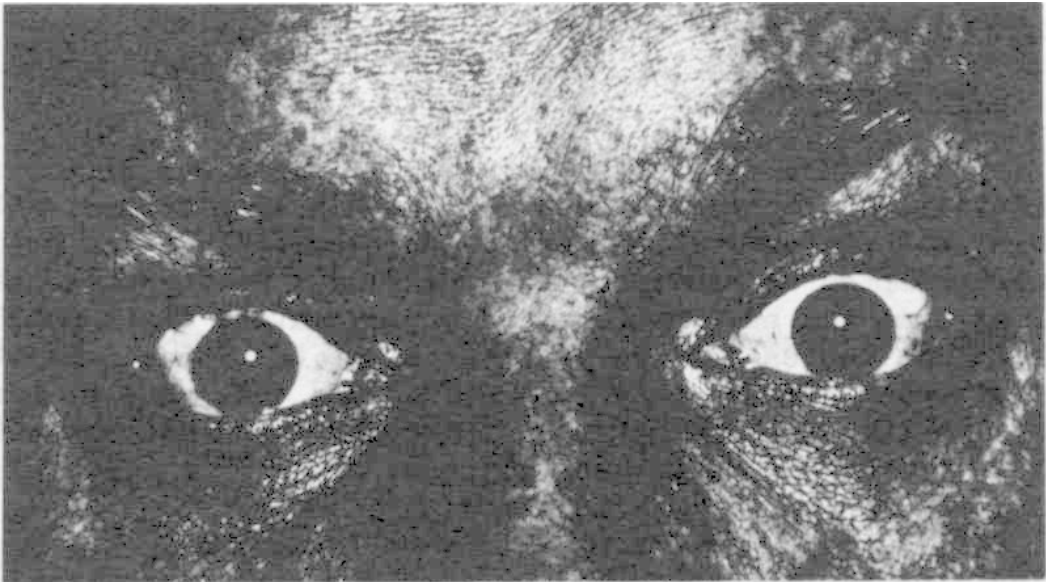
the nerve head. Both retinae show a confluent mottling which completely obscures the macula. There are no hemorrhages or exudates. The arteriovenous ratio is approximately 5 to 1.

Gross confrontation shows no apparent field cuts and no extinction to bimanual visual stimuli.

C. Quantitative Neuro-ophthalmologic Investigation

1. Photographs of exterior eyes (gross):

(Taken with a Zeiss 1.5 F. lens from 15 cm. using stroboscopic lighting). The conjunctival injection is visible; the absence of pigmentation, the state of the pupils, and the axis of the eyes are clearly visible.



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2. Goniometry: The intraocular pressures have been measured with a Schioetz Tonometer. The readings were taken three times, on 19 November 1967, at 10:30 AM (two days after the subject had seen the light).

	<u>Right Eye</u>	<u>Left Eye</u>
#1	18	20
#2	21	17
#3	19	19

3. These consistently normal pressures would dictate against the presence of glaucoma.
4. Visual Acuity: Using the modified Snellen Charts, the right eye showed an acuity of 20/30 and the left eye of 20/35.
5. Color Vision: (Measured with the American Optical Pseudoisochromatic Plates in 60 footcandles of light): moderate red-green dyschromanopsia was revealed about which the patient claimed he had no previous awareness.

DEMONSTRATION SERIES

For plates. Do NOT score.

SCREENING SERIES

(Symbol location in this series varies in different books.)

Plate No.	Symbol	Test	Repetition
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2	O.A		OK
3	A.X		OK
4	O.A		OK
5	O		OK
6	X		OK

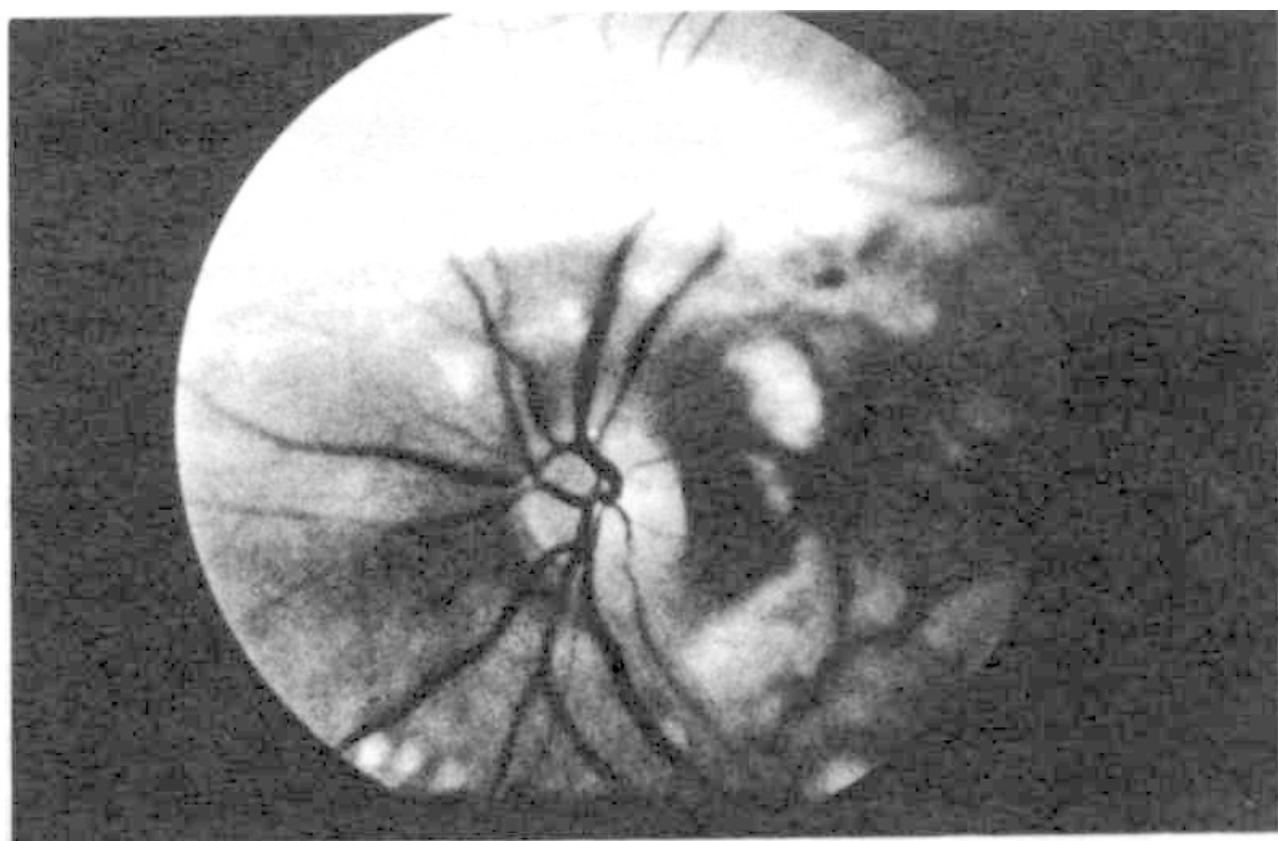
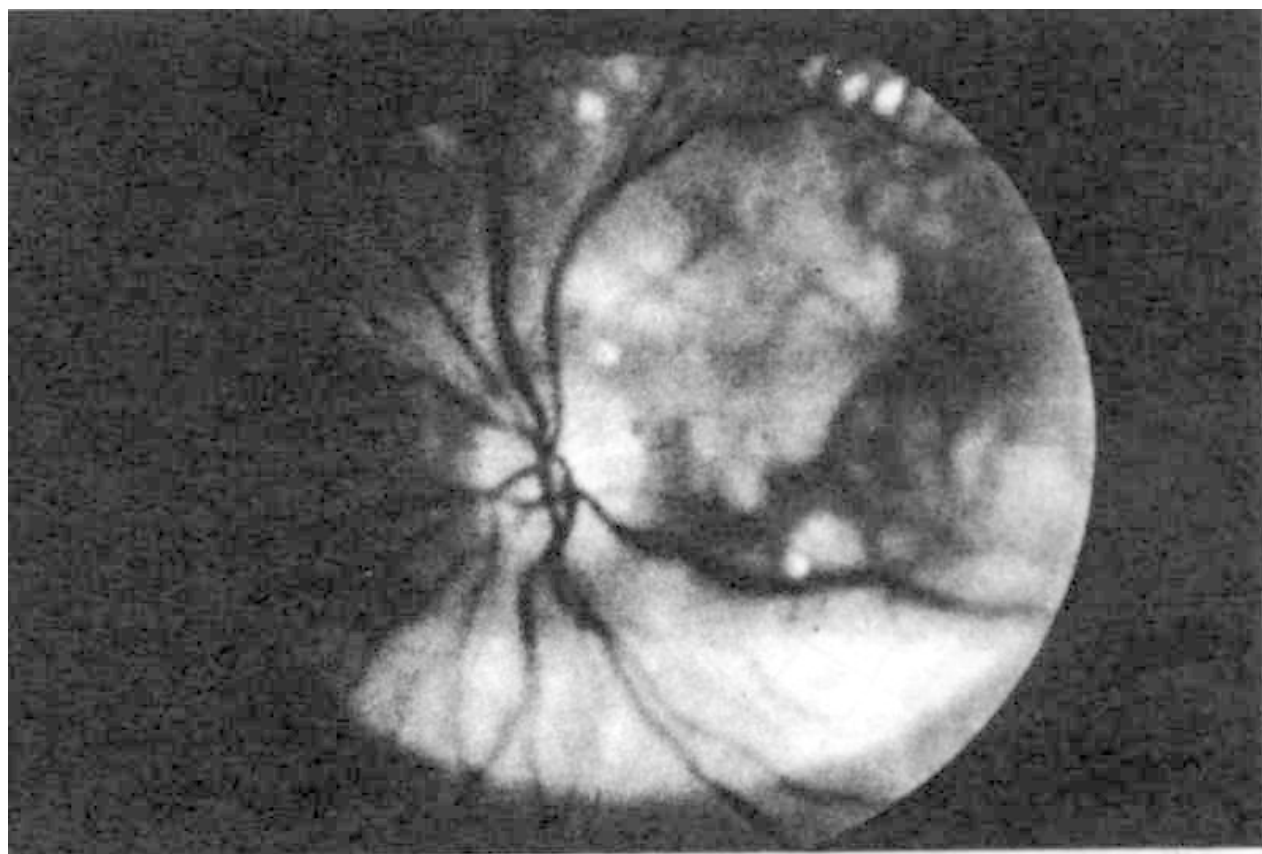
DEMONSTRATION SERIES

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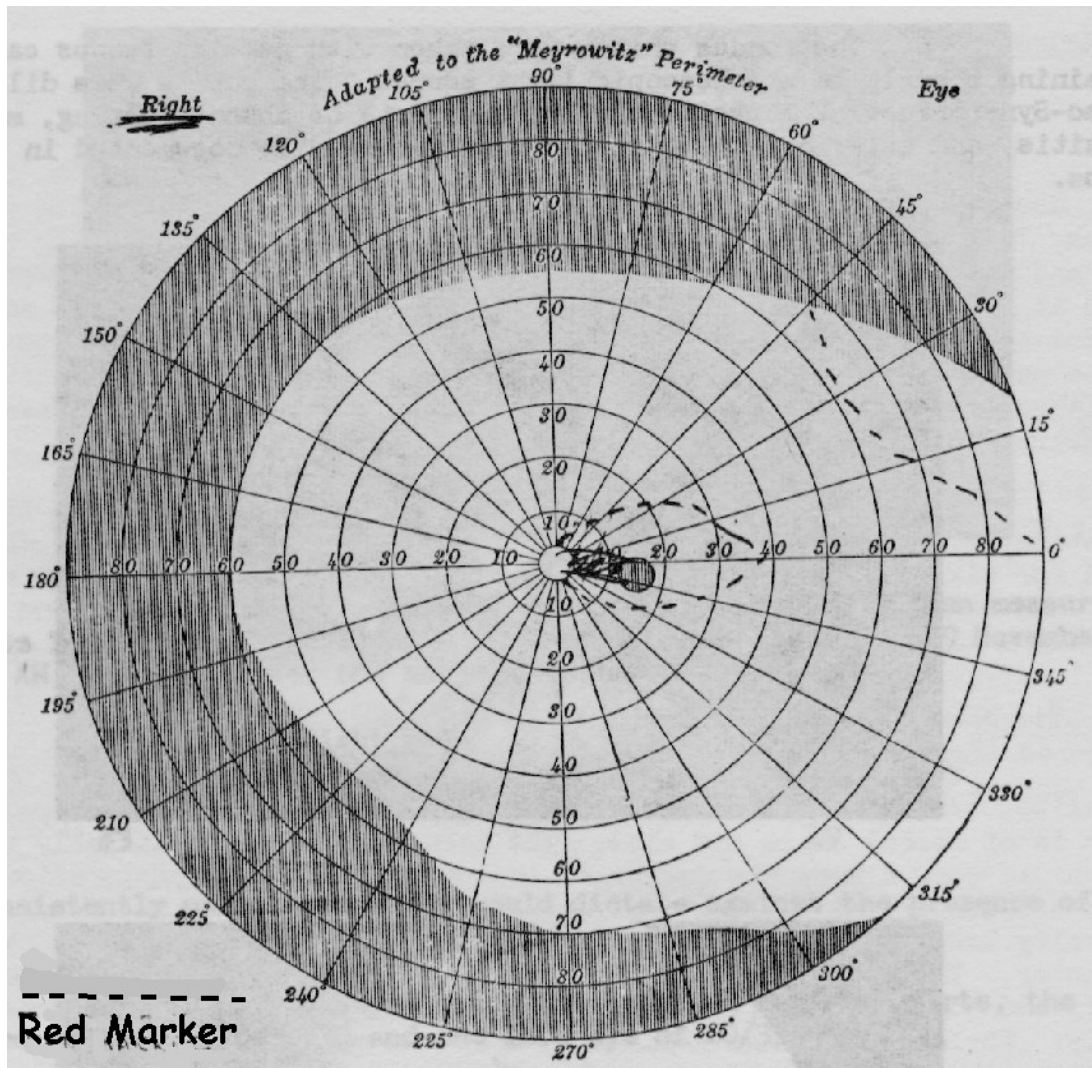
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8	X		OK	Defective
9	A		OK	Defective
10	X		OK	Defective
11	X		OK	Defective
12	A		OK	Defective
13	O		OK	Defective
14	A		OK	Defective
15	X		OK	Defective
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100	O		OK	Defective

[[158]]

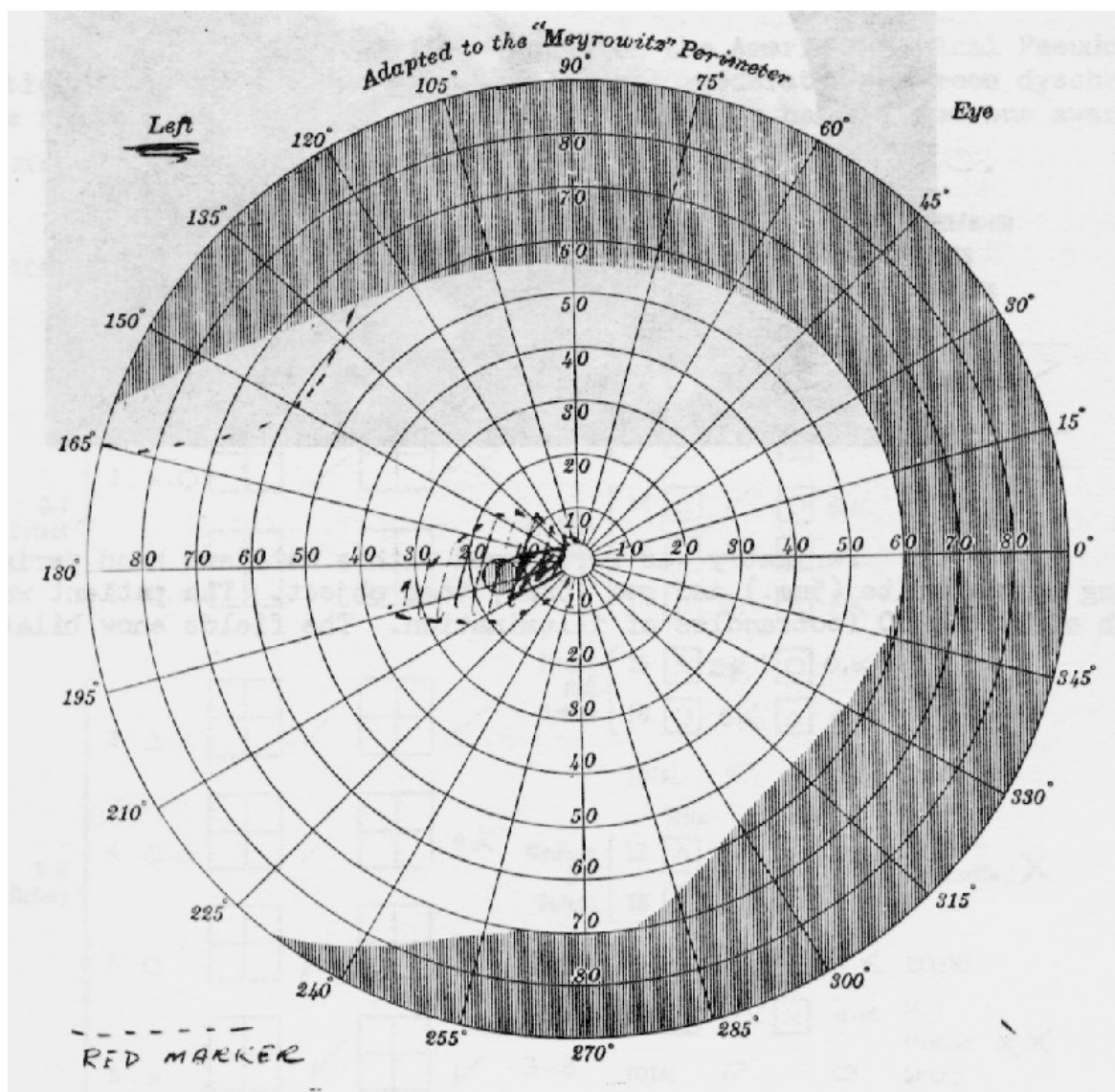
- The fundus photos were taken with a Zeiss fundus camera containing a built-in stroboscopic light source. The pupils were dilated with 1% Neo-Syneprine. The previously noted defects of absent cupping, mottled retinitis, and arteriovenous disproportion are readily documented in these photos.



6. Perimetry was performed with a Matalene hand perimeter, using both a white (5mm.) and red (5mm.) test object. The patient was tested both at 50 and 10 footcandles of illumination. The fields show bilateral



Perimetry Diagram, Right Eye



Perimetry Diagram, Left Eye

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centrocecal scotomata larger for the red object than for the white. There is a superior temporal quadrant defect bilaterally of approximately 30° with the red object stimulus which is not present with the white object. In reduced illumination the subject is completely unable to see any of the test objects.

7. Ophthalmodynamometry was performed with a Cuilbert-Routit dynamometer (using 1% Pontocaine anesthetic) with direct vision of the end point O.D.: 70/30 units; O.S.: 65/30 units. There were no carotid bruits or thrills; the simultaneous systemic blood pressure was 140/80 sitting and 130/80 standing.
8. Opticokinetics (using a one meter by ten centimeter red background cloth with a 10 cm X 8 cm. white check) was performed at a distance of one meter horizontally bilaterally and vertically. The nystagmus response in all directions was normal.

D. Summary of Positive Findings

1. A history of 6-8 weeks of tearing, misty vision, and photophobia.
2. A pale optic nerve with absent cupping; sluggishly reacting pupils; impaired red light reflex.
3. Confluent retinal mottling, obscured macula, mild red-green dyschromanopsia.
4. Bilateral centrocecal scotomata; bilateral superior temporal quadrantanopsia (for red stimulus only. Vision in decreased light (10 foot-candles): grossly impaired to absent.

E. Discussion and Creditability Score

The definite retinitis, field defects for red vision, and red-green dyschromanopsia, along with a history of tearing, misty vision, and photophobia are all consistent with the diagnosis of tobacco-alcohol amblyopia (Ref. 1). This condition is also supported by the findings in the General Medicine Evaluation, where other effects of excessive smoking and alcoholism are evident.

The subject's retinal pathology is severe; in terms of the specific event he claims he saw, it is extreme. His "sighting" is highly unlikely because he attaches both color and shape to it in the face of specific deficiencies in each of these areas. His attestation about seeing the object best when looking straight at it (see Psychiatric Anamnesis) is uncreditable because his central macular vision has been so severely compromised by retinitis. It is conceivable that what actually happened is that he 1) received a transient visual stimulus (i.e., car or airplane lights) which 2) set off some abnormal receptor firing in a damaged retinal area and 3) in turn was misperceived.

Creditability score 5%.

Ref. 1 Walsh, P.B.: Clinical Neuro-ophthalmology, Williams & Wilkins, Baltimore 1957, p. 1182.

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IV. Neurologic Evaluation

A. Neurologic History:

Subject is right-handed and denies any degree of ambidexterity. He denies periods of euphoria, uncontrolled behavior or delirium. He denies recent changes or difficulty with dressing, eating, or writing. He states that he does not feel that he has recently become clumsy or weak. He said he had never had the experience of deja-vu episodes or of performing acts over which he had no control and no unpleasant tastes or odors that he couldn't explain. He states that he is not aware of any increased difficulty in expressing himself or understanding the speech of others. He has no problem with calculation or with seeing objects as smaller or larger than they really were. He is not aware of any difficulty with color vision, flashing lights, or other forms of visual hallucinations.

He admits to headaches which occur after he has been drinking heavily; these have been decreasing in frequency. He states that he has never lost consciousness (with associated tongue biting, incontinence, or period of confusion upon awaking). He denies trauma or infections of his head, eyes, ears, or neck.

B. Neurologic Examination:

Mental Status: See Section V (Psychiatric Evaluation).

Cerebellar Function: Finger-to-nose and heel-to-shin intact; rapid alternating movements are rhythmical and coordinated; no awkwardness or other abnormalities in any gross or fine movements. Foot dexterity and Figure eight test are performed without difficulty. No broad-based gait or ataxia noted.

Cranial Nerves:

I Olfactory: Each nostril perceived cloves (stimulus was identified with patient's eyes closed).

II Optic Nerve: Reported in detail in Section III (Neuro-ophthalmology).

III, IV, VI Nerves: See Section III (Neuro-ophthalmology).

V Trigeminal: All sensory divisions are intact to pin prick. The corneal reflex is present bilaterally and equally. The masseter and pterygoid muscles show equal strength of good quality. The jaw jerk is normal.

VII Facial Nerve: There is no asymmetry of the resting facial muscles. There is no weakness or asymmetry upon raising the eyebrows, closing or opening the eyes, or showing the teeth. Taste was intact bilaterally for sugar and salt.

VIII Acoustic:

- a. Cochlear Portion: Patient perceives normal conversation without difficulty. Weber and Rinne testing show no lateralization. Air conduction is greater than bone conduction.
- b. Vestibular Portion: There is no abnormal nystagmus, past-pointing, or veering when walking.

IX, X Glossopharyngeal and Vagus Nerves: The palate is midline and freely movable, with bilaterally equal elevation on stimulation. Gag reflex is intact bilaterally. No difficulty in swallowing and no regurgitation occurred when swallowing water.

XI Accessory Nerve: The trapezius and sternocleidomastoid muscles have good strength, without fasciculation, atrophy, and spasm.

XII Hypoglossal Nerve: The tongue protrudes in the midline; there is no evidence of atrophy or fasciculation; there is good strength in both directions. There is no difficulty with articulation and no dysarthria.

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Sensory Examination: There is no impairment of vibration sense, position, pain, or light touch.

Deep Tendon Reflexes:

Pectoral (C6-8): +2 bilaterally
Biceps (C5-6): +3 bilaterally
Radial Pronator (C6-7): +2 bilaterally
Triceps (C7-8): +3 bilaterally
Finger Flexion (C7-T1): +2 bilaterally
Deep abdominal (T6-12): +2 bilaterally
Pubo-adductor (L2-4): +1 bilaterally
Patellar (quadriceps) (L2-4): +3 bilaterally
Hamstring (sciatic nerve) (L4-S2): +2 bilaterally
Ankle jerk (gastrocnemius) (S1-2): +2 bilaterally
Gluteal (L4-S2): +2 bilaterally

Superficial Reflexes:

Plantar reflex; both great toes are unequivocally down-going (flexion). Chaddock, Oppenheim, and Gordon reflexes are also down-going. Superficial Abdominals react equally bilaterally.

Motor Function:

Good strength both proximally and distally in upper and lower extremities. Wrist flexors and extensors are equal bilaterally; grip is strong bilaterally.

Other Cortical Tests:

Frontal Lobe: No suck, grasp, snout, or palmental reflexes.

Temporal Lobe: No hemianopsia on confrontation.

Parietal Lobe: No stereognosis, bimanual extinction, or impaired 2-point discrimination.

Occipital Lobe: See Section III (Neuro-ophthalmology).

Autonomic Function: There is no abnormal sweat level and no flushing is in evidence.

C. Pertinent Laboratory Studies

	<u>Normal Value</u>	<u>Subject</u>
<u>Blood:</u>		
Calcium	9 - 11 mg/100 ml.	9.3 mg/100ml.
Phosphorous	3 - 4.5 mg/100 ml.	4.0 mg/100ml.
Magnesium	1.5 - 2.5 mEq./L.	1.6 mEq./L.
Barbiturates	less than 10mm/hr. Wintrobe	18 mm/hr.
a) long-acting	less than 5 mg/100 ml.	none
b) short-acting	less than 1 mg/100 ml.	none
Dilantin	none	none
Bromides	1 - 2 mEq./L.	3 mEq./L.
Carbon Monoxide (Carboxyhemoglobin)	less than 5%	none
<u>Urine:</u>		
Coproporphyrins	none	none
Uroporphyrins	none	none
Lead	0 - 0.12 mg/24hr.	none
Arsenic	0.1 mg/liter	none
Mercury	10 micrograms/24hr.	none
Salicylates	none - 30mg/100ml.	none
Ethyl Alcohol	none	none
Phenothiazines	none	none
Alkaloid screening		
a) atropine	none	none
b) ergotamine	none	none
<u>Serologic Test:</u>		
FA-ABS (Fluorescent Treponemal Antibody Absorption Test)	negative	negative
Brucella Agglutination	negative	negative
Coccidiomycosis	negative	negative

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D. Summary of Positive Findings

1. Optic Nerve changes: (see Neuro-ophthalmologic Evaluation).
2. Bromides and atropine detected in urine.
- 3.

E. Discussion and Creditability Score:

Since the head of the optic nerve (disc) is directly visible for examination, its state is often used as a reflection of the condition of the other nerves. It can be reasonably conjectured that the same metabolic or toxic insults that have produced the abnormal appearance of the subject's optic nerve are also subtly influencing his other nervous system functioning (even although no gross neurologic signs can be elicited). One likely effect of such changes would be increased irritability and associated behavioral effects. These would also be expected to occur as a result of the bromide or atropine toxicity (associated with the subject's excessive use of non-proprietary sleeping medication).

In this case, the subject's abnormal liver function (reversed A/G ratio, etc.) increases the danger of such toxicity because of his impaired ability to bind, detoxify, and excrete both bromides and atropine. Hallucinations are among the outstanding toxic effects of both these drugs (Ref. 2). It would thus not be unlikely that the contents of the sleeping pills have not only contributed to the subject's current psychic disequilibrium but have specifically affected his propensity to "see things".

Creditability score 75%

Ref. 2. Walker, S. Psychiatric Signs and Symptoms Due to Medical Problems, C.C. Thomas, Springfield, Ill. 1967.

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V. Psychiatric Evaluation
A. Anamnesis

The subject was seen for psychiatric evaluation on each of two successive days for one and a half hour interviews. The first interview took place 36 hours after he had seen the luminal object. He is aware of why he is being seen, says he "doesn't mind a bit", but feels nervous because he doesn't know exactly what he will be "expected to tell" about himself.

He came to live in the Tucson area 12 years ago because of his widowed mother's failing health and a doctor's recommendation that she move from East Boston (where they had always lived) to a drier climate. Since her death 9 years ago, he has carried on alone, at first in their apartment and then in a boarding house where his meals are prepared and his laundry is done for him. Although he is not enthusiastic about his living arrangement, he seems quite proud of his association with a branch of the local bank. In the past five years, he has advanced from assistant bookkeeper to teller to head teller to the banks' real estate loan section, of which he has been the chief for a week. He says that it was five days after he had assumed this new responsibility that he saw the "odd light in the sky".

He describes the scene as follows: He had been having trouble getting to sleep for two months (doesn't know why) and this particular night was no exception. Although he had taken several "Sleep-eze" tablets, he still felt edgy and very wide awake at 2:30 AM. So he got up from bed to get a cigarette and a shot of bourbon. He then sat facing his closed window and gazing out, preoccupied, for about half an hour. He remembers everything seemed very still and quiet but can't recall what he was thinking about. About 3 AM he became vaguely aware of a new light near the mountains off to his left (northeast).

It seemed to be moving toward his direct line of vision and as it did so became increasingly vivid. The light was a diffuse, pale, yellow-green color. It seemed very large (twenty to thirty times the size of an airplane at the same distance) and its shape was like that of a humped disc that was flat at the bottom. At times, it seemed to be hardly moving at all, at others it bobbed up and down as if from a breeze. He felt peculiarly drawn to it and seemed unable to avoid looking at it. When he tried to glance to either side of it, the disc seemed to fade, and he felt almost as though his direct gaze was the only thing holding it there. At the same time, he felt almost as though he were being called upon by it to stare. Afterwards, upon reflecting, he decided that it was the unusual nature of the object that had created these peculiar feelings in him.

After a couple of minutes it seemed less bright and looked like it was beginning to move away. At that point he felt as though he wanted to follow it. By the time it had completely faded away, he felt a little sad, lonely, hopeless, or something, he's not sure which.

It never occurred to him to call anyone else's attention to the light (probably because of the late hour, he says) and he was surprised to be asked about that by the police the next day. He says, however, that anyone in the city who was looking in a northeasterly direction at the right time that

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night couldn't have missed that light. Although it was an unusual sight, it seemed very real to him and is still very vivid in his mind. He had never seen anything like it before and in fact had never previously had the occasion to report anything whatever to the police. He says that the only reason he had reported seeing the light was a sense of duty, after he had read in the morning paper that someone else had also seen an unusual object in the sky on the same night.

The patient was the youngest male and third youngest child among seven siblings born in Boston into a lower class urban situation, during the Depression. His father, Irish by heritage, was an occasional bartender who was rarely home, paid little attention to his children, and is best remembered as "scary" because of his violently angry outbursts at the mother when he had been drinking. The patient's early memories include 1) a scene in which his forlorn-looking mother is bending over a tub scrubbing clothes in an icy cold kitchen and 2) an episode in which his oldest sister snatched his doll away from him but was later made by the mother to return it. It is that same sister whom he now visits during his vacations; she is married but childless and still lives in Boston. He would like to live permanently with her, if her husband were better dispositioned. His other sisters all have children, and it makes him nervous to be around them.

He says he always got along better with his sisters than his brothers and has not kept in touch with any of the latter. He has never had many friends; even as a boy, he was a "loner" and a "homebody" who was more than once called a "mamma's boy" by his peers. He didn't involve himself in school athletics or neighborhood games because he seemed to be so clumsy, but did sell newspapers in another part of the city for several years for the sake of the family budget. His leisure hours were spent reading and re-reading old comic books, making up stories about his adventures with Ali (a make-believe playmate from whom he was inseparable until he was 12), and helping his mother in various ways.

It is still difficult for him to talk about his dead mother, although he says he thinks about her all the time. Painfully, he revealed that he feels he was never a good enough son to her, that he had wanted to make up to her for all her hardships at the hands of his father but that he had never been able to fill a certain void for her (despite his long-term devotion and protectiveness).

He tends to blame himself in a sense for her death and says that it is his fault that she spent her final days so unhappily far away from all her other children; apparently, he had insisted that she follow her doctor's advice and took her west for the sake of her "asthma" condition. She had died on her seventieth birthday. He didn't know the cause. He had come home and found her on the floor of their Tucson apartment near the phone (which was off the hook). It had been 7 PM when he had arrived, having stopped for a couple of drinks at the neighborhood bar. He says he still gets sick to his stomach when he thinks about how he was sitting in that bar while she was dying and trying to reach him.

He remained in Boston, unemployed, for six months after the funeral, during which time he slept a lot, ate little, and hit the bars more often than usual. By the time he could bring himself to face Tucson and the apartment again, he had lost his accounting job.

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For three months, he worked as a grocery store clerk (in order to pay his angry landlady for accumulated rent) but found the work intolerably fatiguing and took a switchboard job which he did for the three years prior to going to the bank.

His bank work record has apparently been very good. He has taken only two sick days in the entire five years and is never late. Frequently, he wakes up in the morning feeling as though he can't make it to work, but his respect for and sense of responsibility to the institution itself (rather than to any superior or individual person) always win out.

He has no close friends where he works, although he occasionally takes lunch with one of the younger male tellers. His female co-workers irritate him; they seem coarse and loud. Some of the single women tease him about having a mistress (which he doesn't), but he doesn't know where they got that idea. In fact, he doesn't date at all and hasn't for several years now. He guesses it's because he doesn't seem to come in contact with women who are his type (sweet, quiet, feminine). Nor does he seek out partners for intercourse. With considerable embarrassment, he explains that while he was in the Army 13 years ago, he had tried on three separate occasions to have sexual relations with a girl he liked but had been unable to sustain an erection. Part of the problem at the time seemed to be a preoccupation with his mother and how disappointed she would be in him if she knew what he was doing with this girl. Since then, he has not tried to have intercourse again. He says it is not because he is afraid of failure or embarrassment, but more because for him it is a dispensable activity.

The closest he ever gets to a woman is the back row in a local bar where he likes to watch the performance of a certain belly dancer (his mother was half Syrian). He doesn't know her personally, but something about her arouses him. Whenever he masturbates in his room (approximately once a week), he pictures her face and upper torso in his mind's eye; at the same time, he imagines himself removing her round, plastic, chartreuse nipple covers, which seems to be the one thing that will lead to his having an occasional ejaculation. He has felt very upset with himself for masturbating ever since he first did it at the age of 16. This examiner and his old Army buddy are the only people to whom he has ever

acknowledged any such activity. He says he still cannot help but feel that it is an unnatural, perverted practice. Sometimes he wonders whether he is driven to it by a hormone problem or whether it is because of a mental sickness of some kind. He used to think that he would not ever be fit to touch a woman if he masturbated. He says he has never been involved in any homosexual activity, although his Army buddy had once suggested it to him.

His leisure hours are spent watching TV in the bar or in his room, going to movies, either alone or with someone at the boarding house, and reading an occasional magazine story. He likes to sunbathe on his porch on the weekends. He says that he still enjoys making up adventure stories and keeps adding to an on-going serial in which he is the only person living in a desert oasis where he gets into various predicaments and is rescued and nursed back to health by lovely, gracious women who happen to pass by. He never dreams, he says, and doesn't think he ever has.

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He says he rarely gets angry because he doesn't like the feeling. Once a man in a bar began saying insulting things to him, unprovoked, and then took a swing at him but the bartender had intervened. He was just plain scared in that situation and relieved when the tension had abated. A long time ago he had felt like hitting his brother-in-law when the latter had said something or other cruel to his sister (but instead had walked out of hearing range). He had felt intensely, inexplicably angry for several days at age 16 when his father died of a stroke; he remembers wishing he could destroy everything in sight by kicking and pounding it to pieces.

He doesn't see himself as particularly depressed and has no suicidal thoughts, although he acknowledges that after his mother's death, he wished he could have died with her or instead of her. He never has fantasized actively taking his own life, however, and feels it would be very wrong to do so. He does say he feels nervous a lot, especially in the last two months and that certain things upset him more than they used to. For example, noisy laughter at work or in a bar is so unpleasant lately that he usually tries to find an excuse to leave the room. He feels increasingly impatient, particularly in waiting lines, and says he has jumped from smoking one to two packages of cigarettes a day. For the first time in his life he finds himself wishing he could take a whiskey break in the middle of the work day; he then gets preoccupied with the taste of whiskey and with thoughts of how good swallowing it would feel.

After work, he always stops by a certain bar near the house and has from two to five quiet bourbon and waters before returning home. Now, he stays longer at the bar and arrives at the boarding house well past the dinner hour. This is because he isn't hungry, usually, is sick of the food, and finds the commotion at the dinner table disturbing. He does feel he is treated with more respect and deference at the boarding house than he needs or deserves. About his insomnia, he says simply that one pill helped until about a month ago but that lately he has been taking four or five over a two-hour period with no appreciable effect.

He claims he has no notion as to why he should be feeling on edge for these two months, but in the next breath he begins to talk about his bank boss's interest in acquainting him with his daughter. He uncomfortably describes a scene at the last Labor Day picnic in which the boss brought his daughter around to meet him and then walked off, leaving him stranded with her for the rest of the afternoon. Thereafter, some of the people at the bank had teased him about his secret romance with her (which was non-existent). He senses that his boss now seems less friendly, although the older man made no known attempt to stop his promotion. He has no desire to advance any further up the bank totem pole, says he never expected to do even this well, and would be more than satisfied with his present post for the duration of his working days (though he really liked doing bookkeeping better).

In addition to the information already mentioned, his developmental history has the following other significant points: he was breast fed for nearly two years because his mother couldn't afford to buy store milk. Toilet training was completed by age 15 months, but he was enuretic from age two until he was nine. The boys in school found out about it and nicknamed him "Pee-pee".

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Although he was generally unpopular among his schoolmates, he did very well academically, especially in mathematics. He skipped the third and seventh grades, was first in his boys' parochial high school class and received a full-tuition scholarship to Boston College, where he took business administration courses. He never was one to participate in extracurricular activities, but always maintained a part-time job and gave his entire earnings to his mother. He does not see

himself as particularly religious but is faithful in his Mass attendance. He does not expect to ever have a vision, mostly because he believes himself to be too mediocre a Christian. Twice after his mother's death he thought he heard her calling to him in the night and is still not sure that she didn't. He has no opinions about UFO's; although it interests him to read about them, he knows no one who has ever seen one.

In part because of the nature of his description of the light in the sky (and his associated feelings), the examiner was alerted to his description of the belly dancer's chartreuse nipple coverlets, which apparently have significant meaning for him. Attempts to subtly pursue possible connection here reveal the following: The subject's recent anxiousness had begun at about the time he learned he was to be promoted, ever since which he had felt lonelier than ever before and once again very desperate about the loss of his mother. He comments that he thinks his mother would have been very pleased and proud of his success at work, that it would have given her something about which to hold up her head again. It also would have meant (were she still alive) that he could provide nicer living quarters for them both. Now that she is dead, however, such improvements are unimportant; he feels they would be wasted on himself alone.

Along with this loneliness, he acknowledges feeling empty. He says he can't get excited about anything (not even the belly dancer) although he feels extremely tense and has tried more often lately to get some relief via masturbation. He has been thinking about his mother so much he acknowledges that her image gets confused with that of the belly dancer, even when he tries to concentrate just on the latter's nipple covers.

B. Mental Status Examination

General Behavior and Appearance: The subject presents himself as a well-groomed man of medium build. His dark brown hair is moderately long with side burns and a small neatly trimmed mustache. He is dressed in a white shirt, tie, and conservative dark blue suit; his shoes are polished. He sat with head down and steadily smokes throughout the interview. He expresses himself generally well without excessive gestures. He was initially ill at ease and mildly defensive with the interviewer but became more comfortable as the session progressed. He was cooperative and he gave the impression of wishing to be highly candid.

Stream of Talk: There is no evidence of blocking or unusual difficulty in choosing words. His vocabulary was moderately well-developed. The subject speaks in a slightly monotonous manner but his speech is halting at only two points (when he spoke about feeling guilty about his mother and about masturbating). He uses no neologisms, rhymes, or puns. There was no evidence of flight of ideas or clang [sic] associations. There is no stuttering, dysarthria, or mispronunciation; he is able to repeat four tongue twisters without difficulty.

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Mood: The patient appears to be moderately depressed) his posture is slightly slumped, his expression often dejected, and he sighs frequently. His general affect borders on being flat but is not otherwise inappropriate. He fails to show any enthusiasm about anything, claims he has no special interests or hobbies. He seems basically apathetic about both his present and future life. Although constricted but not highly controlled, his anxiety is poorly masked when he talks about conflictual material and certain feelings.

Thought Content: Subject is generally guarded about what and how much he says. When put under some stress by the examiner (during a period when he was less defensive), his associations became briefly mildly loose. His usual preoccupations center around certain guilt feelings, a yearning for his dead mother, and (more recently) the desire for whiskey. Although obviously depressed, he denies suicidal preoccupation. He does tend to ruminate about any teasing from women, but there is no evidence of any kind of paranoid ideation. The content of his day-dreams and masturbatory fantasies are described in the anamnesis (see previous section). The impression that his gaze was somehow holding the odd light in place in the sky is the only evidence suggesting that he has ever felt he had any special powers. Prior to seeing that light, he apparently never experienced a *deja vu*, or any illusory or definite hallucinatory phenomenon (see anamnesis regarding hearing dead mother's voice).

Rituals, obsessional thoughts per se are denied, except for his recent, uncontrollable preoccupation at night with his dead mother. He acknowledges a definite fear of flying (to the point that he has never set foot in an airplane) and is also afraid of heights.

Orientation: Subject is fully oriented as to time, person, and place. Previous amnesia and disorientation (place and time, only) have occurred only acutely following heavy drinking bouts.

Intellectual Status: Attention is consistently well-sustained. Memory (in which there has been no known change in recent years) is generally above average. There was no inconsistent historical data which would indicate his remote memory, or intermediate memory, or recent memory as being confabulation or perseveration. His 24-hour recall is without disparities after several recountings, and immediate recall is normal (he can repeat 6 digits forward and 5 digits backward). Two hours after presentation, he could remember all four test objects (a pencil, key, blotter, and the color yellow). Simple calculations (multiplication, division, addition, and subtraction) were done accurately, serial 7's (from 100-0) were done somewhat slowly but without any errors. General comprehension is at least average; he was able to repeat the "cowboy story" with only four minor mistakes. His proverb interpretation (with six proverbs) [were] done very hesitantly but were adequately abstracted.

Judgment: There is no gross impairment in this area (as evidenced by responses to hypothetical questions) but the interview suggests a mild limitation, particularly in relation to social situations.

Insight: The subject is not psychologically minded and seems to be both unable and disinclined to understand the sources of his current anxiety, insomnia, and general despair. He did communicate a considerable amount of useful psychiatric data but, in the process of so doing, seemed very unaware of how much he was saying about himself and his feelings.

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MMPI REPORT

**CASE NO. 00009²⁷
AGE 37 MALE**

**64561
MMPI NO. 00000**

THE TEST ITEMS APPEAR TO HAVE BEEN ANSWERED TRUTHFULLY WITH NO EFFORT TO DENY OR EXAGGERATE.

THIS PATIENT APPEARS TO BE CURRENTLY DEPRESSED AND ANXIOUS. HE SHOWS A PATTERN WHICH IS FREQUENT AMONG PSYCHIATRIC PATIENTS. FEELINGS OF INADEQUACY, SEXUAL CONFLICTS AND EMBODITY ARE ACCOMPANIED BY A LOSS OF EFFICIENCY, INITIATIVE AND SELF-CONFIDENCE. INSOMNIA IS LIKELY, ALONG WITH CHRONIC FATIGUE. HE IS ANXIOUS, TENSE, AND OVERLY SENSITIVE. SUICIDAL THOUGHTS ARE A POSSIBILITY. IN THE CLINICAL PICTURE, DEPRESSION PREDOMINATES. PSYCHIATRIC PATIENTS WITH THIS PATTERN ARE LIKELY TO BE DIAGNOSED AS DEPRESSIVE REACTION OR ANXIETY REACTION. THE CHARACTERISTICS ARE RESISTANT TO CHANGE, ALTHOUGH SYMPTOMATIC RELIEF MAY BE OBTAINED WITH BRIEF TREATMENT.

HE TENDS TO BE PESSIMISTIC AND COMPLAINING, AND IS LIKELY TO BE DEFEATIST, CYNICAL, AND UNWILLING TO STICK WITH TREATMENT. HE MAY NEED FREQUENT REASSURANCE ABOUT HIS MEDICAL CONDITION. DYNAMICALLY, HE IS A NARCISSISTIC AND SELF-CENTERED PERSON WHO IS RIGID IN THOUGHT AND ACTION AND EASILY UPRISHT IN SOCIAL SITUATIONS.

REPRESSION AND DENIAL ARE UTILIZED AS A DEFENSE AGAINST ANXIETY. IN PERIODS OF HEIGHTENED STRESS HIS ANXIETY IS LIKELY TO BE EXPRESSED IN SOMATIC SYMPTOMS. HE MAY RESPOND TO SUGGESTION AND REASSURANCE.

HE IS A SELF-CONTROLLED CAUTIOUS PERSON WHO MAY BE SOMEWHAT FEMININE IN HIS INTEREST PATTERNS. HE IS IDEALISTIC, SOCIALLY PERCEPTIVE, AND RESPONSIVE. HE SHOWS SOME SELF-AWARENESS, BUT HE IS SENSITIVE AND PRONE TO WORRY. HE IS VERBALLY FLUENT, PERSUASIVE, AND ABLE TO COMMUNICATE IDEAS CLEARLY.

THIS PERSON IS HESITANT TO BECOME INVOLVED IN SOCIAL SITUATIONS. HE MAKES AN EFFORT TO CONSCIENTIOUSLY CARRY OUT HIS RESPONSIBILITIES, BUT HE IS RETERING AND SOMEWHAT WITHDRAWN FROM INTERPERSONAL RELATIONSHIPS.

NOTE: ALTHOUGH NOT A SUBSTITUTE FOR THE CLINICIAN'S PROFESSIONAL JUDGMENT AND SKILL, THE MMPI CAN BE A USEFUL ADJUNCT IN THE DIAGNOSIS AND MANAGEMENT OF EMOTIONAL DISORDERS

SCALE SCORES FOR MMPI

CARE NO: 00000
AGE 37. MALE

RPGI NO: 00000

SCALE	7	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
RAW	0	2	5	16	11	30	30	14	31	11	21	18	12	40		
K-C	0	2	5	16	19	30	30	22	31	11	32	31	18	40		
T-C	0	45	53	65	70	81	75	57	71	58	69	67	45	66		
SCALE	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
RAW	41	16	13	20	9	10	27	17	22	13	19	34	59	20		
T-C	44	42	51	59	49	50	58	56	54	50	58	73	32	23		

CRITICAL ITEMS

THESE TEST ITEMS, WHICH WERE ANSWERED IN THE DIRECTION INDICATED, MAY REQUIRE FURTHER INVESTIGATION BY THE CLINICIAN. THE CLINICIAN IS CAUTIONED, HOWEVER, AGAINST OVERINTERPRETATION OF ISOLATED RESPONSES.

- 133. I HAVE NEVER ENGAGED IN ANY UNUSUAL SEX PRACTICES. (FALSE)
- 182. I AM AFRAID OF LOSING MY MIND. (TRUE)
- 349. I HAVE STRANGE AND PECULIAR THOUGHTS. (TRUE)
- 154. I HAVE HAD PERIODS IN WHICH I CARRIED ON ACTIVITIES WITHOUT KNOWING LATER WHAT I HAD BEEN DOING. (TRUE)
- 337. I FEEL ANXIETY ABOUT SOMETHING OR SOMEONE ALMOST ALL THE TIME. (TRUE)

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D. Summary of Positive Findings: Psychiatric Evaluation and Character Assessment (with supportive data).

Mr. McC. is an oral character who shows a moderately severe passive-dependent life style. This is evidenced by the direction of his relationships (mother-equivalents) and his drinking habits, as well as the content of his fantasies. He is also a withdrawn chronic depressive in acute exacerbation. There may be an underlying endogenous element to his depression but it appears to be primarily reactive and related to the death of his mother.

All the psychiatric evidence points to the event of 17 November 1967, as an acute illusory phenomenon in which his regressed oral yearning for his mother was symbolically represented in the "light". That the object took the color and shape that it did (like the nipple covers) further demonstrates his all-pervasive oral fixation.

D. Discussion and Creditability Score.

The subject's retinal pathology is such that he could not have accurately perceived on direct gaze a greenish, luminous disc in the sky. It may well be that the initial stimulus for his "vision" was a distant light which then was grossly distorted by both his abnormal retina and his highly disturbed emotional state.

Creditability score 5%.

VI. Integration of Findings and Composite Assessment of Central Nervous System Functioning
A. Discussion and Creditability Score

Without the benefit of the results of this medical evaluation, one would probably be inclined to view Mr. McC. as a highly creditable observer. In favor of such an impression are 1) his respectable bank position, 2) his general demeanor (which is very appropriate and does not suggest attention-seeking or his actual psychiatric problems), 3) his claim to seeming good health and 4) the nature and quality of his report of the "light" observed event to the police.

However, on evaluation it was discovered that he was an early alcoholic cirrhotic who was suffering from early occult alcohol-tobacco amblyopia such that he could not have perceived the detailed colored nocturnal event he thought he had seen.

What had actually occurred was the first major hallucinatory experience of his life. In a twilight state, his eye first perceived some kind of stimulus from the night time sky which was then transformed into a rather magnificent symbolic representation of his unconscious wishes and underlying character pathology. The episode occurred when it did because of the subject's state of psychic decompensation. His resistance to a transient hallucinatory experience was lowered by 1) his currently agitated depressed state 2) the adverse effects of toxins (from drugs and liver) on his central nervous system and 3) the visual distortions produced by his diseased eyes.

The entire clinical picture is best explained in terms of the subject's passive-oral-dependent character pathology which is intimately related not only to his acute emotional state but is the underlying source of his physical problems (i.e., alcoholic liver and retina, drug toxicity). This case is thus a good example of multifactorial influences on observer creditability which, in this instance, can be integrated in terms of an underlying source.

Overall observer creditability score 5%.

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THE USE OF PROBABILITY SCORING FOR OBSERVATIONAL CREDITABILITY

In order to translate the results of an extensive, multidisciplinary medical evaluation into a handy estimate of observer creditability, a percentage-evaluation scoring method has been devised. These "probability of creditability" scores are mainly intended to serve the non-medical expert. They are numerical statements reflecting the level and quality of observational ability and are based on all the obtained findings relative to central nervous system integrity.

The scores will be presented in conjunction with (not in place of) summaries of the results of each part of the medical assessment (i.e., medical, neurological, neuro-ophthalmological, and psychiatric) of an individual observer. A composite score will also be offered to suggest the overall level of observational creditability. This final score is based on careful scrutiny, extrapolation, and interpretative integration of all the findings at hand, as they would be expected to influence (in a highly multifactorial way) any reported observations. The nature and extent of an individual's abnormalities will thus be reflected in his creditability score(s), a scale for which has been set up as follows:

<u>Degree of Impairment</u>	<u>Creditability Score</u>
none	95%
mild	75%
moderate	50%
severe	25%
extreme	5%

The scores will be variably useful, depending on their applicability to the situation in question. It is expected that they will be helpful in the screening and selection of candidates for observational jobs (i.e., predictive evaluations). They will usually be more reliable as measures of creditability, however, when they are part of a retrospective evaluation that is being done on an individual who has already reported a particular event. This is because the examiner-scorer is able to avail himself of specific observational material on which to "zero in" and check out, including occasional clues to physical and psychological pathology. In those instances where there are different stories from several individuals who report having witnessed the same event, the value of the creditability scoring can be further demonstrated for sorting out conflicting data.

It is readily acknowledged that this scoring method is somewhat arbitrary. Its reliability and reproducibility will depend largely on the sophistication and the abilities of the scorer. It is essential that the physician doing these studies have 1) a high-level working knowledge of the four specialties involved, that he 2) be specifically well-informed in the pertinent interdisciplinary material related to observational phenomena, and that he 3) be adept in the matter of investigating, synthesizing, interpreting, and finally applying the ramifications of his "pure" medical findings to observational situations. It is further recommended that 4) he himself be thoroughly checked out as a creditable observer, since this proposed method [of] assessing observers rests heavily on the physician's own ability to make accurate observations and sound judgments.

It is probably true that, at this point in time, there are few men in medicine who are adequately trained to do this multispecialty kind of assessment. This is a remediable situation, however, once the projected need for such professional preparation has been recognized and established.

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Biographical Sketch for Dr. Sydney Walker, III

July 22, 1968

Sydney Walker III, M.D. is a 36 year old neuropsychiatrist who was born in Chicago, raised in Pasadena, did undergraduate study at UCLA, followed by graduate work in physiology and pharmacology, and received his medical training at Boston University School of Medicine. Following some neurosurgical training, he did university residencies in both psychiatry and neurology. He has contributed numerous articles in both these specialties and is the author of a recently published book, Psychiatric Signs and Symptoms due to Medical Problems, Charles C. Thomas, Springfield, Illinois, 1967. His interest in neuro-ophthalmology has been more recent and has emerged from his research in connection with the preparation of another monograph, The Neuropsychiatric Evaluation of the Eye Witness (to be published in late 1968).

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APPENDIX 3

Reprints of

"OBSERVATIONAL EVIDENCE OF ANOMALISTIC PHENOMENA"

and

"FUTURE EXPERIMENTS ON ANOMALISTIC OBSERVATIONAL PHENOMENA"

by

Robert M. L. Baker, Jr.

and

ESTABLISHING OBSERVER CREDITABILITY: A PROPOSED METHOD"

by

Sydney Walker, III, M.D.

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The Journal of the Astronautical Sciences Vol. XV, No. 1, pp. 31-36 Jan.-Feb., 1968

Observational Evidence of
Anomalistic Phenomena ¹

Robert M. L. Baker, Jr.²

Abstract

A summary of the data obtained from a series of analyses and experiments, which were initially carried out by the author under the auspices of Douglas Aircraft Company and based upon movie film containing anomalistic data, originally provided by the United States Air Force, is presented. It is concluded that, on the basis of the photographic evidence, the images cannot be explained by any presently known natural phenomena. On the other hand, the quality of the images is insufficient to determine the nature of the anomalistic phenomena recorded on the movie film.

Introduction

Two anomalistic unidentified flying objects (UFO's) were sighted and later photographed at about 11:30 a.m. Mountain Standard Time on August 15, 1950, by Nicholas Mariana at Great Falls, Montana. Mr. Mariana owned and operated a radio station in Missoula, Montana, and was the owner of the Great Falls baseball team.

All of the soft-data (eye witness reports of Mr. Mariana and his secretary) indicated that the objects were silvery in appearance with a notch or band at one point on their periphery and could be seen to rotate in unison, hover, and then "... with a swishing sound, floated away to the left (SW) ..." The hard data from the film showed inarticulate bright white dots. Figure 1 shows the manner in which the diameter of the bright dots decreased with time. The objects passed behind a water tower and are exhibited in Fig. 2, along with the associated frame number (the frames below 65 exhibited no foreground). According to Mariana, 35 of the earlier frames, allegedly lost by the Air Force, showed a larger image, complete with a "rotating notch." Figure 2 was constructed from iconolog measurements (a film viewer with movable cross hairs and a digitalized coordinate output) using the foreground reference points marked (3), (5), and (6). This figure is drawn like a panorama on the assumption that the photographer kept his stance without moving appreciably (which was reported by him

and was well borne out by the consistence [sic] of his perspective). These initial measurements were made by the author at Douglas Aircraft Company in 1955-1956.

Analysis

The "Montana" film contains six independent data (as functions of time) on about 225 frames (frames 65 to 290), which describe the UFO images, i.e., the two degrees of freedom of each dot (as depicted on two-dimensional film after the foreground appears on frame 65) and the apparent diameter of the developed image of each on all 290 frames (no ellipticity could be seen in the images except for occasional image smear due to uneven panning). In the analysis it was convenient to treat the UFO's as a system. The four degrees of freedom chosen for this system were the azimuth and altitude of the midpoint on the line of centers between the images, their angular separation and their inclination to the horizon. The inclination to the horizon was found to be very small, the objects appearing to move almost in a plane parallel to the ground. There is a slight decrease in the angle of inclination as the objects regress, but its small value is almost masked by random errors inherent in the measurements. Figure 3a presents a plot of the angular altitude, h , and the azimuth, A , of the midpoint of the line of centers after frame 65 (i.e., after a measurable foreground appears), and Fig. 3b presents the separation distance ratio θ_e/θ as a function of time, where θ_e is the initial angular separation (frame 1) and θ is the angular separation at any given time. In both of these plots some frames were not measured, e.g., due to obscuration of the images during water-tower passage, or were missing (there were frames missing between frame numbers 177 to 180 on the 35 mm print that was measured for separation distance, but these were accounted for in the time scale using the 16 mm original as a basis). About 225 frames after the foreground (ventilator duct) appears on the film (i.e., after the 290th frame), the objects can no longer be clearly identified and measurements become very uncertain.

¹ Manuscript submitted November, 1967. Paper was presented at an AAS Seminar at the Jet Propulsion Laboratory, Pasadena. A manuscript on the same subject matter was originally submitted in 1962. The complete review of this earlier manuscript, after receiving three favorable reviews, was accepted.

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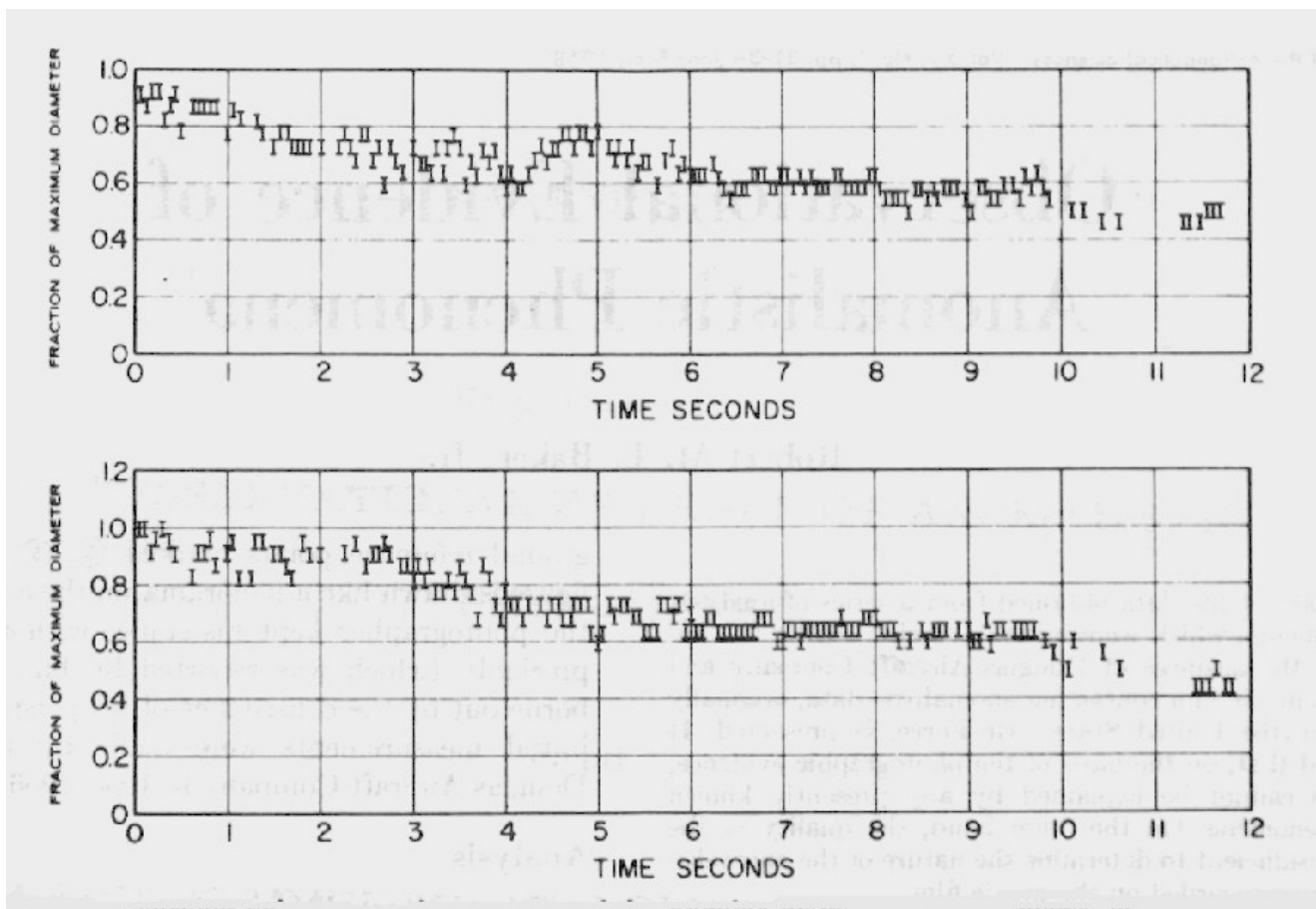
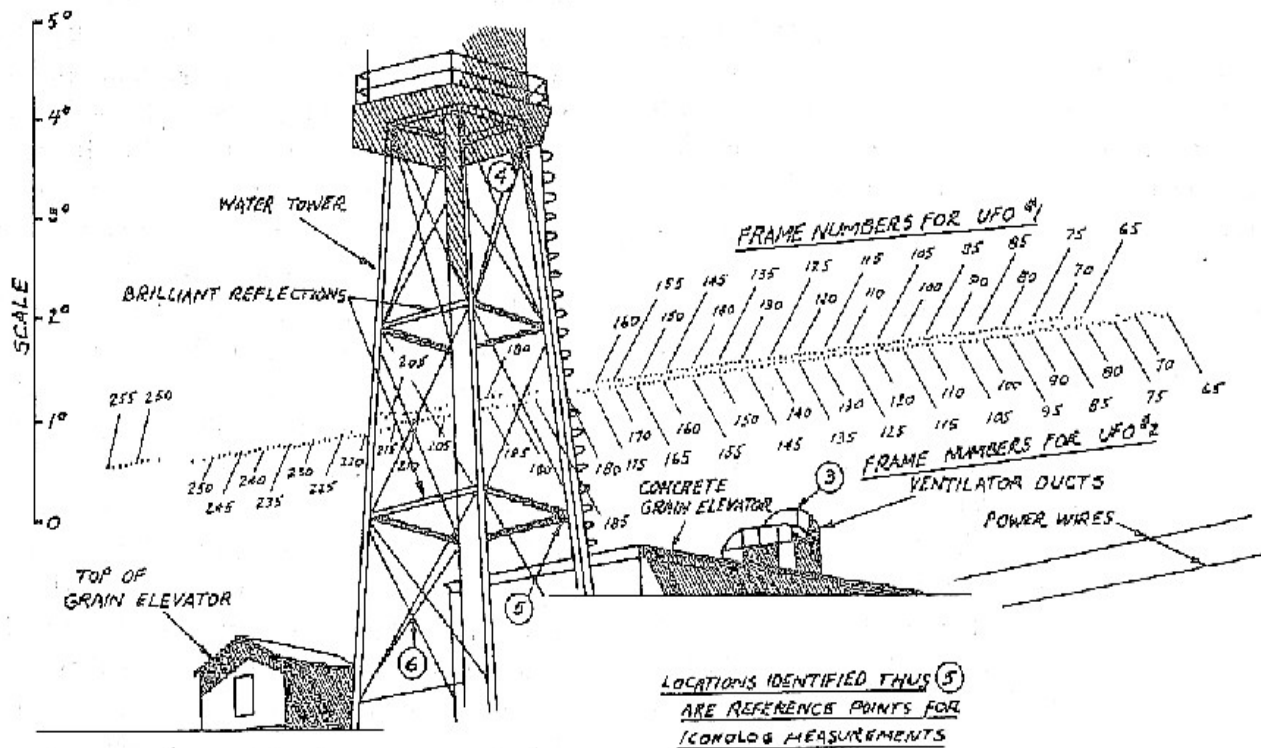


Fig. 1. Ratio of time varying value to maximum value of the angular diameters of the images of UFO #1 and UFO #2.



TRAVEL OF UNIDENTIFIED FLYING OBJECTS (MONTANA FILM)

Fig. 2. Motion of unidentified flying objects relative to foreground.

In Figs. 3a and 3b the dotted lines represent what would be the locus of the data points if the objects remained the same linear distance apart and moved linearly in a horizontal plane. The headings, delta, of 169° to 177° are exhibited. All of the data seems to be consistent with a heading of 171°. Of course, one cannot absolutely rule out some other curvilinear motion of the objects. However, any such motion would necessitate the coincidence of azimuth, altitude, and separation, all varying proportionally in some very peculiar fashion to a tolerance of 1%. Figure 4 is a map of Great Falls, Montana, and includes overlays of the UFO system's motion at various hypothetical distances. (no absolute determination of

FIGURE 3a
MOTION OF UFO SYSTEM

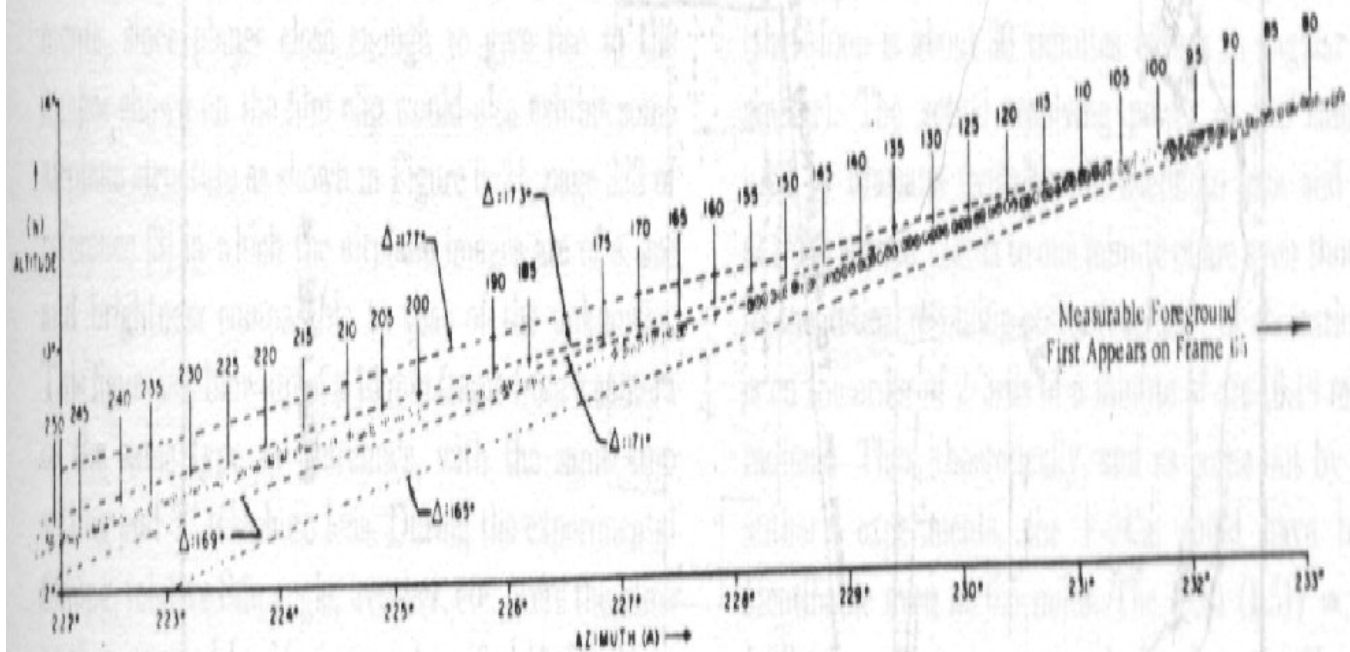


Fig. 3a. Motion of UFO system in altitude and azimuth.

The long persistence of the images would have required the airplanes to have moved on a unique parabolic path with Mariana at the focus. Unfortunately, these hypothetical parabolic paths would be incompatible with the 171° heading defined by the data. In addition, the apparent size of the images (admittedly

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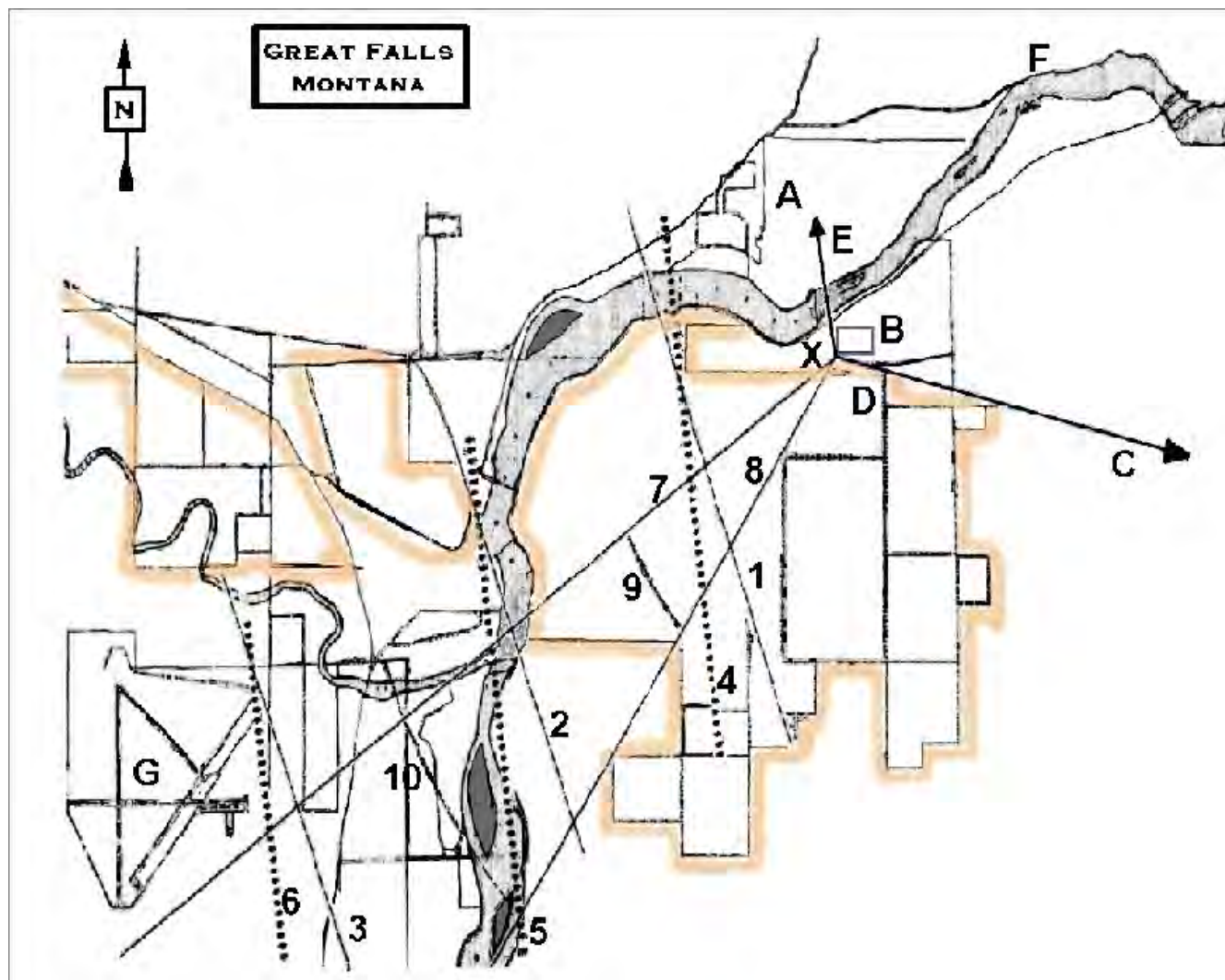


Fig. 4. Map of Great Falls, Montana, including hypothetical UFO paths.

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enhanced by flaring, halation, adjacency effects, etc.) is also not compatible with the photographic experiments, since planes close enough to give rise to the images shown on the film clip would also exhibit some airplane structure as shown in Figure 6-24, page 323 of reference [3] in which the airplane images are of a size and brightness comparable to that of the unknowns.

This figure is a blow-up of a 16 mm frame from a camera of the same type as Mariana's, with the same stop setting and 3" telephoto lens. During the experimental filming, relative Sun angle, weather, etc., were the same as that reported by Mariana and verified by the Montana film itself, except that the jets were on a different heading -- not 171° -- in order to obtain optimal Sun reflections. The jet planes shown in the figure were at a distance of 2.5 miles and their structure

exhibited angular dimensions of about 4 by 1 milliradians, whereas their elliptical, Sun-reflection flare image exhibited angular dimensions of about 6 by 1.4 milliradians.

Upon close inspection, the flare included a roughly circular bright nucleus and a comet-like "tail" of lesser brightness about 4.4 milliradians long. This comet-like Sun flare, which is not exhibited on the Montana film, is also generally characteristic of airplane-fuselage Sun reflections having approximately the same brightness as the Montana film objects. Even with the larger comet-like flare, the jets photographed during the photographic experiment are clearly identifiable.

Finally, airplanes at the limiting distance for resolution of structure (over 6.5 miles), with the 3" telephoto lens used, would have to have been traveling at speeds in excess of the capability of the F-94's (above 600 mph [6] in order to have been compatible with the angular rates of the images displayed on the film. At 6.5 miles a typical 50 foot airplane (such as an F-94) subtends angles of 1.5x0.4 milliradians or 5½ by 1¼ minutes of arc. The resolving power of the eye is from 1 to 3 minutes of arc (the Moon is about 30 minutes of arc in angular diameter). The actual resolving power of the camera used by Mariana (with the 3" telephoto lens and set at f/22) is from 2/3rds to one minute of arc even though its theoretical resolving power (exclusive of aberrations) is on the order of 2/3rds of a minute of arc (0.19 milliradians).

Thus, theoretically, and as borne out by the author's experiments, the F-94's would have been identifiable even at 6.5 miles. The (0.8) (1.51) = 1.2 milliradians fuzzy image (as depicted on the film for UFO #1) would have somewhat obscured an airplane structure at this distance; but the structure would still have been recognizable.

The angular (azimuthal) velocity of the objects was found to be 0.019, 2 radians/second. Equipped with the knowledge of the focal length and frame speed (16 frames per second) of Mariana's camera and the foreground during the filming, the transverse component of the velocity of the objects can be correlated to their height above the local terrain (3,312 ft) and distances from the observer (for the objects when they first appear on the film). Since only angular distances from one station are available for measurement, their actual range cannot be determined. On the other hand, Table I can be constructed on the basis of a variety of hypothetical ranges.

The measurements of the diameter of the developed images presented in Fig. I are the least accurate of all the data because of the smallness of the dimension and the fuzziness of the images. The image of any brilliant light source as seen by either the eye or a camera can appear much larger than the source itself. This fact had obvious bearing on the analysis of the

TABLE I
Hypothetical Ranges, Heights, and Speeds

Range (Miles)	Height (feet)	Transverse	SPEED (mph)		COMMENTS
			at 171° heading	for Optimal Sun Reflection	
0.5	690	552	642		Upper limit to bird speed; but birds would have been resolved. ³
2	2,730	1572	1972	3822	Usual F-94 speed in a landing pattern is 130 to 190 mph; but would have been resolved.
6.5	8,860	4702	6002	1,140	Maximum (dive) F-94 speed is 602 mph; but would have been resolved.
563	950,000 (290 km)	39,000			Low-speed meteors ⁷ ; but would not be detected at this range on a bright day. Atmosphere too thin above 100 km for bolides or fireballs.
2,260	5,610,000 (1,710 km)	156,000			High-speed Meteors ⁷ ; but would not be detected at this range on a bright day. Atmosphere too thin above 100 km for bolides or fireballs.

¹Above the observer -- Add 3,312 ft. for absolute altitude.
²Includes 20 mph component of head winds.
³Ducks, etc. would be flapping or swooping and would not appear like the objects on the film at any distance.

film and motivated the photographic experiment conducted by the author during December, 1955. December, rather than August, was chosen due to the lower latitude of Los Angeles relative to Great Falls and because of the unique (smogless) visibility during the course of the experiment. The experiment was devised in order to obtain empirical information on the effect of distance, lens focal length, iris stop, frame speed, etc., in the photographic images of various small bright sources of reflected sunlight; some 118 combinations of these variables were examined. The experimental results appeared to indicate that if the first few frames of the film show Sun reflections from airplanes, which are optimally oriented with respect to the Sun (not the 171° heading), then the planes would have been on the order of one to three miles distant from the camera. If, however, these first few frames represent images of the reflection from airplanes not quite optimally oriented, then the planes could have been closer. In either event, their structure would also have been visible. The images were found to be much brighter than those that any birds could produce.

The brightness of a constant luminosity source, as it recedes from view, gives rise to a photographic image whose diameter varies somewhere between [the] inverse square root of the range to the inverse square of the range. (Ordinarily, however, with the inverse square for images as bright as the Montana objects.) The effects, which account for this uncertainty in image-size vs. range relationship, involve light scattering in the atmosphere, optical aberrations, flaring at the lens surfaces, diffraction, turbidity in the film, reflections off the film backing (halation), and adjacency effects (chemical reactions between over-exposed and underexposed areas on the film).

On the basis of Fig. 1, we find a decrease in angular diameter of the first object of about 62%, and the second about 61 %. Under the 171° heading assumption, the initial distance is about 78% less than the final distance (at disappearance). Thus, it would seem that the 171° heading hypothesis is also in agreement with the film images being the result of a constant brightness light source receding from the camera. That is, the inverse square distance decreases some 61%. Because the relationship of the developed image size to source range is not precise and because it is doubtful that we are dealing with constant-luminosity isotropic radiators, the third confirmation «f the 171° heading must be regarded as considerably less precise than the confirmations provided by Figs. 3a and 3b.

Conclusions

Because of the conflict between every hypothesized natural phenomenon and one or more details of the hard-data, photographic evidence analyzed (in addition to the uncertainty of the soft data, reported accounts (or rumors) of jet aircraft), no clear-cut conclusion as to a natural phenomenon can be made and the anomalistic images, having no real detail, cannot be analyzed further. These unexplainable images, taken alone, do not provide data on mass, shape, size, or linear speed and, indeed like the early single-camera meteor photographs or even like the early examples of attempts at photography through a microscope, are merely unresolved blobs and simply indicate the presence of a phenomenon. In these past, historical instances, supplementary data and equipment improvement were sought after in a systematic fashion even though there was only conjecture as to the exact character of the phenomena. See reference [8].

A number of other films have been viewed by the author, which purport to be UFO's, and they all seem to exhibit the common quality of poor image definition. This situation is not especially surprising since most of them have been taken with amateur equipment or they were accidentally taken from a great distance by cinetheodolites that were not "tracking" them. Like the Montana film, some of these films definitely cannot be explained on the basis of natural phenomena (others can be "explained" if one stretches one's imagination).

References and Notes

1. A copy of the local half hourly surface weather observation for August 15, 1950, was obtained from the Great Falls, Montana Municipal Airport Station of the Weather Bureau. It shows that the surface wind increased during the forenoon to readings between 26 and 28 mph between 9 a.m. and noon, and that it reached 37 mph at 12:30. The surface wind direction was constantly from the southwest from 10 a.m. until 4 p.m. It was clear (visibility of 60 miles), the temperature was 77°F at 11:27, and the barometer was at about 30.0".
2. In November of 1955, an inquiry by phone was directed to Colonel Donald M. Hamilton, Commanding Officer of Malmstrom Air Force Base. He advised us by letter dated November 7, 1955, that "as far as I can determine, there were no jet aircraft based here at that time, so that if any were in the air, they would have been transients."
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4. Markowitz, William, letters dated November 10 and December 6, 1967. According to Markowitz the panel consisted of H. L. Robertson, L. Alvarez, L. V. Berkner, S. A. Goudsmit, and T. W. Page.
5. Ruppelt, E. J., *The Report on Unidentified Flying Objects*. (Doubleday & Company, Inc., Garden City, New York, 1956), pp. 286 to 288 and p. 292.
6. The maximum speed (achieved during a dive) of the F-94 is 602 mph, its landing speed is 130 mph, and its stalling speed is 108 mph.
7. McKinley, D. W. R., *Meteor Science and Engineering*, (McGraw-Hill Book Company, New York, 1961), page 128.
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The Journal of the Astronautical Sciences Vol. XV, No, 1, pp. 44 - 45 Jan.-Feb., 1968

Future Experiments on Anomalistic Observational Phenomena

The requirement for additional experiments in the area of anomalistic phenomena is given, based upon the paucity of "hard data"; relevant data collected by astronomers, meteoriticists, and meteorologists, which would be either overlooked or not detected; and the possible "filtering" and/or "editing" out of pertinent data by our various space surveillance systems prior to its evaluation. An experiment involving two cameras slaved to a detection radar is outlined broadly and it is concluded that such a system should be constructed for use in meteoritic, meteorological, astronautical, psychological, and "UFO" study programs.

The majority of our astronomical equipment (e.g., conventional photographic telescopes, Baker-Nunn cameras, meteor cameras, Markowitz dual-rate Moon Cameras, etc.) are special-purpose by their very nature and would probably not detect the anomalous luminous phenomenon reported by the casual observer if it were indeed present. Their photographic speed, field of view, etc. put definite limits on their capability to collect data on objects other than those for which they have been specially designed. Even if such data WCPP collected, the recognition of their uniqueness or anomalous character by an experimenter is improbable. Examples abound in celestial mechanics of minor planets being detected on old astronomical plates that had been measured for other purposes and then abandoned. ~~Tombaugh's discovery of Pluto from rather old astronomical plates in storage is a well known example.~~ The space surveillance systems are almost programmed to overlook anomalous data. Any hard-data arising from an object or manifestation that did not move on a nearly two-body orbit, had a low radar cross-section, or followed an erratic path would most probably be filtered out of the system by various data-editing, or data-weighting procedures [1], which are inherent in most of our sophisticated space surveillance systems.

A representative space surveillance radar may have a beam width of $1/6^\circ$ for detection and require accurate orbital information good to 0.01° for fine tracking. Needless to say, such radars often miss even well-known spacecraft and would be completely inadequate for "locking-on" to a hypothetical "UFO." To be sure, advanced radar systems are being developed for our missile defense systems, such as the ALTAR (ARPA Long-range Tracking and Instrumentation Radar), TRADEX (Target Resolution and Discrimination Experiments) and the phased array RESER (Re-entry System Evaluation Radar) system. Although they extend the field of view, they still are developed to filter out anomalous signals. As Cheettam [2] points out, "Power and aperture will be programmed after a learning measurement cycle to conserve and efficiently distribute available energy when and where (reentry) targets are estimated to exist."

Not only are conventional sensors almost insensitive to anomalous data, but observations published by trained scientists, that could be hard-data records of anomalistic phenomena, are often too quickly categorized and then forgotten. The observation by Mohr [3] in a letter to *Science* in 1966 gave an account of a "most unusual fly" and described a very remarkable and almost bizarre event that might or might not have been ball lightning. The Tunguska event of 1908 may well have been a impacting comet [4] and is usually studied in the context of meteoritics [5]. Similarly, the Canadian fireball procession of 9 February 1913 could have been an ephemeral natural satellite of the Earth [6] or it could have been something more involved. In most such cases, and as in also the situation in published UFO studies [7], [8], [10], information-rich hard-data of high quality are rather hard to come by. It therefore suggests itself that a special experimental program is in order. The scientific method usually dictates experiments in the face of anomalous data and, at the moment,

there seems to be sufficient unexplained anomalous hard-and-soft data to warrant an experimental program. Several experiments suggest themselves and might include geological studies, searches for scraps of material evidence, psychiatric-medical studies of witnesses, or radar/optical arrays.

In broad outline, one recommended experiment would involve a large aperture tracing radar that would slave two cinetheodolite-type optical trackers if and when an anomalous object appeared. The radar "lock-on" and tracking-data-analysis program would be especially designed to avoid satellites and, if possible, common meteors and airplanes, but would, for example, detect comet or macrometeorite entry, ball lightning, and any erratic or anomalous object within its range (a range that would probably be limited to 500 km or less). Thus, the system might at least provide accurate positional information that would provide useful meteoritic data and meteorological data in the absence of more bizarre phenomena. The cameras (preferably using Schmidt-type, Maskutov, or Baker catadioptric type optics and, perhaps, computer-enhanced digitalized pictorial data [11]) would be on a 5 to 10 km base line (the "lock-on" program for the active skin-tracking radar might follow the modified Leuschner differential-correction system suggested on pp. 114 and 115 of reference [1] and the system would need to be reliable enough to operate unattended for weeks at a time. As shown by studies of meteorite and comet flux, such as Hartmann's [12], Shoemaker and Lowery [13], McCrosky [14], and Lamar's [5], a waiting period of a year or so is necessary in order to have significant probability of detecting and tracking such natural extraterrestrial objects.

The question of the proper geographical location of the experimental site would almost be as important as the specification of the radar/optical and computer/communications complex itself. The meteoriticist would probably prefer an area with good atmospheric seeing and of low population density such as the "... Tucson area..." [15]. The geologist would prefer a location near dry lakes [16] in order to facilitate the possible recovery of meteoritic or other material, or timely study of manifestations of cometary impact or sub-end-point meteoritic debris [17]. The psychiatrist would be concerned with the psychiatric-medical credence levels of eye witness (soft data) associated with any hard data that might be obtained by the experimental array [18] as well as the general psychological analysis of the "... tendency all over the world to believe in saucers and to want them real, ..." [19]. Thus, he would tend to prefer a site in a moderate population density area. The physicist interested in ball lightning might wish for a site in which atmospheric electrical disturbances were

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frequent. As Singer noted [20], "The specific properties of ball lightning, which present particular difficulty in experimental duplication, are formations of the sphere in air (at near-atmospheric pressure and at a distance from the source of energy) and its extensive motion. It is evident that additional clarification of both theoretical and experimental aspects of this phenomenon is needed." Often marsh gas exhibits bizarre observational data and a location near a marsh might be useful in the examination of such phenomena. Clearly, an overall reconciliation of these diverse and interdisciplinary requirements must be accomplished during the site (or, perhaps, sites) selection process.

In summary, then, four points are to be made:

1. That we have not now nor have we been able in the past to achieve a complete or even partially complete surveillance of space in the vicinity of the Earth, which would betray the presence of any anomalistic phenomena.
2. That so-called hard data on anomalistic observational phenomena do, in fact, exist; but that they are of poor quality due to the equipment employed in obtaining them.
3. That it follows from the scientific method that an experiment or experiments be devised to define better the anomalistic data.
4. That, in order to justify such an experiment or experiments, it is not necessary to presuppose the existence of intelligent extraterrestrial life operating in the environs of the Earth or to make very dubious speculations [9], [10] either concerning "their" advanced scientific and engineering capabilities or "their" psychological motivations and behavioral patterns.

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Establishing Observer Creditability: A Proposed Method¹

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Abstract

This article is a brief review of the critical chain of linked processes -- anatomic, physiologic, and psychological -- which operate to determine the nature of the observations made by an individual, whether of an accident, a planned experiment, or an extraterrestrial phenomenon such as a "UFO." One purpose of such a review is to demonstrate how, through the use of proper medical examination, the integrity of the observer system can be established in such a way that eye witness creditability does not have to be left to the kind of speculation in which it so frequently finds itself today. Without some such investigation, it is not known whether the reporting observer has, for example, serious visual abnormalities, a brain tumor that causes visual hallucinations, or character pathology such that he is prone to attract attention to himself by fabricating or frankly lying about what he has seen.

That such observer evaluations have not been previously proposed is probably because adequate assessment depends on incorporating the approaches and tools of several medical specialties, rather than one.

Introduction and Rationale

Human testimony to events which have been observed is crucial to science, law, and the national security. Yet the creditability of such testimony is frequently left either entirely to speculation or, at best, inadequately ascertained.

One need merely to look at the current controversy and confusion surrounding the issue of unidentified flying objects (UFO's) to appreciate the need for careful observer assessment. Only after observer creditability has been established, can one sort out the "soft data" of UFO reports and scrutinize them for scientific usefulness [1].

One recourse, or course, is to deal only with "hard data" and to simply refuse to deal in any way with eye witness reports, contending that such observations are unlikely because they are too bizarre or have previously been reported only by "crazy people." This kind of reaction reflects scientific closed-mindedness. It is apt to be based in prejudice or fear of the unknown (particularly when that unknown, if taken seriously, would threaten one's safety or survival). Such an attitude is among those which the scientist who wants to be objective will guard against, in the interest of truth and progress. On the other hand, the opposite position of complete, unquestioning faith in observer reports is no better.

This author suggests an initial attitude of "benevolent skepticism" because of an acute awareness of the myriad of individual processes (and maladies) that determine what has been witnessed and how it is described. Further, and more importantly it is proposed that specific, specialized medical assessment of individual observers is essential to establishing the integrity of the observer system. Following careful, clinical investigation, much of the human error in observation can be placed into a perspective which eliminates the "blind faith" in eye-witness testimony and gives the reported data a confidence proportionate to its value.

Although it is well-known that specific training can serve to increase observational acuity, the basic individual ability is variable. People differ considerably in terms of genetic endowment, neurologic integrity, and personality characteristics and dynamics -- all of which account for what they see or say they have seen. By applying selected methods used in medicine, particularly in neurology, psychiatry, and neuro-ophthalmology, observers can be clinically evaluated for creditability, both predictive and retrospective. Such an approach offers both quantitative and qualitative assessment of central nervous system functioning as it would be reflected in observational reporting.

Adequate clinical assessment of an observer must involve cross-disciplinary integration because of the nature of the bodily processes involved in seeing and reporting an event. In the beginning, the event is perceived. Usually, this is basically a matter of seeing, although other sensory modalities can also be involved. The initial critical consideration, then, is the state of the eye (cornea, lens, retina) and its connections with the brain (optic nerve, tract, temporal, parietal, and occipital lobes). A careful examination of these structures (both directly and indirectly) can establish whether or not it would have been possible for a particular individual to have perceived what he has reported or whether, on the sole basis of the state of his input apparatus, his observation was distorted.

Once it has been established that a visual image can be picked up and transmitted, unmolested and unaltered,

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along normal pathways to the back of the brain to allow for perception, the next question is how the brain codes it. This involves the ability to deal with detail, to make associations and spatial relationships, and to do other intellectual work, all of which occurs very rapidly and before the processed material is made available at the temporo-parietal lobe level for communication or for a reaction of any other kind. A great many pathways and a number of brain areas are operative in this critical coding step, and a number of problems, both anatomic and physiologic) can affect the process, either subtly or grossly. The responsibility of the clinician here would be to test cortical integrative ability with the various neurologic

testing techniques available to him. He must also rule out (by careful history, general physical examination, and certain laboratory' measures) the innumerable disease states -- toxic, infectious, endocrine, metabolic, deficiency, and neuropathologic -- that can subtly alter cortical functioning and thus interfere with the coding of an observation.

The next step in observer evaluation is the psychiatric part which, if properly carried out, will probably be the statistically most fruitful for uncovering observer creditability gaps. This is in part because the same types of disease processes listed above for interfering with cortical integration (coding) also can cause such mental aberrations as frank hallucinations and delusions or lead a person to fill in with make-believe details (confabulate) the parts of a report that his brain condition no longer allows him to remember.

In addition, there are the purely psychological problems, based in background factors, which lead an observer to deliberately fabricate or unwittingly distort what he has seen. If consciously driven, his motivation may be fame, fortune, competitive strivings or some rather specific, complicated need which has been tapped by finessing the event he is reporting. If the distortion has its roots at an unconscious level, it is likely that it was triggered by something about the event in relation to the patient's remote past. In the case of a functionally psychotic person, the entire observation may be the product of his own intrapsychic life instead of having had anything at all to do with an external event. On the opposite end of the continuum is the normal or only mildly neurotic person whose "hang-ups" are such that they have either not substantially affected his report or have only very subtly colored a small detail. It may be just as important to ascertain this.

Other aspects of the psychiatric part of observer examinations are the matters of intellectual differences and language factors, both of which would have some bearing on the reporter's strengths and limitations as a creditable and adequate observer.

A sound systematic method for ascertaining observer creditability would have widespread application. People in the legal profession grapple daily with this problem [2]. Eye-witness testimony determines individual life and death decisions in courtrooms. On an even grander scale, it shapes far-reaching diplomatic and military policy. In the laboratory or other scientific settings, when inaccurate, it can lead to an horrendous waste of money and professional man-hours. In all these situations, we should be demanding to know more about the likelihood of a crucial observation before acting on it.

Many people in science, technology and government perform basically observational roles. Some of these individuals are in such responsible positions that what they think they see or say they have seen, and how they respond to it, could profoundly affect the course of human events. (Such a statement will not seem overdramatic or exaggerated to those readers who have some knowledge of how, for example, our national security system operates.) The choice of these people on the basis of tenure, military rank or years of good conduct seems hardly pertinent, since these factors don't necessarily reflect anything about the state of their central nervous system. Given our extreme reliance on some of these individuals, it is suggested that they be screened for observational integrity prior to placement in key positions and that they also be given periodic follow-up evaluations.

All-encompassing medical assessments of observers have not, to this author's knowledge, been previously proposed. This is probably because developing the idea and applying the methods entails a working knowledge of at least three of those medical specialties which focus on the central nervous system. It also demands an eagerness to integrate certain aspects of each specialty, for purposes of problem-solving. The desired end, in this case, is a more complete understanding of the individual observer.

Rather than extensively elaborating on the necessary examination techniques, the following outline stresses processes, structures, and diseases that determine the nature of reported observations. The specifics of the material are intended mostly for the non-medical reader, since the question of observer creditability is so often his business and since he will be the one in the position to decide when to request the special assessment.

Method

The initial phase of integrated eye-witness assessment is a general medical evaluation. This involves, besides the complete physical examination, a careful history and selected laboratory' studies. The rationale for beginning in this way is screening, since many disorders of other organ systems are well-known for their adverse effects on central nervous system functioning. Knowledge about the background and current status of the observer's general bodily health will alert the physician to which areas will need further investigation and which of the later, special examinations will

warrant particular scrutiny [3]. When diabetes, for example, is known to be present, the physician will look for specific related abnormal findings when he checks the eye and does the neurologic and mental status examinations.

Since observations usually begin with the eye and/or some other sensory organ, the next step (once adequate general medical screening has been done) might naturally be a neuro-ophthalmologic examination. This would concern itself with the major structures of the visual apparatus and any of their abnormalities which might influence accurate reception of the visual images [4].

The cornea, the most external structure, accounts for visual distortion through scarring and clouding. These changes are caused by such insults as trauma to the eye, exposure to toxic fumes, infections, and deficiency or degenerative diseases. Inspection with an ophthalmoscope and/or slit lamp will positively establish corneal integrity.

The lens of the eye is the main structure for directing light rays from external phenomena to the retina. It has a wide range of possible variation, on both a genetic basis and, like the cornea, as a result of aging, trauma, deficiency diseases and infections. The configuration of the lens, as it is suspended in front of the eye by delicate muscles, accounts for the sharpness (and shape) of the image known as refractive ability.

The aqueous humor which bathes the lens is of particular concern because of the pressure it exerts on the rest of the eye. Increased pressure changes in this medium, measurable with a gonimeter) are responsible for glaucoma which can result in serious impairment of visual acuity. After a period of time, the increased pressure will also lead to a characteristic constriction of the visual fields, which can be established by examination (perimetry).

The vitreous humor fills the eyeball and is the other fluid through which the light rays of a visual image must pass before they reach the retina. This medium is subject to clouding and other signs of early inflammation. "Floaters," which are abnormal proteinaceous particles in the vitreous humor, are sometimes mistaken by people as moving objects that are in their outside environment. Again, ophthalmoscopic and slit lamp examination will serve to determine the status of the vitreous humor.

The retina is the structure on which the visual image is actually received; loosely, it can be likened to camera film. Located in the posterior eyeball, it is the beginning of the neural perception linkage which eventually reaches the brain and consciousness. The retina is subject to many and varied abnormalities which can severely disturb both visual sharpness (acuity) and range (fields), as well as color perception. Retinal pigment accumulation, inflammatory, and other exudates, vascular problems and other types of pathology can come between an otherwise observable event and the retina, such that part or all of the event is obliterated or distorted in various ways. Ophthalmoscopic inspection will yield a great deal of information about the anatomic integrity of the retina, but a complete assessment must also include detailed mapping of both visual fields by perimetry, with attention to the size and shape of the blind spot. The observer's ability to perceive color at the retinal level may be challenged with Ishihara charts, which are most popularly used for detecting color blindness. These charts also will pick up abnormalities in color perception which are due to drugs, other toxic conditions, and higher, cortical integrative problems.

The head of the optic nerve (disc) can also be easily inspected with the ophthalmoscope, as it sits bare at the back of the eye. The optic nerve is subject to similar pathologic processes as those mentioned above: i.e., developmental, inflammatory, metabolic, and toxic. The color, texture and anatomic configuration of the nerve head indicate not only the integrity of the optic nerve at this vital point but also offer highly suggestive inferential information about the state of the rest of it, which is not directly visible. In addition, when there is increased intracranial pressure due to any type of brain abnormality, it can be reflected in the appearance of the optic disc.

The optic nerves from both eyes join in the area of the pituitary gland and then redivide in such a way that fibers from both eyes are represented in the optic tracts that form. Each tract then travels along either side of the brain (medial aspect of parietal and temporal lobes) via optic radiations to the occipital cortex. These pathways, although not directly visible, are accessible through the use of several maneuvers. Composite findings on neurologic examination, including visual field results, are traditionally used, but opticokinetic studies should also be done because of the abundance of information they can give about the integrity of the optic radiations. This involves the use of a moving, checkered tape which the patient watches and to which his eyes should involuntarily respond with rapid, rhythmic movements (nystagmus) [5]. If, on the basis of these studies, some kind of local pathology or other interfering process is suspected, the physician can then make use of special x-ray procedures (pneumoencephalography, arteriography) for looking at the areas in question.

Once the examining physician has satisfied himself as to the status of an observer's visual apparatus (to the point where the cerebral cortex takes over), he will want next to proceed with a detailed neurologic examination. His index of suspicion about the presence or absence of pertinent central nervous system disease had already been altered by his findings on general physical evaluation, as well as from the eye examination.

There is a clinical format for doing a complete neurologic examination; it is well-known to neurologists and

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other interested physicians. Certain of the maneuvers, particularly those which test cortical integrative function, are extremely important in the evaluation of an eye-witness. This is because they will indicate the ability of the observer's cerebral cortex to process what his visual apparatus has fed in -- to differentiate various kinds of sensory input, process detail, make associations, and integrate spatial relationships. More specifically, those tests that reflect cortical sensory status are particularly pertinent for eyewitness assessment. This is because there are numerous medical disorders that cause neurologic disruption at the cortical sensory level, resulting in hallucinations, delusions, distortions, and confabulations [6].

"Organic" hallucinations and distortions often seem very real, even afterwards, to one only transiently afflicted and are apt to be reported as witnessed events. They can occur in people suffering from acute infections, adrenal insufficiency, brain tumors, chronic pulmonary disorders (respirator acidosis), complications from vitamin deficiencies and alcoholism, abnormal calcium metabolism, low blood magnesium levels, epilepsy (for several reasons), and Sydenham's chorea. In addition, there are scores of commonly used drugs which will produce hallucinations if taken in toxic quantities or, by certain people, in prescribed amounts. These include antihistamines, meprobamate ("Milltown"), dephenylhydantoins (antiepileptic agents), atropine (found in many non-prescription sleeping pills), and bromides (as in Bromoselzer). The report of an eye-witness who has been scrutinized for these possibilities alone (by history, examination, and necessary laboratory data) will understandably assume more creditability.

The possibility that an observation may have been influenced by an "organic" delusion should also be investigated. Frequently, as with the hallucinations, there will be clues to this situation from the observer's history or from some examination findings. Among the underlying medical causes of delusions are trichinosis, syphilis, hypothyroidism, calcium disorders, various blood disorders, encephalitis, and pellagra. Some of these same disorders can, of course, also influence observational reporting through other channels.

Confabulation, as a neurologic sign, is particularly important to rule out in the eye-witness report because it can be so deceiving. In fact, it serves as a cover-up for memory impairment by filling in the gaps with sundry (but inaccurate) details. Typically, confabulation is seen in association with peripheral neuropathy (careful examination is thus apt to alert the physician) and is the result of either a blood disorder or, more commonly, exposure to toxins [7].

Many gross mental aberrations, such as hallucinations and delusions, are not associated with abnormal physical or neurologic signs and can be causally traced to underlying psychologic disorders. These are likely to be recognized and so labeled in the neurologic phase of the assessment where, as in psychiatry, a standard mental status examination is used for ferreting out emotional disorders, as well as memory and other intellectual impairment. For example, the schizophrenias and psychotic depression (which are the more frequent functional disorders associated with hallucinations and delusions) usually have well known clinical characteristics and will be obvious to physicians doing formal mental status testing [8].

It is because of the less florid kinds of psychopathology that a thorough psychiatric evaluation should be part of an observer creditability assessment. The complexities and vagaries of the human personality can lead to some gross distortions and fabrications around an event, particularly when finessed by people who are borderline psychotic, paranoid, sociopathic, hysterical or inadequate personalities. Some of these people, when stressed, have brief, episodic breaks with reality in which they are frankly psychotic and hallucinate, yet then resume previous functioning.

During a sophisticated psychiatric evaluation, the physician would be likely to recognize a propensity for such episodes. His main job, however, would be to gather enough information about the observer as a person to be able to check him out generally, psychologically, for creditability. This would involve complete developmental and psychosexual history, studying family relationships (past and present), assessing intellectual ability, elaborating on areas of major conflict, assessing for characterologic make-up and evaluating for ego-strength or weakness.

In instances where an observer is being retrospectively evaluated (i.e., he has already reported an event) there should be an intensive effort made to explore the observer's feelings about what he has seen and described. Such discussion, when properly guided, is likely to uncover inconsistencies and other helpful clues, in the case of the noncreditable observer. Unconscious motivational forces that have led to inaccurate reporting can sometimes be uncovered by exploring the observer's fantasy life, listening for slips of the tongue, or attempting free association. In an occasional observer, where substantiation of his creditability is crucial and there is vague reason to suspect it, a pentathol interview may be indicated.

In instances where frank lying about an event is suspected, the observer can be questioned while monitored by a polygraph. This machine measures some of those bodily responses that are under the control of the autonomic nervous system which is, in turn, partly regulated by cortical centers. If the observer being studied is truly sociopathic and has never developed a super-ego, or conscience, the polygraph will not be able to pick up his lie, since he will have no associated conflict on telling it. The lying will be picked up, however, when the polygraph is used on other personality types.

Up to this point, this paper has focused on the many factors that interfere with observer creditability. There

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is as well, an obvious positive application for these assessments. The psychiatric evaluation, for example, can be useful for further screening for the strengths of observer candidates who have already been ruled medically and neurologically intact. In addition to making some sound predictions about accuracy of reported observations, the psychiatrist could also explore the candidate's ability to appropriately respond, under stress, to what he has seen. This aspect of an individual's make-up is of grave importance (as implied earlier) in some military, security, and other key positions.

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GENERAL DISCUSSION AMONG SYMPOSIUM PARTICIPANTS

1. General Discussion
2. Article Summary Read into the Record
3. Adjournment

Mr. Roush. Thank you, Dr. Baker.

I anticipated we would have difficulty keeping the members of the committee here at a time when important legislation is considered on the floor. We thought we would reserve the final few minutes for those of you who have made presentations to discuss among yourselves questions which may have been aroused by one of your colleagues' presentation today.

With that in mind, we are going to permit you to have a real free for all. Dr. Sagan.

Dr. Sagan. I just wanted to underline one point that Dr. Baker made. Congressman Roush, in his detailed presentation of the various Air Force systems, I am afraid that the main point won't come across to a lay audience, and that is that with relatively little expenditure of funds, it would be possible to significantly improve the available information.

Apparently what is now happening is that the Air Force surveillance radar is throwing away the data that is of relevance for this inquiry. In other words, if it sees something that is not on a ballistic trajectory, or not in orbit, it ignores it, it throws it in the garbage.

Well, that garbage is just the area of our interest. So if some method could be devised by the Air Force to save the output that they are throwing away from these space surveillance radars, it might be the least expensive way to significantly improve our information about these phenomena.

Mr. Roush. Thank you.

Dr. Baker. Let me just make a comment: That is quite true. At the present time our space surveillance sensors are about 200 percent overtasked. That means they could make about 50 percent of their time available to us. They task too many space objects, their capacity is much greater than the space objects that they are tasked to watch. The space population may grow to fill this void, but currently what Dr. Sagan says is true, we could as I indicated in conclusion (4) modify our current space surveillance system.

It is not an expensive thing to modify existing radars. The FPS-85 itself costs something like \$100 million. The software modification called for here I am sure would be much less.

Mr. Roush. Dr. Hynek.

Dr. Hynek. I would just like to concur in what Dr. Sagan has said. I understand there are several hundred UCT's a month, uncorrelated targets, that because they don't -- I understand -- which since they do not follow ballistic trajectory, they are tossed out. It would not be expensive to introduce a subroutine into the computer to take care of these things for a short while. I strongly second Dr. Sagan's and Dr. Baker's suggestions.

Mr. Boone. Mr. Chairman.

Mr. Roush. Mr. Boone.

Mr. Boone. I think the gentleman should advise you too, though, when you do that, you must make a trajectory determination on each target including aircraft which may put a terrific burden on the radar you are insisting on upgrading.

Dr. Hynek. I will certainly grant that.

Dr. Harder. I would only respond to Mr. Boone by suggesting you could reject all objects that were found, for instance, under 90,000 feet.

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Dr. Sagan. That is just what I was going to say. Certain velocity and altitude limitations.

Mr. Boone. With that I agree. But I don't think we make many sightings at that altitude. We do have a problem here of what you want to look at. So in fact I think the thrust of Dr. Baker's argument here was that most of the Air Force equipment do not supply the material you would like to have.

So you are going to have to go to a much lower altitude, and you are going to have to check a much larger number of targets.

Dr. Sagan. I may have misunderstood, but my understanding was, since all of these "uninteresting" trajectory objects are thrown away, we have no way of knowing at the present time whether there are or are not large numbers of interesting objects at altitudes above 90,000 feet.

Mr. Boone. What this means is you check each one and determine its trajectory, and then throw it away, so it no longer becomes a simple task of saying "Oh, I only want to look at the unidentified ones." I have to check each one, and discard it.

Dr. Sagan. Isn't that being done already?

Mr. Boone. No, it doesn't do it below certain altitudes.

Dr. Sagan. Right.

Mr. Boone. All right. Certain targets are picked up at certain ranges, are they not?

Dr. Sagan. Right. So therefore the suggestion is that within the altitude range, that is being used anyway by the surveillance radar --

Mr. Boone. You complicate the procedure.

Dr. Sagan. Slightly.

Mr. Boone. The procedure is used but it involves the software again which is much more difficult to add to the systems than I believe is being presented. It can be done, there is no question it can be done.

Dr. Harder. I would agree the amount of effort that goes into the relative softwares, although by no means a \$100 million project, it is not a very simple project.

Mr. Roush. Dr. McDonald, do you have a comment?

Dr. McDonald. Yes. I would underscore another one of the points, the general points that Dr. Baker made. I think it addresses itself to the question raised. Both scientists and members of the public are quite aware we have many monitoring radar systems, optical and so on.

This question is raised often, why aren't UFO's tracked? The point one is struck with in studying each of these systems in turn is the large degree of selectivity that is necessarily built into them. Good examples were cited by Dr. Baker.

It has to be kept well in mind that even systems like SAGE when they were developed necessarily had to have programmed into them certain speed limits both lower and upper, certain safe requirements like if the target was on an outbound path it could be ignored. In almost every monitoring system you set up, whether for defense or scientific purposes, if you don't want to be snowed with data, you intentionally built selectivity in, and then you do not see what you are not looking for.

Consequently, this point is important, that despite our many sensing and monitoring systems, the fact that they don't repeatedly turn up

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what appear to be similar to UFO's, whatever we define those to be, is not quite as conclusive as it might seem.

The second comment I would make concerns Dr. Baker's remark that we should move ahead to instrumental techniques and perhaps lessen attention on the older data.

I too agree that we have much need to replace what police officers and pilots saw with good hard instrumental data, the sooner the better, but there are many fields in which once you get instrumental data, say seismology, and being to learn about the phenomenon you are studying, seismology, astronomy, meteorology, once you understand these things you do go back to exploit the knowledge that is implicit in older data. Seismologists do study old earthquake records to improve the seismicity data available. Ecologists do look at old shifts in plant and animal patterns. Astronomers do look at old eclipse information, because once you begin to understand a problem, you can then sort out much better the important material.

I would not want to see excluded entirely -- in fact, I think it would be folly to exclude observations that go back 20 years, and a part of the problem we have not talked about today, still earlier observations.

Dr. Baker. Yes, I concur in that.

My message there was that if we preoccupy ourselves with continually going over past history, it is going to be frustrating. I think we can always use past history in retrospect. In order to go back, as you say, to look at the data and to put it in the proper perspective, when we learn more about the phenomena. So I agree.

Mr. Roush. Is there any other aspect of previous presentations that any of you would like to question?

Dr. Baker. I have a question of Dr. Harder about the Ubatuba magnesium.

Was this magnesium terrestrial? In other words, it is granted that Ubatubas couldn't produce it, but could the magnesium have been produced terrestrially, and if so, in what connection would we produce and employ such magnesium here on earth?

Dr. Harder. Well, such pure magnesium is indeed produced terrestrially in connection with Grignard reagents, and produced by the Dow Chemical Co., where magnesium is produced in greater purity actually than this.

At the time in 1957, the Brazilians did not have a sample of magnesium from the U.S. Bureau of Standards that was as pure as this Ubatuba magnesium with which to compare it. I might enlarge upon the data which was produced, or which was gotten at the request of Dr. Craig, that of the impurities found by the Colorado group, the principal one was zinc strontium with barium being a runner-up. these are very curious kinds of alloys from any terrestrial point of view.

No detected aluminum, and only three parts per million copper, and those are the most likely alloying elements from the terrestrial point of view.

Dr. Baker. Would you say that the sample was partially terrestrialized, and it might be the remnants of an ultrapure nonterrestrial alloy, or did it appear these particular impurities were in the sample from the beginning?

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Dr. Harder. This was done by a neutralization [sic] analysis on a very tiny slicer [sic]. It would be hard to say to what extent over the intervening 9 years there might be some terrestrialization, but certainly it would not have taken out aluminum or copper. It might have added zinc or barium, although that seems somewhat unlikely.

Dr. Sagan. So some comparison analysis has been made for example of the magnesium flares. A magnesium flare has an abundance of impurities?

Dr. Harder. It would hardly be 99.9 percent purity.

Dr. Sagan. That is what I meant.

Dr. Harder. Yes, that is right.

Mr. Roush. Dr. McDonald

Dr. McDonald. Both Dr. Hall and Dr. Sagan remarked in different contexts on the intense emotional factors that predispose some people to certain systems of belief, and I would like to remark on that to be sure that some perspective is maintained on that part of the problem.

In the witnesses I have interviewed -- I have intentionally stayed away from those who immediately show a very strong interest in a salvation theory, or something like that -- so I have cut down my sample right at the start.

I would want to leave the point strongly emphasized that though there are a few people, and some of them rather visible and vocal, who are emotional about the problem and tie it to almost religious beliefs, the body of evidence that puzzles me, that bothers me, and I think demands much more scientific attention, comes from people who are really not at all emotional about it; they are puzzled by it, they are reliable, a typical cross-section of the populace. They have not built any wild theories on it.

In fact, let me mention one important sighting in New Guinea. I didn't interview the witness in New Guinea, out in Melbourne, Australia. An Anglican Missionary, Rev. William B. Gill, was teaching the school in New Guinea, and when he and some three dozen mission personnel saw an object hovering offshore with four figures visible on top of it, even this minister didn't begin to put any religious interpretation on it. He said this is what he saw, and he wrote very careful notes about it. It is that kind of evidence, and not evidence that comes from people with emotional factors predisposing them to system [sic] beliefs that impress me.

Mr. Roush. Let's have the psychologist speak here for just a moment.

Dr. Hall. Thank you.

I welcome that clarification.

The point I was making was not that the witnesses generally are emotional and precommitted to a position at all, but that the people who are interpreting the evidence after it has been gathered are usually precommitted beyond the point of rationality, and it is a very important distinction that you brought out.

The primary problem of witnesses, it seems to me, is this reluctance to report based apparently on a feeling that they will be ridiculed -- that their evidence is not welcome -- and I guess I can't resist telling the little story from the Wall Street Journal, quite recently, of a man who had five pet wallabys in Westchester County. A wallaby

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is a miniature kangaroo. These five wallabys escaped, and rather than upset people he didn't report this, he waited for people to tell him that they had seen them. And nothing happened for days and days.

Well, when they were finally relocated and caught then lots of people started admitting, yes, they had seen these wallabys, but after all, if you see a tiny kangaroo loping across the road in New Rochelle, you are reticent to report it.

Mr. Roush. Dr. Hynek again.

Dr. Hynek. I think that is a most interesting point that ties in. I think sometimes we don't ask ourselves really very fundamental questions, and that is, how is it that these reports exist in the first place?

It is not just because they are strange, because we don't have reports of Christmas trees flying upside down, or elephants doing strange things in the sky; the reports are strange, but they do have a certain pattern.

Now, I have often asked myself, well, why do the reports exist in the first place? And how many are reported?

Whenever I give a presentation to some group I frequently will ask them, well, how many of you have seen something in the skies you couldn't explain; that is a UFO, or some friend whose veracity you can vouch for?

I have been surprised to find that 10 to 15 percent, albeit it is a specialized audience, they are there already because they are interested, hence there is a selection factor, but nonetheless I am quite surprised that many respond.

Then I ask the second one, Did you ever report it to the Air Force? And maybe one or two will say that they have.

Now, why, then, should people make reports anyway, since they face such great ridicule? They do it for two reasons, those that I have talked to: One, is out of a sense of civic duty. Time and again I will get a letter saying, I haven't said this to anybody, but I feel it is my duty as a citizen to report this. And many letters come to me. In fact, even saying, please do not report this to the Air Force.

The second reason is that their curiosity finally bugs them. They have been thinking about it and they want to know what it was they saw, and many letters I get will end in a rather plaintive note, can you possibly tell me, or can you tell me whether it is possible what I saw?

Those two reasons are the "springs" of why the report is made in the first place. I don't know how much store can be put in the Gallup poll, but I understand when, about 2 years ago a poll was made on this subject, there was something like -- the poll reported 5 million people, 5 million Americans had seen something in the skies they could not explain. Over the past 20 years the Air Force has had some 12,000 reports. Therefore, one can logically ask, who is holding out on the other 4,988,000 reports?

I think there may be quite a reservoir of reports that simply have not come out into the open because of this natural reluctance of people to speak out.

Mr. Roush. Dr. Hynek, your experience has been similar to mine, although much more extensive. In the 10 years I have served on this committee I have had occasion to ask various witnesses their beliefs

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as far as UFO's are concerned. They have included Air Force generals and Army generals, and usually they display a great interest. Sometimes they will say, I don't believe, But my wife does; some will say.

The other day I was engaged in a colloquy over on the floor of the House, not a part of the record, but just as a side conversation, with two of my colleagues who sit on this committee.

(At this point, discussion was off the record.)

Mr. Roush. Back on the record.

As a result of my experience on this committee I have been privileged to visit the tracking stations which NASA has throughout the world. Each place I have visited I have asked the question, "Have you tracked any unidentified flying object?"

Well, it is obvious they apparently don't have the ability to track, but the response was "No," everywhere except in South Africa. Then they said, "anything we track, which we do not understand, we turn over to the Department of Defense," inferring there were some things they did not understand.

The same is true with those places in the world where there is a Baker-Nunn camera. I asked the same question of them. For the most part there was a boundless curiosity, but a negative response.

Dr. Hynek. I might respond to that, of course, in talking to them, you have represented officialdom, and they may themselves be a little afraid to say anything to a Congressman that might get them into trouble.

But I get reports sub rosa that are to the effect that people, trackers, and so forth, have seen things, but they would not dare think of reporting it.

Now, that is hearsay. I am sorry it is not hearsay; it has happened to me.

But it is not what I would call "solid evidence,"

Mr. Roush. Just one other comment. I serve on the board of trustees of a college back in Indiana. In the course of a year they had numerous lectures by outstanding people in their lecture series, quite outstanding people on various subjects, but they scheduled one lecture given by a student at the college on unidentified flying objects. Needless to say, he had the best attendance of the entire series.

Dr. Harder.

Dr. Harder. Following on something that Dr. Hynek said about the small percentage of actual sightings that are reported, this would suggest that the two instances that I brought out, which to my knowledge are the only extant pieces of what you might call scientific information -- information containing information of a scientific nature, might well be multiplied by a factor of 10, if it were not for this ridicule bit, and furthermore, if it were not the subject of ridicule, many people would perhaps take greater care in the observations that they do make, and perhaps come up with similar kinds of anecdotal nature of somewhat more importance than just flashing lights.

For instance, the plane of polarization or -- well, many kinds of observations came to us. We would have even at this point far more anecdotal information of a scientific nature and of scientific importance than we now have.

Mr. Roush. I think those of you who have sat on this panel today have made perhaps a greater contribution than you realize in adding

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some respectability to the interest the American people have in this phenomena. Perhaps we can, by further activity on the part of this committee, and you on your part, and by the public reading what you have said today, cause people to be more responsive and to report what they see. Perhaps we can thereby give an air of respectability to these sightings which will permit people to go ahead without being embarrassed or ashamed of reporting what they have seen.

Does anyone else have anything here?

Mr. Fulton. Mr. Chairman, sightings of UFO's in western Pennsylvania have now increased to the point where interested citizens have established a UFO Research Institute with a 24-hour answering service, to investigate reports and sightings.

In my congressional district, there is the Westinghouse astronuclear plant, whose fine work is well known to the members of our committee. As I have been asked by Mr. Stanton T. Friedman, a nuclear physicist at Westinghouse who makes a hobby of investigating UFO sightings and publicly speaking on the subject, it is a pleasure to insert a statement by Mr. Friedman, "Flying Saucers Are Real" into the record at this point. He is one of the few observers with the candor to conclude and so state that "the earth is being visited by intelligently controlled vehicles" from outer space.