

The World of Flying Saucers

A SCIENTIFIC EXAMINATION OF A
MAJOR MYTH OF THE SPACE AGE

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To FRED L. WHIPPLE, whose studies have added much to our knowledge of meteors—which have furnished more than their share of UFOs.

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Figure 18. Courtesy *True, The Man's Magazine*. Copyright 1952, Fawcett Publications, Inc.

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PREFACE

Both as scientists and as devotees of science fiction, we have long been interested in space travel. When reports of unidentified flying objects began to increase in the years between 1947 and 1952, one of us (D.H.M.) collected and studied the limited information available about the sightings. He soon concluded (with a slight feeling of disappointment!) that the flying saucers were not vehicles from other worlds but were only mundane objects and events of various kinds, some of them commonplace, some familiar chiefly to meteorologists, physicists, and astronomers.

At a conference with Air Force officials in Washington in April 1952, he presented his idea that planetary mirages, sundogs, reflections, and other astronomical, atmospheric, and optical phenomena probably accounted for a large percentage of the mysterious UFOs. This suggestion met with strong skepticism from some of the conferees who at that time were sympathetic to the interplanetary hypothesis and were, of course, better acquainted with military than with physical science. Other conferees, however, wished to consider and test the theories offered. Proof obviously required a knowledge of all the facts of a given sighting, facts that often were not available to the public. The Air Force therefore granted access to the file of UFO cases. At the same time, since many of the cases were then classified as secret, the Air Force imposed the condition that security regulations must be strictly observed.

D.H.M. was then preparing a book to present his explanations of flying saucers. Acceptance of the Air Force offer, with the accompanying restriction, would have prevented his publishing analyses based on material in the files. It would also have hindered any future public discussion of the UFO problem. For these reasons he felt compelled to decline the opportunity.

In the spring of 1959 as we began planning the present book, we

again requested permission to study the Air Force records of UFO sightings. This time the officials generously opened their files to us without restriction. Thus we have been able to include detailed studies of particular incidents, to give the explanations found for most of them by Air Force investigators, to explain the causes of some hitherto unsolved cases, and to suggest highly probable solutions for several classic "Unknowns."

To discuss each one of the thousands of unidentified flying objects reported during the last fifteen years is obviously impossible. We have therefore chosen to describe the common types of sighting and to analyze some of the representative and most interesting cases in each category. In general we have avoided using the names of the persons involved; but when the names are well known to the flying-saucer public and have previously appeared in print, we have felt no obligation to disguise them.

Many persons have contributed to the material in this book. Members of the United States Air Force have generously helped us to collect the basic facts, and have shown amazing patience in answering hundreds of small questions of detail. In particular, we wish to thank Col. Philip G. Evans, Col. Edward H. Wynn, Lt. Col. William T. Coleman, Lt. Col. Robert J. Friend, Lt. Col. Lawrence J. Tacker, Major Carl R. Hart, and Sgt. David Moody.

Others who have helped us in various ways include Dr. Isaac Asimov, Mr. Carleton Atherton, Miss C. M. Botley, Mr. Wilfred J. Chambers, Mr. Albert M. Chop, Dr. Leon Davidson, Mr. Charles W. Dean, Mr. John F. Gifford, Mr. Richard Hall, Mr. Theodore Hieatt, Prof. Seymour B. Hess, Prof. J. Allen Hynek, Dr. Luigi G. Jacchia, Mr. Craig L. Johnson, Dr. Urner Liddell, Mr. Oscar Main, Prof. Charles A. Maney, Dr. Richard E. McCrosky, Mr. John W. McLellan, Capt. William B. Nash, Dr. Thornton W. Page, Dr. Vernon G. Plank, the late Dr. H. P. Robertson, Dr. Donald H. Robey, Dr. Carl Sagan, Dr. Clyde W. Tombaugh, Mr. John Walkin, Prof. Fred L. Whipple, and Mr. John G. Wolbach.

D.H.M.
L.G.B.

THE WORLD OF FLYING SAUCERS

Chapter 1

THE SAUCER WORLDS

Thousands of reports of “flying saucers,” “unidentified flying objects,” or “UFOs” have appeared in print during the last fifteen years. Although most of the things seen have later been explained as unusual but normal phenomena, some enthusiasts continue to regard them as mysterious, and thus help perpetuate the myth that the “saucers” are actually spaceships from other planets, busily carrying out a patrol of the earth.

This saucer myth owes an unacknowledged debt to Charles Fort, a talented reporter, writer, and self-appointed gadfly of science. With a strong curiosity about the world of nature but without training in the disciplines of research, Fort liked to challenge scientists in general and astronomers in particular with tales of “impossible” happenings culled from books of folklore, old journals, and newspapers. He mistrusted orthodox knowledge because, he believed, it smugly damned to oblivion all reports of marvels that it could not explain: pyrogenic persons; rains of fish, frogs, and stones; accounts of telepathy, teleportation, the vanishing of human beings, luminous objects in the sky. Although he never claimed that he believed the stories himself, Fort enjoyed collecting them and before his death in 1932 had completed four volumes of these anecdotes.

Science-fiction writers have found an inexhaustible mine of ideas in *The Book of the Damned*, *New Lands*, *Lol*, and *Wild Talents*, which also provide the chief elements of the saucer myth:

“Unknown, luminous things, or beings, have often been seen, sometimes close to this earth, and sometimes high in the sky. It may be that some of them were living things that occasionally come from somewhere else in our existence, but that others were lights on the vessels of explorers, or voyagers, from somewhere else.” [1]

These extraterrestrials may have been in communication with earthmen for many years, Fort suggested, and they may sometimes kidnap and carry away human beings.

UFO Reports and the Air Force

Most flying-saucer reports have come from reliable citizens who have seen something extraordinary, something they do not understand. Genuinely puzzled, they often report the incident to the nearest Air Force base. The evaluation of such cases is the responsibility of the United States Air Force. Since the beginning of the saucer scare in 1947, the chief investigating agency has been that at Wright-Patterson Air Force Base, Dayton, Ohio, and has borne a succession of names—Project Sign, Project Grudge, Project Blue Book, and the Aerial Phenomena Group of the Aerospace Technical Intelligence Center, usually known as ATIC. Until recently this group operated under the jurisdiction of the Assistant Chief of Staff, Intelligence. On July 1, 1961, it was transferred to the jurisdiction of the Air Force Systems Command. To simplify discussion in this book, however, the group that investigates unidentified aerial phenomena is generally referred to as ATIC.

In military parlance the phrase “unidentified flying object,” abbreviated as UFO, is used to indicate any air-borne phenomenon that fails to identify itself to, or to be identified by, trained witnesses on the ground or in the air who are using visual or radar methods of observation. Created in the early days of the saucer era, the term UFO is unfortunately misleading because it seems to imply that the unknown is a solid material object. Many of them are not. The more dramatic phrase “flying saucer” is similarly misleading because not all the unknowns are shaped like a saucer, and not all of them are flying. Since no one has been able to devise a more accurate brief term that will apply to all reports in this category, both “UFO” and “flying saucer” have remained in common use.

Air Force investigators and scientists have been able to account for almost every reported “spaceship” as the result of failure to identify some natural phenomenon. Some were the product of delusion or deliberate hoaxes. A few remain technically “Unknown”

because, although the probable explanation is obvious, too few facts are available to permit a positive identification. No such report suggests the possibility that interplanetary craft are cruising in our skies.

The Scientist's View

If a spaceship from another planet should ever visit the earth, no one would be more eager to acknowledge it than our government officials and our scientists. All governments would feel their responsibility to protect the human race if necessary, and to establish diplomatic relations with the alien race if possible. The scientists would want to study, analyze, and try to understand the nature of both the ship and its occupants.

Many persons, sincerely believing that flying saucers do exist, berate the investigator who denies their reality and characterize him as stupid, willfully obtuse, or intellectually dishonest because he does not accept the saucer reports at face value but weighs them by the same methods most of us use in weighing evidence in everyday life. When told there's a horse in the bathtub, for example, the sensible man realizes that the alleged visitation, while not impossible, is extremely improbable. Therefore he does not immediately begin speculating on the color of the horse, where it might have come from, what its purpose may be, and whether it will wreck the bathroom. Instead he adopts the scientific method and first goes to find out whether the horse is really there.

Like Fort, some flying-saucer believers are consciously or unconsciously antagonistic to the scientific method and resent its restrictions as a child objects to discipline. Suggesting that a strictly logical approach deprives us of valuable truths about the nature of the universe, and bluntly asserting that present-day physicists and astronomers have closed their minds to the possibility of new knowledge, these enthusiasts imply that we should require less rigorous proof for the reality of saucers than for other types of physical phenomena.

Because so many amateur investigators have misunderstood, misrepresented, and condemned the scientists' attitude, the authors of this book (asking the indulgence of their colleagues) will briefly

outline the principles a researcher ordinarily applies to the study of any new problem—the nature of radioactivity, the cause of a disease, or the origin of flying saucers.

The Question of "Evidence"

Most physicists, chemists, biologists, and astronomers will agree that life in some form probably exists in other parts of the galaxy. These other life forms, if they exist, may or may not have a kind of intelligence similar to our own; if they have, we might or might not be able to recognize it. Such speculations, while fascinating, lie entirely in the realm of theory. They are not facts and do not provide the slightest support to the often stated corollary that intelligent creatures do live on other planets and frequently visit the earth.

In approaching the spacecraft hypothesis, the scientist asks first: What facts are we trying to account for? And second: Does the spacecraft theory account for these facts better than the normal explanations that are already available? After studying hundreds of UFO reports, however, he concludes that much of the startling "proof" that saucers are spacecraft is merely inference. Of the established facts, none requires a new theory to account for it; and no evidence exists that even faintly suggests, to the expert, that interplanetary visitors are involved.

In the study of UFO phenomena this question of "evidence" is crucial. The careful investigator tries always to distinguish sharply between an observed fact, which is evidence, and an interpretation of that fact, which is not evidence no matter how reasonable it may seem.

As a simple analogy, consider this situation: A man is sitting in his living room late at night; the rest of the family have gone to bed. Suddenly he is startled by a loud noise somewhere upstairs. Trying to account for the noise, he thinks of various possible causes—a burglar, the "settling" of the house, a mouse in the wall, someone dropping a shoe, the wind rattling a door, the sonic boom from a distant plane. If, without having further information, he decides that any one of these is the true cause, he is accepting a guess as though it were a fact. The real cause of the noise may be one of

these or it may be something else that he hasn't even thought of.

Amateur investigators of UFOs publish many reports which they characterize as absolute proof that spaceships exist. The expert, analyzing the same reports, finds no proof at all because the actual facts and the interpretations of the witnesses are hopelessly confused. An early UFO case provides a typical example.

According to Air Force records [2], on the morning of December 6, 1952, a B-29 bomber was over the Gulf of Mexico returning from a training mission. At 5:25 A.M. the student radar operator, using an uncalibrated set, observed four bright blips (radar jargon for bright spots on a radarscope; such a spot indicates the presence of an object reflecting the radar pulses, but does not reveal the nature or shape of the object). The blips were apparently returns from objects about twenty miles away, in no specific group, which rapidly moved off the scope. Similar groups of fast-moving blips appeared at intervals during a period of about five minutes, and appeared also on two auxiliary radarscopes. After the first set was calibrated, the blips reappeared; none was observed after 5:35 A.M. From the radar data estimates of size and distance were made; calculations based on these estimates indicated a probable speed of 5000 to 9000 miles an hour. During the ten-minute period two visual observations were made, lasting about three seconds, which bore no obvious relation to the radar observations: at the right of the plane one crewman saw a single blue-white streak going from front to rear under the wing, and another crewman saw two flashes of blue-white light.

An explanation of the incident was not found immediately, and ATIC at first classified it as an Unknown. Some saucer enthusiasts interpreted the facts to mean that several groups of saucers had been in the area, machines flying so fast that they were visible only as blue-white streaks, whose presence was confirmed by radar. These conclusions were merely deductions from fact, not observed facts. The radarscope is not a camera and does not, at least at present, picture the shape or physical structure of the phenomenon it reports; it shows only spots of light that change position and size. Similarly, the blue-white streaks were mere flashes of light without size or shape.

In a later study of the evidence, the Air Force experts recognized this incident as one of false targets on radar (see *Chapter VIII*).

The radar phantoms may have been caused by beacon returns triggered by another radar; by variations in the atmosphere; or, if "ducting" conditions existed, by reflections from objects that were far beyond the normal range of the radar set. The blue-white flashes had no relation to the radar returns and were probably meteors; the date corresponded with the beginning of the annual Geminid shower (see *Chapter v*).

This Gulf of Mexico incident is neither complicated nor puzzling. We mention it chiefly to illustrate why the saucer enthusiasts so often disagree with the conclusions reached by the Air Force experts. The amateur assumes that the instrument operated faultlessly and detected a solid object; he uses these assumptions to interpret the data, uses the interpretation as fact, and by this "bootstrap" process deludes himself into thinking he has proved what he assumed in the first place.

Various Types of UFO

A biologist trying to identify a group of unusual animals which are said to represent a new species begins by collecting all possible information about their appearance and behavior. After he has determined their typical size, shape, color, mode of reproduction, manner of locomotion, etc., he compares these characteristics with those of animals of known species and eventually classifies the strange specimens. In a similar way the professional investigator of UFO phenomena begins by asking the question: What is a typical unidentified flying object?

The published reports comprise a heterogeneous collection of facts, fiction, and guesses. The investigator must first separate and discard accounts that are obvious hoaxes or delusions. There are many of these. The remaining material he divides into two classes. The first includes statements made by competent, careful witnesses, describing what they have seen and heard—for example, "I saw a brilliant light moving swiftly without sound." The second class includes statements of opinion or belief about the thing seen—for example, "The strange light obviously was controlled by intelligence." Putting aside this second class of material for the time being, he

looks at the information in the first and immediately faces an awkward conclusion: apparently no "typical" flying saucer exists.

Descriptions of UFOs

No two reports describe exactly the same kind of UFO. There are dozens of types of saucers, resembling each other as little as turnips do comets. Hoping to find some consistent pattern, the investigator opens his notebook and starts listing the data.

Shape—The flying saucer varies greatly in shape (see Figure 1). At different times and places it may be a circular disk like a saucer, often with a small protrusion in the center like the knob on a tea-kettle lid; elliptical or bean-shaped like a flattened sphere; a circular base supporting a dome-like superstructure; a sphere surrounded by a central platform, like Saturn in its rings; long and thin like a cigar; a tapered sphere like a tear-drop; spindle-shaped, with or without knobs on the ends; or a double- or triple-decked form like a stack of plates.

Size—The saucer varies greatly in size. Estimated diameters range from 20 or 30 feet to several thousand. While under observation it may instantaneously increase or decrease in size.

Color—The saucer varies greatly in color. It may be white, black, gray, red, blue, green, pink, yellow, silver; may be luminous or dull; may be a solid color; may be circled by a central band of different color; may display flashing lights of various colors. It may change color or luminosity while being observed.

Motion—The saucer displays a wide variety of motions. It may travel very slowly; very fast, approaching the speed of light; at jet speed; at meteoric speed; may hover motionless over one place. At any speed it can instantaneously change velocity and direction of motion—can move horizontally, vertically, toward the observer, away from the observer, in a straight path, a zigzag, a spiral. Like the Cheshire cat, it can vanish instantly or slowly fade away.

Means of propulsion—Unknown. Some saucers move in complete silence; others produce noises: a hiss, a whistle, a roar, a thunder-clap, or a detonation like a sonic boom.

Incidence—Saucers may appear at any hour of the day or night,

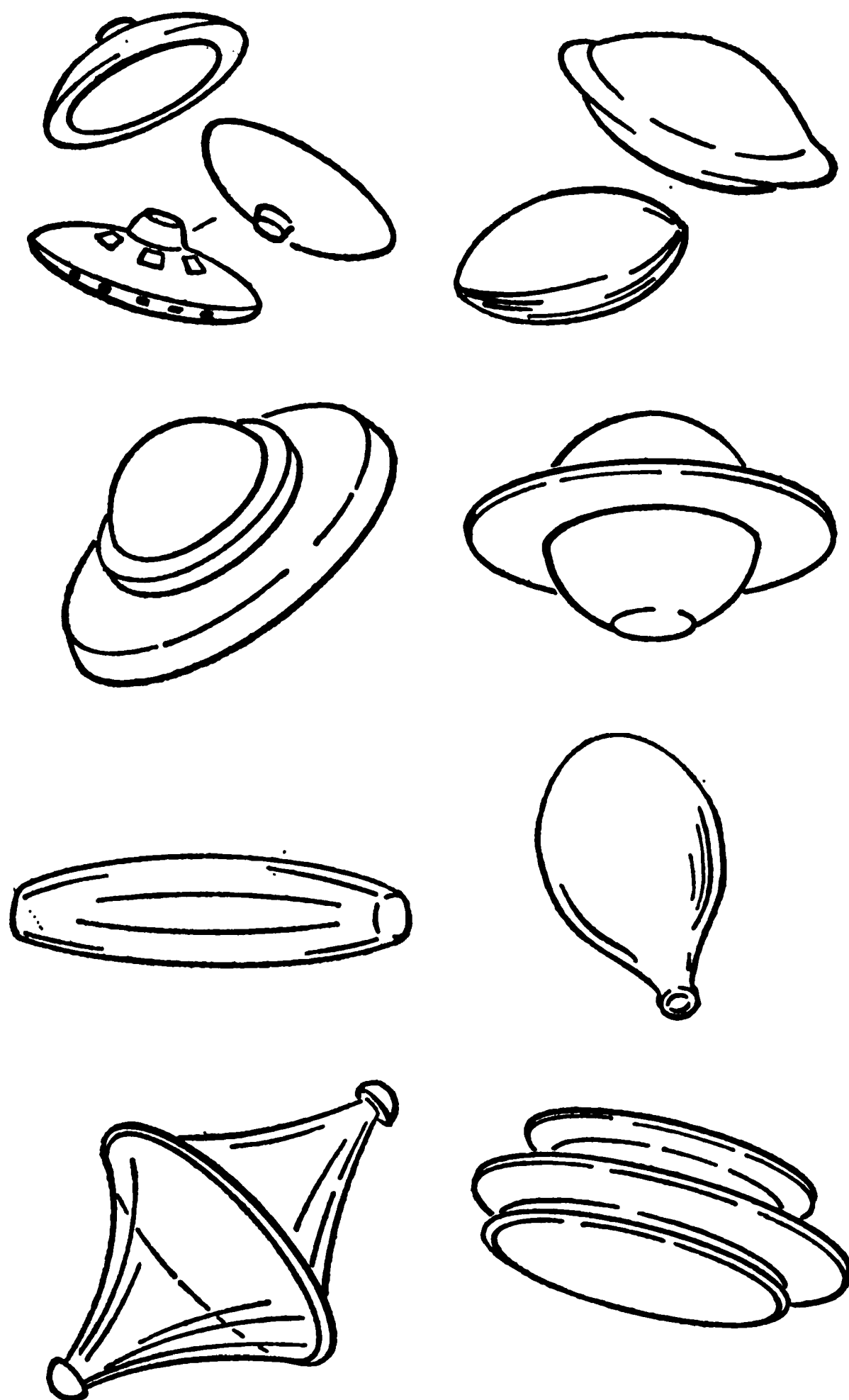


Figure 1. Shapes of various reported UFOs.

but they appear most frequently in the hours before and after sunset, and before and after sunrise. Their numbers may suddenly increase at certain places and certain times. The objects can appear singly, in random groups, in groups showing a geometrical pattern. A single object may split and multiply into a group, or a group may merge into one. Saucers almost always appear in the air, rarely on the earth's surface or in bodies of water. They almost never come within touching distance of the observer. The length of their stay varies greatly, from about two seconds to two or three hours.

Structure—Unknown. A saucer may be visible or invisible to the observer; visible to the human eye but not to the camera or radar; visible to the camera or radar but not to the eye. Some obey the laws of gravity and inertia, others do not.

Purpose—Unknown. No officials in the government, the press, the churches, or the universities have received any attempt at communication. No saucer has produced intelligible visible, audible, or radio signals.

Long before finishing this tabulation the investigator realizes that he is not dealing with one thing but with many. No single phenomenon could possibly display such infinite variety. However, before he starts trying to classify the descriptions and to explain them, he takes a look at the second class of material—the conclusions offered by saucer enthusiasts. Leaving the realm of observation for that of interpretation, he is suddenly catapulted into a world of fantasy.

A "Baedeker's Guide" to Saucerdom

One of the commonest themes in science fiction is that of parallel universes—a number of nearly identical worlds coexisting in alternate space-time continua. Occasionally, at a vulnerable spot, the barrier between two of these worlds will dissolve so that they overlap near the point of contact. After such an accident a man may find himself unhappily living two lives at once, identical in some ways but so different in others that if one is real, the other cannot be. Until the break is repaired and the incompatible worlds are safely separated once more, the man exists in a state of desperate confusion and performs agonizing mental acrobatics, trying to main-

tain a foothold in both worlds until he can decide which one is valid.

From the "damned" phenomena collected by Charles Fort, plus the legends of Atlantis, Mu, and Lemuria, flying-saucer addicts have constructed a multiplicity of such alternate worlds. Although they differ in minor ways, all are in direct conflict with the real world known to science. Let us ignore, for the moment, the descriptions given by the "contactees" (*Chapter x*) and consider only the beliefs and/or theories offered by serious proponents of the interplanetary theory and publicized by writers such as Donald E. Keyhoe [3, 4, 5], Aimé Michel [6], and Morris K. Jessup [7]. A "Baedeker's Guide" to saucerdom based solely on statements and speculations in the books published by these investigators would portray a fantastic universe:*

"In saucerdom, alien spacecraft continually visit the earth and have done so for centuries. Constructed and controlled by intelligent extraterrestrial beings, the craft perhaps come from secret bases on artificial earth satellites; on the moon; on Mars; on Venus; on Jupiter; perhaps on the planets supposed to be orbiting the binary stars 61 Cygni and 70 Ophiuchi; or from planets supposed to be in orbit around the stars Tau Ceti and Epsilon Eridani, about eleven light-years distant from earth. Radio transmitters serving as beacons for space navigation may exist on both Venus and Jupiter.

"These spacecraft can perform maneuvers that, on earth, are possible only for rays of light. They fly at speeds of many thousands of miles an hour, can reverse direction instantaneously at any speed, ascend or descend vertically, and hover motionless in the air. They accomplish these feats perhaps by using the power of cosmic rays and by generating and manipulating artificial gravitational fields, which they could also use to prevent the transmission of sound waves and to become invisible.

"The extraterrestrial visitors may be explorers sent to study the earth, descendants of a race living thousands of light-years away

* Following common practice in scientific discussion, we originally included the specific sources of important and/or controversial ideas described in this book and, for maximum accuracy, often used the original phrasing of the several authors involved. In this and certain other sections, however, we have been forced to abandon the more scholarly method of presentation because one author (Major Donald E. Keyhoe) refused permission to quote from his works.

from the solar system. They may be the ancestors of the human race, which itself is a remnant of a colony established on earth thousands of years ago and then abandoned. More than 300,000 years ago the inhabitants of earth had found the secret of space travel, and human beings mapped the earth by an aerial survey at least 5000 years ago. It is also possible that these craft come not from space but from time; they may be earthmen of the future who have traveled backward through time to explore their own past.

"The purpose of these visitors is still unknown. They shun close contact with human beings, rarely if ever land their ships, and never allow close-up photographs, perhaps because they are afraid of human savagery or are afraid of starting a panic. Nevertheless they attempt to signal to earthmen in various ways: they have caused the production of gigantic letters of the alphabet [U and Z] on earth radarscopes; from a material that radiates light they have built an enormous letter W, spanning more than 1000 miles on the surface of Mars; they have sent out wireless signals in Morse code to represent the letter S. They may occasionally abduct earthmen in order to use them as language teachers.

"Although these visitors are probably not hostile to human beings, they often manifest their presence in destructive ways. They cause many airplane crashes; seize and carry off ships, human beings, and airplanes; destroy flocks of birds; interfere with the operation of radio, TV, gasoline and electric motors; pelt the earth with rocks, metal, and strange organic substances; create loud noises and detonations; damage the windshields of cars; set fire to highways; hurl various types of missiles; drop chunks of ice; cause storms; and cause radioactive rain.

"One of the most peculiar features of saucerdom is the role played by government officials and scientists who, knowing the space visitors are real, yet deny their existence and unite in a gigantic conspiracy to deceive the public."

These excerpts from a hypothetical Baedeker have summarized the ideas publicized by the most literate and most persuasive advocates of the saucer theory. The chapters that follow will examine certain flying-saucer cases. As the discussion continues and is able to account for specific UFOs in terms of normal physical phenom-

ena, these anarchistic worlds of saucerdom will gradually dissolve and merge with reality as we know it—a world that holds many mysteries but is still subject to the laws of nature.

[1] Fort, Charles. *Lol* New York: Claude H. Kendall, 1931.

[2] Air Force Files.

[3] Keyhoe, D. E. *The Flying Saucer Conspiracy*. New York: Henry Holt & Co., 1955.

[4] ——— *Flying Saucers from Outer Space*. New York: Henry Holt & Co., 1953.

[5] ——— *Flying Saucers: Top Secret*. New York: G. P. Putnam's Sons, 1960.

[6] Michel, A. *The Truth about Flying Saucers*. New York: Criterion Books, Inc., 1956.

[7] Jessup, M. K. *The Case for the UFO*. New York: Citadel Press, 1955.

Chapter II

LO!

The overture to the *Flying Saucer* opera took place in the summer of 1947, presenting the main themes that were to develop with fantastic variations during the fifteen-year-long drama that followed: mysterious apparitions in the sky, alleged interplanetary visitors, government investigators, growing public excitement, civilians who zealously encouraged the hysteria, and, as a climax, an elaborate hoax that produced material "evidence" to prove the existence of spaceships.

Arnold's Nine Disks

The first man to report a flying saucer was a veteran pilot named Kenneth Arnold, representative of a fire-control equipment firm in Boise, Idaho. On the afternoon of June 24 Arnold was flying a private plane on his way from Chehalis to Yakima, Washington. Above the Cascade Mountains at about 9200 feet, he noticed a series of bright flashes in the sky off to his left. Looking for the cause, he saw what appeared to be a formation of peculiar aircraft approaching Mount Rainier at fantastic speed. There were nine very bright, disk-shaped objects which he estimated to be twenty to twenty-five miles away, forty-five to fifty feet long, and traveling at a speed of almost 1700 miles an hour. Talking with a reporter that evening, Arnold said that the objects "flew like a saucer would if you skipped it across the water." In a later report to Air Force Intelligence he stated: "They flew very close to the mountaintops, directly south to southeast down the hogback of the range, flying like geese in a diagonal, chainlike line, as if they were linked together. . . . They

were flat like a piepan and so shiny they reflected the sun like a mirror." [1]

Newspapers all over the country picked up the story and printed it under headlines describing flying pies, flying piepans, and flying saucers. Alert to the possibility that the objects might have been a new type of aircraft of Russian origin, investigators from Military Intelligence interviewed Arnold and officials from Air Technical Intelligence requested a report.

No one doubted Arnold's word. He was an experienced pilot, a respected citizen, and a careful observer. Nevertheless his description showed some inconsistencies that made it difficult to decide what the nine disks really were. If they had actually been forty-five or fifty feet long, they must have been much closer than he thought; objects that size would not have been visible at a distance of twenty to twenty-five miles. However, if the estimated distance was correct, then in order to be visible the objects must have been much larger, at least 210 feet long. One of the estimates must be wrong—but which one? Until that question was settled, the computed speed was meaningless, since to estimate the velocity of a moving object an observer must know either its true distance or its true size. Even after a careful study, Air Force investigators could not identify the disks; they might have been clouds, a mirage, or some kind of aircraft, but no definite answer was possible from the evidence available.

Predictably, after so much publicity, a rash of similar sightings broke out all over the country and continued for the rest of the summer. During the hot months of the "silly season," newspapers are traditionally hospitable to tales of barnyard freaks, sea serpents, and man-bitten dogs. Such stories were now shoved aside as people in every state began to report unorthodox objects sailing through the sky—flying disks, flying dimes, flying ice-cream cones, flying shoe heels, and flying hubcaps. Seeing saucers became a national pastime, but Arnold, who had reported the strange objects in all good faith, resented the implied ridicule. Deluged with telephone calls and mail, he resolved to keep silent in the future even if he should happen to see a ten-story building flying through the air.

In spite of the publicity, the flying-saucer scare would probably have died with the first frost of autumn but for the efforts of a

talented writer, editor, and publisher of science fiction, Raymond A. Palmer. Among the many letters Arnold received was one from Palmer, then editor of *Amazing Stories*. Tired of being laughed at, Arnold found the tone of "sincere interest" so appealing that he answered the letter [2]. After a second letter a week later, he changed his mind about keeping silent and agreed to sell his story for publication.

Under the title, "I *Did* See the Flying Disks," the article appeared in the first issue of a new magazine, *Fate*, which published "true stories of the strange, the unusual, the unknown." [3] Although Arnold was not a professional writer, he had the assistance of an expert and produced a vivid, clearly written story—Palmer had had unusual experience in helping fledgling authors tell their tales. Interesting differences between Arnold's original statements and those in the magazine version demonstrate how much he must have owed to editorial help. Without it, he might not have included certain colorful details that he had apparently overlooked earlier. In his original reports, for example, he said that he had at first supposed the disks to be some type of experimental aircraft; in the magazine version he added that, even at the time, the objects had given him "an eerie feeling." In the intervening months he had also remembered more about their shape (see Figure 2). He no longer described them as saucerlike, flat and shiny like piepans. Instead, a drawing based on his revised account shows an object like the crescent moon with a sharp protrusion on the inner, concave side and a dark, mottled circle marking the center of the top surface. Furthermore, he told the readers of *Fate*, one object had been darker than the others and of a slightly different form—a detail he had forgotten to mention to reporters, to military officials, to his friends, or even to his wife.

Arnold had never been much of a reader and was not a science-fiction fan, but his interests were obviously widening. The next two issues of *Fate* carried other articles under his name. Palmer's growing influence is suggested by the titles: "Are Space Visitors Here?" [4] and "Phantom Lights of Nevada." [5]

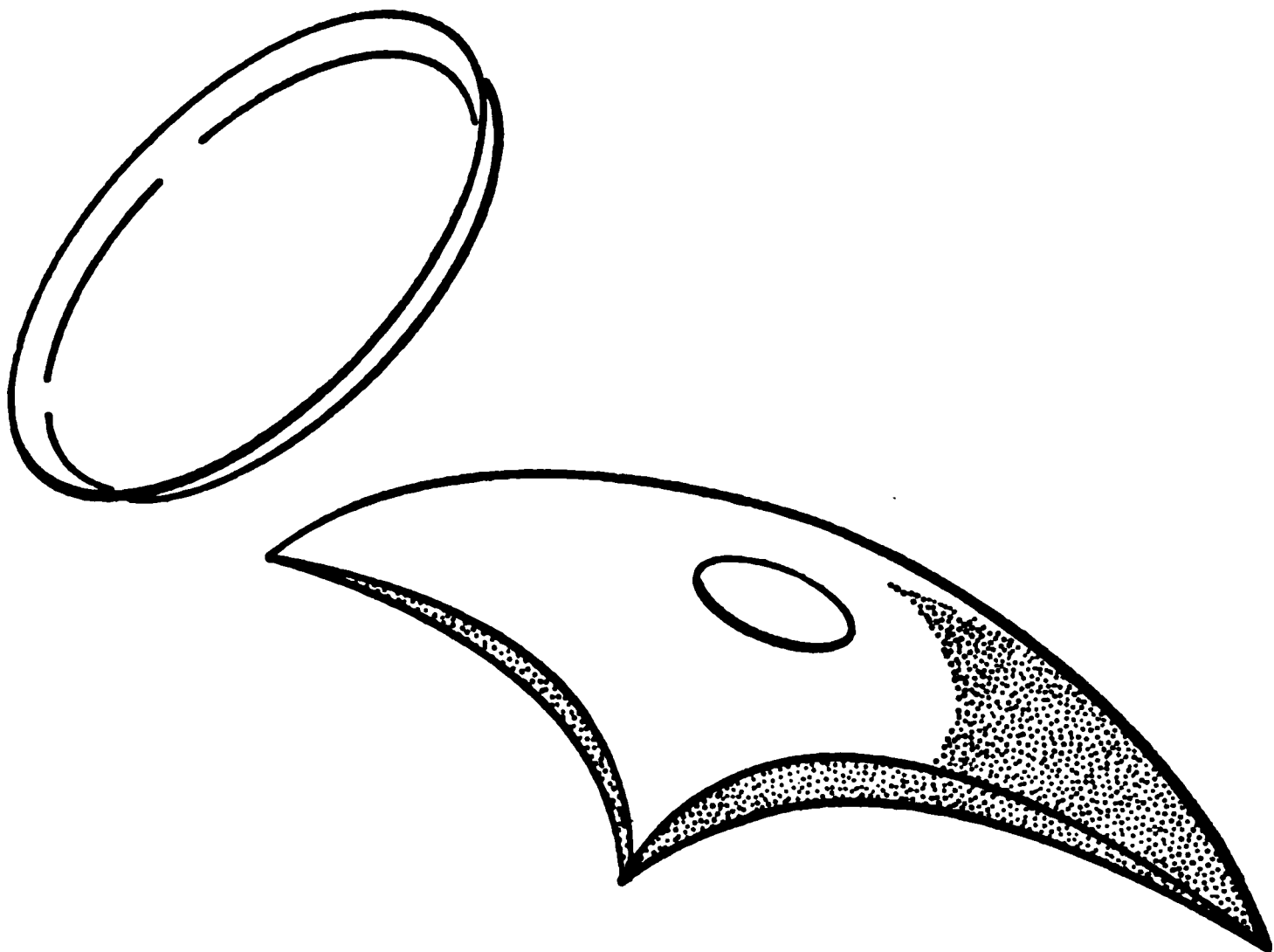


Figure 2. Arnold's flying saucers. Left, as first described; right, as later sketched.

The Great Shaver Mystery

Ray Palmer lays claim to being "the *first* flying saucer investigator" [6], although he frankly admits his debt to the writings of Charles Fort. Any full account of the saucer era must include the names of other enthusiasts such as Adamski, Bethurum, Scully, Cramp, Keyhoe, Jessup, Michel, and Wilkins, but none merits so much credit for keeping the saucers flying as does Palmer. He not only opened the pages of his magazines to the first saucer reports but also, in the beginning, paid the witnesses for their stories.

In 1947 Palmer was the editor of *Amazing Stories* and *Fantastic Adventures*, two of the great magazines of science fiction in which stories of spaceships and interplanetary travel have long been commonplace. For several years he had been hinting to readers of these magazines that alien spaceships might *actually* be cruising in our skies, but *Fate* was the first magazine that seriously promoted the idea. No man was better qualified to glimpse the dramatic possibilities of flying saucers. Born in Wisconsin in 1910, Palmer had

begun reading *Amazing Stories* soon after it started publication in 1926. Turning to writing, he showed the remarkable persistence that has characterized his life. Although he received 100 rejections before he sold his second story, he stubbornly kept on until he not only achieved success as an author but also, in 1938, became managing editor of *Amazing Stories* for the Ziff-Davis Publishing Company. Under Palmer's guidance, ". . . the entertainment side of science fiction took over. . . . Gone were the ponderous styles, the verbiage, the highly technical explanations of what mattered little in the first place. The stories took on pace and excitement, the characters in them were faced with human problems, the dialogue was realistic. . . ." [7]

Alert to the tastes of his readers, Palmer carried the magazine to new heights. Many science-fiction fans (including the present authors) still remember that golden age around 1940 when *Amazing* came out every month with 146 pages full of startling, fantastic, wonderful stories of how life might be on other worlds and in other galaxies.

In January 1944 began the publishing drama that for a time changed the direction of *Amazing* and heralded the advent of flying saucers. The "Discussions" department that month included a letter captioned "An Ancient Language?" which introduced what came to be known both as the Great Shaver Mystery and the Great Shaver Hoax. Signed "S. Shaver," the letter began:

"Sirs: Am sending you this in hopes you will insert in an issue to keep it from dying with me. It would arouse a lot of discussion." [8]

It did indeed. The letter announced the discovery that words and syllables of the ancient Atlantean language still exist in English today; hence the legends of Atlantis must be true and a "wiser race than modern man" must once have existed on the earth.

Richard Sharpe Shaver was then living in Barto, Pennsylvania, and operated a welding machine in a war plant. In writing to thank the editor for publishing his letter, he enclosed a manuscript called "Warning to Future Man" which purported to give his memories of life in the fabled continent of Lemuria. The information had been preserved in "thought records" hidden in secret caves. By "telaug," a kind of audio-visual telepathy, he had begun to remem-

ber his forgotten past when, through the noise of his welding machine, he heard voices. After visiting Shaver and probing his “memories,” Palmer bought the story. He didn’t like the way it was written, however, so he rewrote it, added material that expanded it to three times its original length [9], changed the title to “I Remember Lemuria,” and started advertising it well in advance of publication as a *true* story:

“Twelve thousand years ago the Lemurians and the Atlanteans disappeared from the Earth. Where and why did they go?” [10] This story would show that Newton and Einstein were all wrong, Palmer promised, and would reveal new concepts of gravity, the nature of matter, and the foundation for physical mathematics.

Thus began the controversy that rocked the world of science fiction. Since Palmer has affirmed that “Flying saucers are a part of the Shaver Mystery—integrally so” [11], we turn to the old files of *Amazing Stories* to trace their development.

The first of the Shaver series, “I Remember Lemuria” appeared in March 1945 [12], along with “Mantong, The Language of Lemuria,” an article signed by both Shaver and Palmer, and other stories followed quickly in succeeding issues of *Amazing*. The basic themes were shopworn—a jumble of Fortean ideas, Plato’s fables, and mystic science—but when brightened by Palmer’s magic pencil, they seemed fresh and exciting: The earth had an ancient past, now forgotten. The lost continents of Atlantis, Lemuria, and Mu had been colonized many thousands of years ago by superior beings from another planet who could travel through space by utilizing forces unknown to present-day earthmen. Eventually these noble aliens had been forced to abandon the earth to escape evil radiations coming from our sun, but they had left descendants who still lived on earth in concealment in great subterranean cities that could be entered through certain caves. The underground dwellers in the hidden world had retained all the secret powers of their ancestors. They could communicate by thought transference, could speak to earthmen by mental “voices,” and could travel on beams of light because they understood the true nature of gravity and magnetism. These creatures were divided into two opposing groups, one good and one evil. The dero (detrimental robots) were the bad guys and they caused all the unexplained accidents and misfortunes that happen

to human beings. The tero (integrative robots) were the good guys; they warned earthmen of danger and tried to protect them from the destructive forces of the dero.

Reader response to these fantasies was phenomenal. Fan mail zoomed from 40 or 50 to 2500 letters a month [13], and the magazine's circulation increased by some 50,000. As the records of "racial memory" continued to appear, connoisseurs of good science fiction began to cry "Hoax!" but their protests had no effect. Thousands of new readers were buying the magazine and many of them were beginning to recall and report "memories" of their own. Since the "Discussions" columns could not take care of so many letters, Palmer opened a new department, "Report from the Forgotten Past" [14], and urged the readers to send in their personal experiences with the hidden world. Did they ever hear strange voices? Receive mysterious messages through the air? Suspect that they were being affected by strange rays? Feel that they had been put on earth for some special mission? Have dreams that they could not explain? Have a strong urge to explore caves? Have memories of other lives? The editor was eager to learn of all such incidents. Through the Shaver stories, Palmer was already promoting the idea that interplanetary craft do visit the earth:

"There are many mysteries of the past that have intrigued investigators to an almost unbearable point. . . . What were the glories of Babylon? What truth is there in the Chinese legend of being the people of the Moon, and of coming to Earth in rocket ships? What was the mystery metal of the Lemurians, orichalcum? What was the secret of their airships that walked on beams of light?" [12]

When one correspondent informed him that space travel was possible "if one travels through curves but not through angles," Palmer replied, "Your editor is sincere—and he'd like to know everything you know. . . . For instance, please explain this space-travel business—about curves and not angles." [15]

For more than three years the columns of *Amazing* continued to assert, not as fiction but as fact, that interplanetary travel is a present reality and that the laws of physics are not valid. In a mystic mumbo jumbo the readers were told that the velocity of light, for example, was not the ultimate speed:

"Light speed is due to 'escape velocity' on the sun, which is not

large. This speed is a constant to our measurement because the friction of exd, which fills all space, holds down any increase unless there is more impetus. The escape velocity of light from a vaster sun than ours is higher, but once again exd slows the light speed down to its constant by friction, so that when it reaches the vicinity of our sun, no appreciable difference is to be noted. A body can travel at many times the exd constant, under additional impetus, such as rocket explosions. A ship whose weight is reduced to a very little by reverse gravity beam can attain a great speed with a very small rocket." [12]

Devotees of reasonable science fiction (who include many leading scientists) were writing angrily to Palmer, protesting that the Shaver hoax had gone too far, but their letters seemed only to amuse him:

"There have been some odd reactions, one of them being a promise by a fan group to 'expose' our 'hoax' (which was a compliment, by the way, because it was termed the 'biggest ever attempted in modern science fiction history'). We are waiting for this expose, [sic] with interest—because we are curious to know how a hoax which is not a hoax can be exposed as a hoax. We realize that a lot of our readers find it difficult to believe that we ourselves believe one single word of what Mr. Shaver tells us in his stories, but we'll keep on presenting the evidence as it comes in, and you can judge for yourself." [14]

Readers continued to object and many stopped buying the magazine, but Palmer persisted with ambiguous hints that spaceships were really here. A full year before the first flying-saucer report he wrote:

"If you don't think space ships visit the earth regularly, as in this story ['Cult of the Witch Queen'], then the files of Charles Fort and your editor's own files are something you should see. . . . And if you think responsible parties in world governments are ignorant of the fact of space ships visiting earth, you just don't think the way we do." [16]

In succeeding months he became more and more explicit. In September 1946 he told one correspondent, "As for space ships, . . . personally we believe these ships do visit the earth. You, or any observer, would be inclined to call it something else if you did see one." [15] In the spring of 1947 he replied to a reader who asked

for concrete evidence that Shaver's stories were true: ". . . the mystery is not just 'are there caves with dero and tero in them?' but it has to do with space ships, other inhabited worlds, and so on." [17]

In June 1947, the month the first flying saucers were reported, the issue of *Amazing Stories* was an addict's dream [18]. The cover featured "The Shaver Mystery, the Most Sensational True Story Ever Told"; the four stories, 90,000 words, were all under the by-line of Richard S. Shaver. The entire magazine—editorial comments, discussion columns, and most of the feature articles—was devoted to the supernatural world of Shaver.

But the end was near. *Amazing* published its last Shaver story, "Gods of Venus," in the summer of 1948; as far as the magazine was concerned, the mystery was dead.

Who or what killed it? One version says that the publisher, William B. Ziff, ordered the series stopped because so many fans had quit buying the magazine. Palmer himself has given various explanations. He stopped the stories, he said at first, when he realized that such material did not really belong in a fiction magazine. Later he explained that he killed the mystery because he intended to go into publishing for himself and didn't want to leave his successor to handle "this hot potato." [19] Later still, he implied that publishing the stories was dangerous; that he had learned too much about the "hidden world," the sinister forces responsible for the plane crash that followed the Tacoma hoax. Said Palmer, "I wanted no more dead men on my hands." [11]

The Maury Island Fragments

The Maury Island Mystery, a complex and eventually tragic affair, occurred near Tacoma, Washington, less than 100 miles from the place where Arnold had sighted the nine disks. In this mystery, too, Palmer was involved. According to their story, two harbor patrolmen named Harold A. Dahl and Fred L. Crisman on June 31 had observed a group of six flying disks that hovered over their boat near Maury Island and jammed their radio when they tried to notify the authorities. One of the disks had seemed to be disabled, had showered down lavalike metallic fragments that damaged the

boat and killed the dog on board; the disks had then disappeared but the fragments remained as proof of the visit. The men also claimed to have taken some pictures that showed the six objects but were fogged as though by radiation. Back on shore, they had not telephoned the newspapers nor had they notified any government officials. Instead, they had mailed a box of the fragments to Ray Palmer, to prove that they had actually seen an accident to a flying saucer [20].

Crisman was no stranger to *Amazing Stories*. A science-fiction fan, he apparently had accepted the Shaver stories as literal truth. More than a year before the Maury Island episode he had written to Palmer, warning him that the knowledge contained in the Shaver stories was too dangerous to print. Identifying himself as an ex-Air Force pilot who had flown the Hump, Crisman explained that when he was in Burma, he had been exploring a cave when a dero attacked him with a mysterious ray that made a hole the size of a dime in his arm. Palmer had kept up the correspondence [21] and, some months later, received a telephone call from Crisman, then in Texas: for \$250, said Crisman, he would descend into a cave and take some actual pictures of the mysterious underground machines that Shaver had described. The result of this offer is not known, but in July 1947 Palmer received another letter from Crisman; he had witnessed an accident to a flying saucer and was sending a box of the fragments as proof [22].

Palmer considered buying the story for *Fate*, but first he asked Arnold, living close to the scene, to investigate the tale. Arnold agreed. Thus the first man to report flying saucers became also a victim of the first flying-saucer hoax.

With an advance of \$200 for expenses, Arnold flew to Tacoma and into a nightmare of mystery. The two men were elusive, their story full of discrepancies, their manner evasive. Wondering at first whether the affair was a hoax, Arnold finally attributed the strange behavior of the men to their fear of hostile saucers. Alarmed, he called in the help of Army Intelligence. Two officers arrived from Hamilton Air Force Base, California, and made a careful investigation. They found that Dahl and Crisman were not "harbor patrolmen" but salvagers of floating lumber; their boat was scarcely seaworthy and showed no evidence of major repairs; they couldn't

remember what they had done with the pictures they mentioned; and although the saucer accident was supposed to have occurred nearly six weeks earlier, they had never notified the authorities or even mentioned it to a reporter. The only evidence offered for the truth of their tale was the collection of "strange" fragments which were later found to be slag from a local smelter plant. Similar fragments could be found by the ton on Maury Island [20].

The officers concluded that they had wasted their time on a flagrant hoax, but the bewildered Arnold insisted that they take some of the fragments for analysis. Unhappily, on the way back to the base the plane crashed and although two passengers parachuted to safety, both officers were killed. At once fantastic rumors sprang up: that the Tacoma "disks" had been spaceships, and that the beings who operated the craft had been forced to arrange the plane crash so that no one could analyze the fragments of their disabled spaceship. Arnold himself seemed to believe that the crash had resulted from extraplanetary sabotage, but investigation showed a more ordinary cause. A burned exhaust stack had set the left wing afire; the blazing wing had then broken from the fuselage and torn off the plane's tail.

For a time government officials considered placing a charge of fraud against the two men who had started the unhappy chain of events. After further questioning, both had admitted that their "sighting" had been a hoax, planned merely to make their story more salable, but when first Arnold and then Military Intelligence had entered the picture, the hoax had simply gotten out of hand. Since the men obviously had never intended the tragic outcome and were not directly responsible for it, the idea of prosecution was abandoned [1].

Science Fiction Adopts the Saucers

No longer editor of *Amazing*, Palmer continued to promote the cause of flying saucers in the pages of *Fate*. During the early nineteen-fifties, the boom years of science fiction, he started other magazines—*Search*, *Mystic Universe*, *Other Worlds Science Stories*. After

a time, *Fate* began to concentrate on tales of the mystic and occult, while *Other Worlds* eventually took over the flying-saucer theme.

Starting as an orthodox magazine of science fiction, *Other Worlds* flourished until the general slump in the market caused it to suspend publication. Revived after a time, it has undergone several changes of editorial policy reflected in its changing names: *Other Worlds Science Stories*, *Flying Saucers from OTHER WORLDS*, *FLYING SAUCERS from Other Worlds*, *Flying Saucers the Magazine of Space Conquest*, and, since the spring of 1961 when the magazine became pocket-size, just *Flying Saucers*. Classic science fiction long ago vanished from its pages and all articles are "true" accounts of flying saucers and similar Fortean incidents.

Flying Saucers is probably unique in modern publishing history. Issued monthly or bimonthly at a price of thirty-five cents, the magazine does not pay its authors because, as the editor explains, "*Flying Saucers* is *not* a commercial project." Published by Palmer Publications, edited by Palmer, containing liberal amounts of editorial comment and at least one article by Palmer, a typical issue in 1960 [6] contained sixty-six pages and carried a small number of advertisements for telescopes, binoculars, Rosicrucian and similar mystic publications. The remaining ads featured books and magazines issued by Palmer Publications, Amherst, Wisconsin; books issued by Amherst Press, also of Amherst, Wisconsin; Saucerian Books, published under the aegis of Gray Barker, a contributing editor to *Flying Saucers*. "Austrogen," described as a face cream or clay for skin ailments, was obtainable from Palmer at a dollar an ounce. Another ad recommended something (the wording does not specify exactly what, perhaps a powder?) that helps make good chili. Readers could buy this too, from Palmer, for a dollar a pound or \$3.50 for five pounds. A combination dandruff remover, itch preventer, and restorer of hair color personally recommended by Palmer sold for \$5.00 a bottle, number of ounces not specified.

The dandruff remover was also recommended by Kenneth Arnold, whose flying disks had started the saucer epidemic. Arnold was advertising his "World Society of Flying Saucer" which would "hold no meetings, no minutes, no by-laws, no restrictions or regulations, no records outside of actual membership, no presidents, no vice-presidents, no secretary, or board of directors." For only

\$5.00 those who joined the society would receive twelve issues of *Flying Saucers* (which if ordered from Palmer Publications would have cost \$4.00), plus an official membership card. Arnold also offered for sale a crescent-shaped lapel pin in solid silver, supposedly just like the "original" saucers he had sighted in 1947; and, for the ladies, the saucers in pendant form. The addition of seven-point diamonds was optional.

The magazine has grown smaller, but its main theme is still flying saucers, which until recently have been interpreted as interplanetary vehicles. In December 1959, however, [23] Palmer announced in a lead article that flying saucers were *not* from outer space after all; instead, they came from secret earth bases located under the north and the south poles. The earth is actually shaped like a doughnut, not like a pear, he says, and has openings at both poles where the saucer people reside. Whether they are manned by dero or tero he has not said.

In the autumn of 1962, Arnold entered the arena of politics and was the Republican nominee for lieutenant governor of Idaho, but lost. Shaver became a dairy farmer, a Wisconsin neighbor of Palmer's, but in science-fiction circles his name will never die. Recently he has been advertising the sale of alleged pre-Deluge and pre-Ice-Age "art stones" described as rare, voluptuous, exciting, and usable as ornaments for wall or mantel, or simply as book ends.

Palmer has now revived the Shaver Mystery and is reprinting the entire series in book form "with the fiction removed," under the general title of *The Hidden World*. In advertising the new project he stated, "This magazine concerns flying saucers. Flying saucers are a part of the Shaver mystery—integrally so." He abandoned the stories in *Amazing*, he says, not because an outraged publisher insisted, but because he believed the stories to be true. "That is the true motive. I was convinced that not only was there a 'hidden world,' but it was one of immense ramification, and the caves of the dero, flying saucers, military espionage, the political science of the world, and even some phases of religion, specifically those of the 'cult' variety, were inextricably linked." In announcing that he intended to end the secrecy that had existed for so long, and to tell the truth after seventeen years of "sugar-coating" the facts, he did not explain exactly why he feels it is safe to publish the "truth" now,

when it was not safe seventeen years ago. He says only, “. . . there have been good reasons for the delay—had it been done from the beginning, the pitfalls that would have crushed it could not have been avoided.” [11]

At the tenth annual World Science Fiction Convention, held in Chicago in September 1952, fans and fellow editors awarded to Palmer a bronze plaque honoring him as a “son of science fiction,” [24] a citation he fully merits. As long as flying saucers continue to make good copy and sell magazines, Palmer will probably keep them soaring—whether their home bases are other planets or polar caves. As one of his colleagues once commented:

“. . . in these times of drab and unconvincing falsehood, there is still something to be thankful for. A Palmer promotion has the touch of genius. It has zing, sparkle, and true showmanship. It can be spotted a mile away by the bright lights. The thing to do is sit back and enjoy it.” [19]

Mirage or Wave Clouds?

What did Kenneth Arnold actually see, that June afternoon in 1947? No absolutely certain answer is possible after so long a time. The disks were probably a mirage (see Figure 3) in which the peaks of the mountains seemed to float above the mountain chain [25]. An alternative but much less probable explanation is that he observed orographic clouds, a type unique to mountainous country, which often appear to stand more or less motionless and can assume dramatic shapes. “Grindstone” clouds, shaped like thick, solid disks (see Plate Ia), are common phenomena in the valleys just east of the Sierra Nevada in California and in the mountainous regions of Washington, Colorado, and New Mexico—areas where flying-saucer reports have tended to concentrate [26]. One of the most spectacular types of mountain cloud, it closely resembles the “*pile d’assiettes*” or “stack of plates” formation in which the cloud assumes a flat, round shape like a plate or a saucer, and two or more are piled together in a neat stack, as in Plate Ib [27]. Another picture of a “stack of plates” (which some observers reported as a hovering flying saucer) was made on May 31, 1953, near Jindabyne, Snowy Moun-



Figure 3. Mirage of mountain peaks. Top, normal view of mountain chain; bottom, mirage in which some of the peaks seem to be detached and above the peaks, like saucers.

tains, New South Wales, and reproduced in *Weather* in November 1954 as Plate 47. The cloud formed over a tub-shaped depression in the mountains and remained stationary for more than an hour [28].

Such clouds reflect the undulations of lee waves formed in the atmosphere when stable currents of air flow over obstacles such as hills or mountains. An up-and-down wave motion may be impressed upon the air, provided that temperature and wind conditions are suitable. As the air describes its wavelike path, it alternately warms and cools, the warming taking place as it sinks into the wave trough and the cooling as it ascends to the wave crest. If the air is very dry, the undulating current will not be visible to the eye, although the updrafts and downdrafts will readily be felt by air-

craft that chance to pass through them. On the other hand, if the air before entering the wave is moist enough, the cooling in the wave crest will cause water droplets to condense and a cloud to appear.

In the vicinity of an isolated peak the cloud may assume the form of a cap covering the summit, or it may be displaced slightly downwind and resemble a lens or disk. Not infrequently a series of lenticular clouds will appear, trailing downwind at regular intervals of a few miles. Although these wave clouds are usually stationary, they sometimes move at great speed, especially when the air temperature is changing rapidly.

From a study of a remarkable photograph made in 1956, R. J. Reed of the University of Washington has offered the suggestion that the disks Arnold saw were actually wave clouds in rapid motion.

On the afternoon of December 29, 1956, a photographer for the *Seattle Times* was on top of Pigtail Peak near White Pass, Washington (not far from the area where Arnold's nine disks had appeared), taking ski pictures for the rotogravure section of the *Sunday Times*. The weather was beautiful. Down in the pass temperatures hovered near freezing, but the slopes were warmed by sunlight that filtered down through thin cirrus clouds and raised the temperature to a balmy fifty degrees. Just at sunset a strange object suddenly appeared off toward the northeast horizon. Several skiers urged the photographer to take a picture of the "flying saucer," but since it was still far away and indistinct, he waited. The first object, now followed by a second one, moved rapidly toward Mount Rainier, began to sharpen in outline, and both were soon so clearly visible that he was able to snap his unusual picture. The photograph shows two apparently solid, disklike objects, flattened, brilliantly white but dark at the bottom, apparently linked together by white streamers, skimming toward the mountain peak (Plate Ia).

Recognizing the close resemblance between the objects in the photograph and those Arnold described, Reed made a full analysis of the weather conditions prevailing at the time the picture was taken. From radiosonde data provided by the Seattle-Tacoma Airport, he obtained measurements of the size of the clouds, their height above the mountains, wind directions, and temperature and

humidity at mountain height and cloud height. Obviously the pattern of weather conditions that prevailed that day was suitable for the formation of saucerlike clouds.

To test the hypothesis that Arnold also had seen such clouds, he then obtained records of the weather data for June 24, 1947, to determine whether atmospheric conditions on the two dates were basically similar. "To be comparable, winds would have to be blowing from the north or northwest in Mr. Arnold's case since the objects were sighted to the south and southeast of the peak. The air would have to be dry at lower elevations and moisture would have to be spreading in at higher levels. An inspection of the historical maps reveals that, indeed, all these conditions were met." [29]

Reed concludes that, although we can never know for certain, the implication that the *Times* photographer and Kenneth Arnold viewed essentially the same phenomenon seems "inescapable." This interesting hypothesis, however, requires the presence of undulating air currents and turbulence great enough to endanger a plane in flight. Since Arnold specifically mentioned the smooth, calm flying, the mirage explanation remains the most probable one.

- [1] Air Force Files.
- [2] Arnold, K., and Palmer, R. A. *The Coming of the Saucers*. Amherst, Wisconsin: privately printed, 1952.
- [3] *Fate*, Vol. I, No. 1 (Spring 1948).
- [4] *Fate*, Vol. I, No. 2 (Summer 1948).
- [5] *Fate*, Vol. I, No. 3 (Fall 1948).
- [6] *Flying Saucers, The Magazine of Space Conquest* (June 1960).
- [7] *Amazing Stories*, Vol. XXX, No. 4 (April 1956).
- [8] *Amazing Stories*, Vol. XVIII, No. 1 (January 1944).
- [9] *Amazing Stories*, Vol. XIX, No. 4 (December 1945).
- [10] *Amazing Stories*, Vol. XVIII, No. 5 (December 1944).
- [11] *Flying Saucers, The Magazine of Space Conquest* (November 1960).
- [12] *Amazing Stories*, Vol. XIX, No. 1 (March 1945).
- [13] Palmer, R. A. "An Open Letter to Paul Fairman," *Other Worlds Science Stories* (June 1952), pp. 151-56.
- [14] *Amazing Stories*, Vol. XIX, No. 3 (September 1945).
- [15] *Amazing Stories*, Vol. XX, No. 6 (September 1946).
- [16] *Amazing Stories*, Vol. XX, No. 4 (July 1946).
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- [19] Fairman, P. W. "Personalities in Science Fiction," *If* (May 1952), pp. 63-67.
- [20] Ruppelt, E. J. *The Report on Unidentified Flying Objects*. Garden City, New York: Doubleday & Co., 1956.

- [21] *Flying Saucers, The Magazine of Space Conquest* (December 1958).
- [22] *Flying Saucers from Other Worlds* (June 1957).
- [23] *Flying Saucers, The Magazine of Space Conquest* (December 1959).
- [24] *Other Worlds* (July 1953).
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- [26] Ives, R. L. "Areas of Occurrence of 'Grindstone' Clouds," *Weatherwise*, Vol. XI (1958), p. 201.
- [27] Scorer, R. S. "Lee Waves in the Atmosphere," *Scientific American*, Vol. CCIV (1961), p. 124.
- [28] Kraus, E. B. "Flying Saucer?" *Weather* (November 1954).
- [29] Reed, R. J. "Flying Saucers over Mount Rainier," *Weatherwise*, Vol. XI (1958), p. 43.

Chapter III

AIR-BORNE UFOS: BALLOONS TO BUBBLES

In the year 1948 the "Skyhook" balloons were an official secret. These giant plastic bags, shaped something like a teardrop, a hundred feet and more in diameter, were part of a classified research project sponsored by the United States Navy, and few except the researchers and technicians involved knew of their existence. Carrying cases of heavy instruments, the balloons were launched from various Air Force bases to collect information about the atmosphere high above the earth, the winds in the stratosphere, and the incidence of cosmic rays. Soaring upward, they traveled in courses determined by the winds and changed in direction and speed as they shifted from one wind stream to another. Even at heights of 60,000 feet these objects with their highly reflecting surfaces could be seen from the ground (see Figure 4). Such balloons were especially noticeable against dark-blue skies, which are much more common in the western United States than in the eastern areas. They could reach heights of 100,000 feet, higher than our planes could go. Once considered as a means for collecting information for Military Intelligence, a task later assumed by the U-2 jets, they could travel across the entire continent and even across the oceans. If the plastic skin developed a leak, the resulting loss of gas altered both the appearance and the behavior of the balloon; if the leak became great enough the balloon shriveled and eventually fell to the earth. At high altitudes where the cold was extreme, the skin might become brittle and the balloon would burst into fragments to be dispersed by the winds and vanish.

Although these balloons were sometimes visible at distances of fifty or sixty miles and were very conspicuous, officially they did not exist until 1950 when Dr. Urner Liddel of the Office of Naval

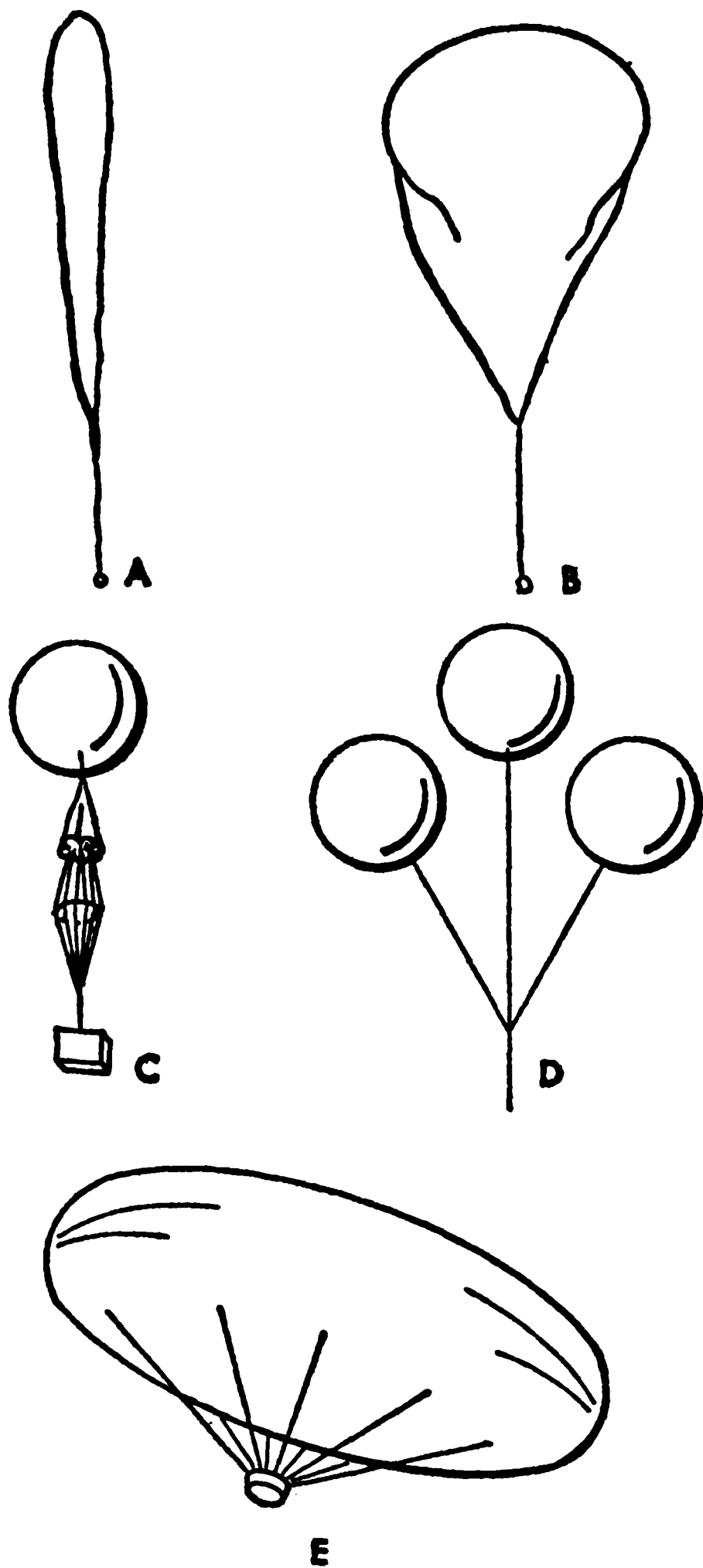


Figure 4. Shapes of various balloons. A, Skyhook at launching; B, Skyhook at high altitude; C, radiosonde or pibal; D, balloon cluster; E, blimp or sausage-shaped balloon.

Research released the facts behind the Skyhook balloon program. He pointed out then that the balloons had given rise to many reports of flying saucers. If the Skyhook project had been public knowledge in 1948 and if information about their launching and movements had not been a matter of security, a courageous pilot might still be alive today and the infant flying-saucer myth would have died long ago. There can be little question that Captain Mantell crashed in trying to intercept a Skyhook balloon, an object he had never heard of.

The Mantell Tragedy

The basic facts of the Mantell case, the second of the "classic"• UFO sightings, are familiar to all who have studied flying-saucer phenomena [1, p. 51]. Early on the afternoon of January 7, 1948, the Kentucky State Highway Patrol received a large number of calls from the towns of Maysville, Owensboro, and Irvington, reporting a strange object moving west at high speed. Alerted by the police, officials at Godman Air Force Base, near Ft. Knox, began looking for the unknown craft. They soon located the object but could not identify it. Watching it through binoculars, various observers described its shape as circular, like a teardrop, or rounded and tapered like a parachute or an ice-cream cone. At about 2:30 P.M. (all times in this account are E.S.T.), as they were discussing the object, a flight of four P-51 planes approached the base from the south. Led by Captain Thomas Mantell, the planes were being ferried from Marietta Air Base, Georgia, to Standiford Field near Louisville. The tower operator at Godman thereupon radioed Captain Mantell for assistance:

"We have an object out south of Godman here that we are unable to identify and we would like to know if you have gas enough and if so could you take a look for us if you will."

* A "classic" in the literature of flying saucers is a particularly dramatic UFO incident whose specific cause has not yet been found or, if found, cannot be absolutely proved from the evidence available. Lacking a completely airtight explanation, official investigators classify the case as Unknown. Saucer fans classify it as proof that flying saucers exist.

The ferry had been planned as a low-level flight and none of the planes had been serviced with oxygen. Captain Mantell, a combat pilot in World War II, nevertheless agreed to help out: "Roger. I have the gas and I will take a look for you if you will give me the correct heading and any information you have on locating the object."

The talk between Godman tower and Captain Mantell was not recorded and transmission was sometimes garbled. Although many persons heard the exchange of remarks during the next critical minutes and agreed on the general content, no two remembered exactly the same words; therefore the official reports [2] represent only the best possible reconstruction of the conversation that took place.

One plane, short of fuel, continued on to Louisville. The other three circled and began to climb. At about 2:45 Mantell notified the tower that he was at about 15,000 feet: "I have an object in sight above and ahead of me, and it appears to be moving at about half my speed or approximately 180 miles an hour." One of his wing men said: "What the hell are we looking for?" When Godman asked Mantell to describe the object, he said: "It appears to be a metallic object, or possibly a reflection of sun from a metallic object, and it is of tremendous size. I'm going to 20,000 feet."

The other two pilots, who had seen nothing and were alarmed at flying so high without oxygen, leveled off at 15,000 feet. Mantell was then above 22,000 feet and still climbing. In ship-to-ship conversation he said that he would go to 25,000 feet for about ten minutes, then come down. When all further attempts to call Mantell went unanswered, the other pilots discontinued the search and went on to their base; although one returned after refueling and equipping himself with a mask and oxygen, he found nothing in the area.

At about 3:15 Mantell radioed that the object was "directly ahead of me and slightly above, and is now moving at about my speed or better. I am trying to close in for a better look." He did not call again. Less than an hour later searchers found the crashed plane. Mantell was dead. His shattered watch had stopped at 3:18.

During the period of search, ground observers at Godman Field

had been able to watch the UFO, gradually diminishing in size, and about 3:50 it disappeared from view. Within a few minutes, however, observers farther south in Kentucky and Tennessee were reporting an unknown object in the sky.

A hundred rumors sprang up immediately after the tragedy: that the UFO was a Russian missile; was a weird machine from outer space that had deliberately or accidentally knocked the plane out of the air when it got too close; that Captain Mantell's body was riddled with bullets; that the plane had completely disintegrated before striking the ground; that the wreckage was radioactive.

Investigators rushed in to find the cause of the fatal crash and brought confusion with them. Some facts could be quickly established. There were no bullet wounds. The plane had not burned on impact and was not radioactive. The left wing had come off while in the air and landed 100 feet from the main crash area. Parts of the plane were scattered on a line north to south within six tenths of a mile of the central wreckage. The emergency canopy lock was in place and apparently no attempt had been made to release it. The throttle was set at one fourth open, mixture control at "Idle cut-off," and prop control at "Full increase r.p.m."

From this evidence investigators concluded that because of lack of oxygen Mantell had lost consciousness at about 25,000 feet, while his plane continued to climb to about 30,000 feet; leveling off, it then began a gradual turn to the left because of engine torque, and went into a spiraling dive that produced a speed and a structural stress greater than the plane could stand—the plane was "red-lined" (Air Force jargon for the limit of safety) at 525 mph. Pilots who have flown the P-51 in combat conditions have agreed with this conclusion and have suggested that, as the plane fell, Mantell may have regained consciousness, realized what was happening, pulled the throttle back and tried to pull back on the control, thus producing a stress so great that the wing was torn off and the plane then fell vertically.

As an immediate result of this tragic accident, Air Force officials recommended that all pilots be briefed again on the use of oxygen and the effects of lack of oxygen. New orders were issued: that no pilot go above 12,000 feet without oxygen under any circumstances;

that no aircraft be cleared for cross-country flight unless it had been serviced with oxygen; that classes in the use of oxygen start immediately for all pilots and crew members; that all aircraft be equipped with oxygen; and that all pilots carry mask, helmet, goggles, and gloves on all flights.

The cause of the crash was known. But investigators had still to solve the problem: what was the unknown object that Mantell had been chasing?

An Air Force official had announced to the press that the unknown had been the planet Venus. This explanation, while not impossible, was not very probable. The position of Venus that afternoon had indeed been very close to that of the unknown object. But with a stellar magnitude of -3.4 , less than half its maximum brilliance, in the daylight sky the planet would have been visible, if at all, only as an exceedingly small, bright point of light. Furthermore this answer did not fit the pattern of sightings. The accompanying map (see Figure 5) of the Ohio-Kentucky-Tennessee region illustrates the succession of events:

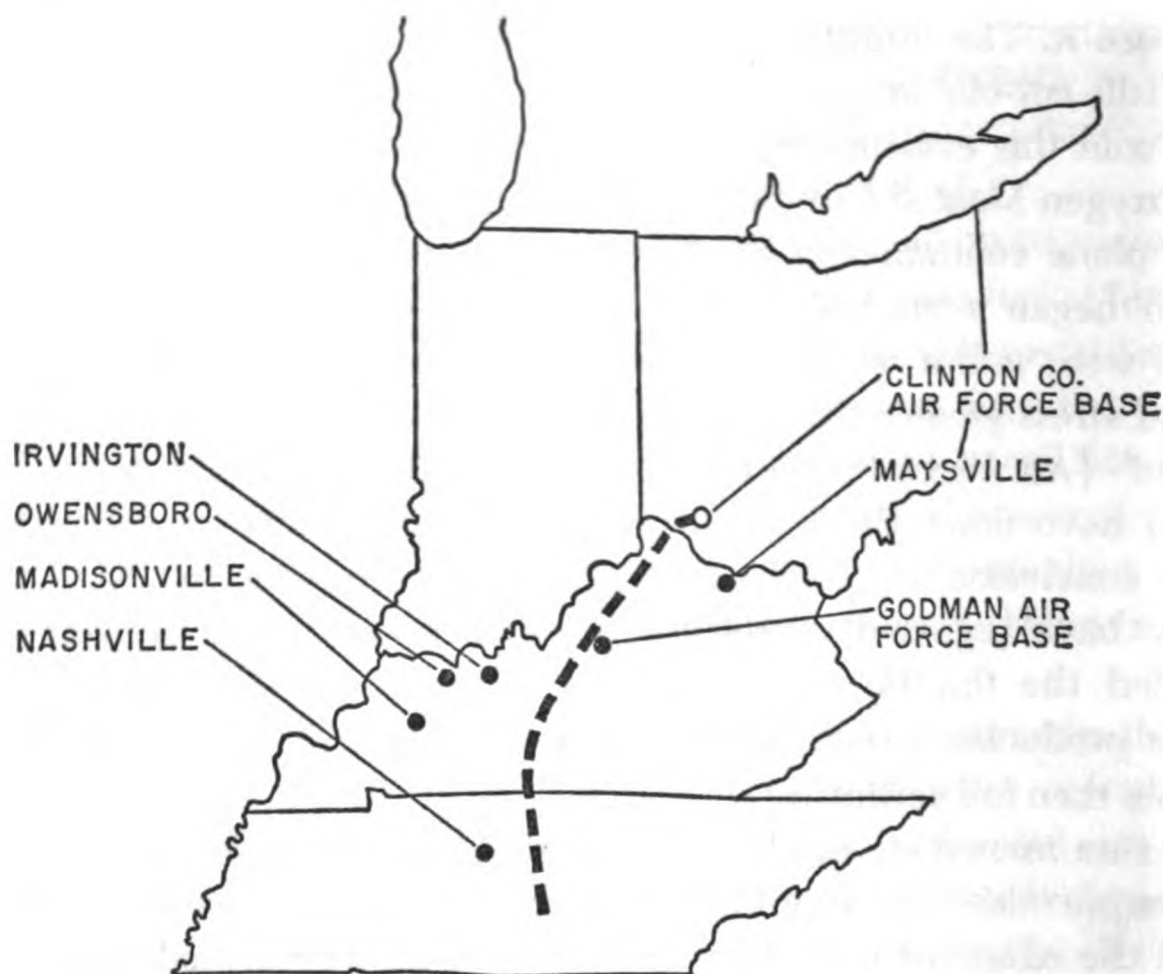


Figure 5. UFO sightings in the Mantell case. The broken line indicates the path a balloon would have followed.

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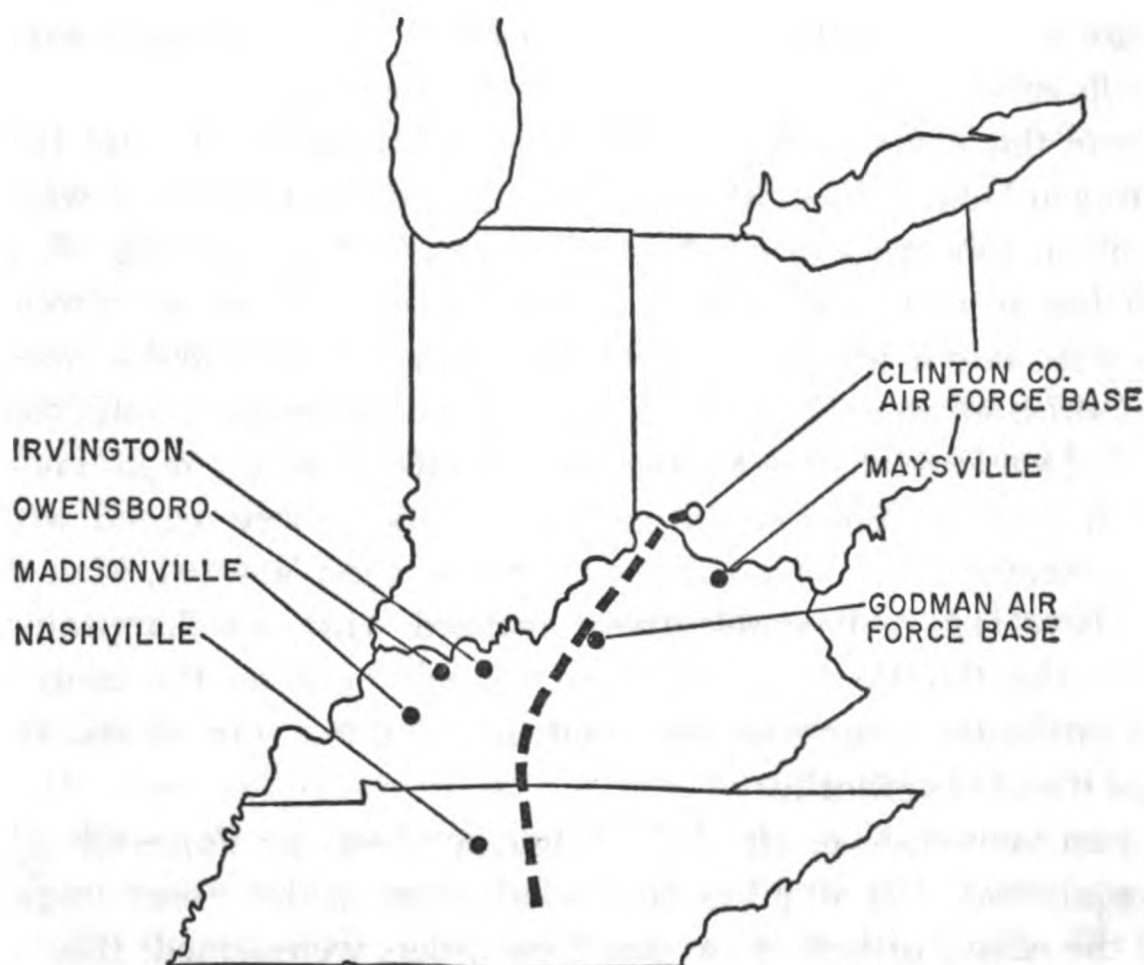


Figure 5. UFO sightings in the Mantell case. The broken line indicates the path a balloon would have followed.

1:15 P.M., Maysville, Kentucky. Strange object sighted moving west.

1:35 P.M., Owensboro and Irvington, Kentucky. Circular object sighted, 250 to 300 feet in diameter, moving west.

Shortly before 1:45 P.M., Godman Air Force Base, Kentucky. Circular or parachute-shaped object sighted; in view for about two hours, slowly moving south.

4:00 P.M., Madisonville, Kentucky. Strange object; through binoculars identified as a balloon.

4:45 P.M., Nashville, Tennessee. Strange object sighted; through binoculars identified as a balloon.

5:00 P.M., Lockbourne Air Force Base, Columbus, Ohio. Round glowing amber object sighted on southwest horizon in horizontal flight; in view about twenty minutes, then disappeared below the horizon.

All but the last observation in this series suggested a balloon flight, but a quick check with the weather stations in the area failed to turn up any record of a routine launching. Air Force investigators knew about the Skyhook project and could have obtained information on secret launchings, even though it was classified. But, since many of the investigators in these early days of the saucer era were more than half convinced that the unknown had been an interplanetary vehicle, they abandoned the inquiry at this point and officially labeled the case an Unknown. Flying-saucer addicts pounced on this conclusion as proof that the object had actually been a spaceship, that the Air Force knew it to be a spaceship and was deliberately concealing the news from the public.

A Probable Solution of the Mantell Case

Although the case remained unsolved for nearly four years, the original analysis of the evidence, carried out by Dr. J. Allen Hynek, scientific consultant for the Air Force, made certain facts clear from the beginning. The final sightings in Ohio, so inconsistent with the general pattern of the other observations, obviously were not related to the reports from Kentucky and Tennessee. The object seen at Columbus had undoubtedly been the planet Venus, glowing

brilliantly on the sunset horizon (see *Chapter IV*). But the object that traveled southwest over Kentucky and Tennessee had almost certainly not been Venus. At least two objects—balloons or other aircraft—must be involved. It was possible, though not probable, that the unknown over Godman Field had been the planet Venus, or it might have been still a third object. The senior author of this book, after studying the facts available at the time and analyzing the weather conditions prevailing that winter afternoon, suggested that the object could have been a “mock sun” created by ice crystals in the cirrus clouds at high altitudes [3, p 22].

The final solution of these UFO mysteries often depends on one key fact. Without it, the puzzle may never be solved. With it, all the pieces fall into place. The “mock sun” theory (see p. 244) remained the most probable explanation until, some time after the Skyhook project had been declassified, ATIC investigators discovered the key fact: At the time of the Mantell crash, the Clinton County Air Force Base, in southern Ohio, had been a launching site for Skyhook balloons. Unfortunately records for the day of Captain Mantell’s death were not available, and the men who had worked on the balloon project could no longer remember whether they had launched a Skyhook on that particular day. If an unacknowledged balloon had been in the area, however, only one more piece was needed to complete the puzzle: What path would the balloon have followed?

The records at Wright-Patterson Field show that the winds that afternoon would have carried a balloon over exactly the course the UFO followed: from southern Ohio west into Kentucky. It would have climbed rapidly and at about 35,000 feet would have entered the southward-flowing jet stream; shifting direction, the balloon would have traveled south at a high rate of speed, still climbing. Somewhere south or southwest of Godman Field it would have climbed through the jet stream to enter a region of calm at about 60,000 feet; slowing down, it would have drifted south or southeast into Tennessee. Of its fate after that we can only guess [4, p. 19].

Without the Skyhook records for the day in question, this solution cannot be called absolutely certain. But the chances of its being correct are overwhelmingly high—infininitely higher than the prob-

ability that Mantell died while chasing a spaceship from another planet.

A Radiosonde over Virginia

In the years that followed, the pattern of sightings in the Mantell case has often reappeared but, fortunately, without the same tragic outcome. After each Skyhook launching, a flood of UFO sightings came in to ATIC from towns that lay under the path of the balloon. The Skyhook project sometimes was able to relocate a "lost" balloon by following newspaper reports of flying saucers.

By the summer of 1952 the existence of giant balloons was no longer classified information. When on June 15 an unidentified flying object appeared over several towns in Virginia and followed a course that closely resembled that of the Mantell UFO, Air Force investigators recognized the pattern and began looking for a balloon as the probable explanation. The reports were as follows [1, p. 192]:

3:40 P.M., Unionville, Virginia. Very shiny object sighted at high altitude.

4:20 P.M., Gordonsville, Virginia. Round, shiny object sighted in the southeast.

4:25 P.M., airliner near Richmond, Virginia. A silver sphere sighted at eleven o'clock high.

4:43 P.M., south of Gordonsville, Virginia. Jet pilot sighted and tried to intercept a round, shiny sphere.

5:43 P.M., south of Gordonsville. An Air Force jet pilot sighted and tried to intercept a shiny sphere; at 35,000 feet the object was still above him.

7:35 P.M., Blackstone, Virginia. A round, shiny object with a golden glow sighted, moving south.

7:59 P.M., radio station at Blackstone. Shiny object sighted.

8:00 P.M., Blackstone. Jets from Langley Air Force Base tried to intercept object.

8:05 P.M., object disappeared.

Investigators first of all checked with officials at Lowry Air Force Base, which served as a plotting center for all Skyhook balloons,

but there were none in the East that day. Next they checked the possibility that the UFO had been a weather balloon, but nearby weather stations replied that none of their balloons could have been responsible for the sightings. After calling other stations within a 150-mile radius of Gordonsville with negative results, investigators called the weather station at Pittsburgh, Pennsylvania. A radiosonde (a small balloon attached to an instrument for taking soundings in the upper atmosphere) had been released that afternoon, but had been lost about sixty miles southeast of the station when it apparently sprung a slow leak and leveled off at 60,000 feet. The weather man at Pittsburgh offered to plot its probable course as determined by the prevailing winds, and soon telephoned Dayton to report that the UFO was probably their balloon.

Southeast of Pittsburgh above 50,000 feet there was a strong current of air that fed into a stronger southerly stream flowing parallel to the Atlantic coast, just east of the Appalachian Mountains. The balloon would have floated along in this current like a log floating down a river, and should have arrived in the neighborhood of Gordonsville and Blackstone in the late afternoon or early evening. The UFO had been sighted near Gordonsville between 4:43 and 5:43 P.M., and near Blackstone between 7:35 and 8:00 P.M. The unknown was thus clearly identified as the lost radiosonde.

Skyhook and Pibal UFOs

The year 1952 was a big year for experimental balloons—and for UFO sightings. Weather balloons in clusters, 100-foot Skyhooks, radiosondes, pibals (pilot balloons sent up to show the direction and speed of the wind) were released on schedule all over the continent. Launchings were recorded and the balloons were tracked, as far as possible, so that for any given day or area ATIC could consult a map and try to correlate the position of a known balloon with that of a reported flying saucer. When a balloon was lost, any UFO sightings it caused were not always easy to account for until—and unless—the balloon could be found again.

These spheres of gas vary in size from a few inches in diameter to some two hundred feet. Often they look and behave very unlike

the popular concept of a "normal" balloon, and under the right conditions they can fool even the most wary observer—particularly if he is more or less expecting to see something strange.

A man on the ground or even in a plane, watching the maneuvers of an object some 20,000 to 100,000 feet above him, finds it impossible to make an accurate estimate of its true height, diameter, distance, or speed. Strong windcurrents can change the orientation of the sphere, and the particular angle of vision of the observer can make the object look wholly unlike a balloon. It may assume the shape of a disk, a lens, a teardrop, a parachute, a sausage. Temperature inversions can produce a double image of a balloon so that it looks like a linked pair. Balloons released in pairs or clusters may seem to be traveling in formation under intelligent control. Sunlight, moonlight, or the lights of a city reflected from the surface may cause them to look white, gray, amber, red, silvery, or metallic. Since balloons often carry a heavy instrument load, they may give a radar return that indicates a solid object.

When balloons develop a leak, they may drop some distance at high speed and then level off, as though under intelligent control. At the extreme cold of high altitudes they may burst and suddenly vanish. High in the sky at morning and evening twilight they may appear to be self-luminous, taking their light from the invisible sun just as our artificial satellites do. They often travel high above the air lanes, higher than any plane can go, where varying wind streams may propel them at great velocities, slow them until they seem to hover and be almost stationary, abruptly change the direction of their motion so that they reverse course, dive toward the earth, or ascend rapidly into the sky.

At night all these illusions are magnified because the observer has fewer visible reference points by which to evaluate the true shape, distance, and type of motion of these wandering spheres. They can deceive even the most hardheaded and able pilot. The pilot is only human when he doubts that any balloon can fool him—until it does.

The Guantánamo "Dogfight"

An American Navy pilot, practicing night flying over the Guantánamo City base in Cuba on the night of September 24, 1952, engaged in a "dogfight" with a balloon that exhibited all the characteristics associated with this type of flying saucer. It seemed to take evasive action, deliberately elude the pilot, make head-on passes, and respond to every move of the plane with a countermove.

The pilot was at 4000 feet and slowly climbing when he spotted an orange light approaching the city from the east at 10,000 to 15,000 feet. Realizing that the object was not a Navy plane, he tried to intercept it, but the light had started a left turn and he could get no closer than eight to ten miles. The object appeared to be as large as a Navy bomber and had a greenish tail five or six times the diameter of the light, visible only intermittently. When he reached 10,000 feet, the light was still circling left and climbing in a ten- to fifteen-mile orbit. To keep the nose of the relatively slow TBM on the light required about 40 degrees of bank. At 12,000 feet the light was still climbing faster than the plane; the pilot then stopped climbing and reversed from a left to a right turn. The light seemed also to reverse direction.

All attempts at interception seemed to be met by purposeful evasive action, and the object seemed to be guided by intelligence. When the pilot followed the light to the north, it shifted to west, then south, at about 25,000 feet. Suddenly it began to climb at an angle of approximately 60 degrees and at a terrific rate. Although it had been a large bright glow, it now appeared as a very small red point which would have blended with the stars had it not been moving. It then started a rapid descent. By this time the pilot was over the base and headed northeast to intercept the light as it descended. He described the ensuing "dogfight" [2]:

"The light appeared to level out rapidly, and I missed it on the first run and started a tight port turn. As I headed for a point that would give me a 90-degree collision course for the light, it appeared to accelerate and crossed my bow at an incredible speed. I immediately went into a tighter turn and the next intercept was the

same except that I was almost on the light, as it flashed from starboard to port. At this close range nothing but the light could be seen, and it was a brilliant white, approximately fifteen feet in diameter. After each run, the light appeared to go out one-quarter to one-half mile, and slowing in speed, continuing in a port turn. As I pulled out of the third run the light appeared to start another rapid descent towards Caimanera. This time I went into a steep dive to follow, when the light appeared to shallow its dive and head towards the control tower. My altitude was 6000 to 8000 feet, descending at a speed of better than 200 knots. The light was below me and going at more than twice my speed. As I approached the north shore of the Bay, at approximately 2000 feet descending, the light seemed to veer to port, pass over the army dredge, steady out on an easterly heading, level out over the mangroves, slow down rapidly over the cove . . . hover over the water momentarily, and then fade from sight." After the plane landed, harbor police searched the area but found nothing.

When the pilot was informed that he had been fighting a lighted weather balloon, released that night from the Naval Air Station at Guantánamo Bay, he may very naturally have felt incredulous. Instead of arguing, however, he helped carry out an experiment. On the following night the station released another lighted balloon, at about the same time, and the pilot took off to try an intercept. After comparing the experience with that of the night before, he concluded that he had indeed fought a balloon:

"Many of the illusions seen on the previous night could be duplicated by maneuvering the plane appropriately. I tracked the balloon to 12,000 feet and made runs on it from as far away as ten miles. I could always intercept and pass it at any predetermined position, as against the fact that I could not get close to the other light, which at the time appeared to be moving away at each attempt at approach."

There were other differences, too. The rate of ascent was faster on the first night, and the second balloon did not exhibit a tail. Discussion with members of the Aerology Department brought out the explanation of these differences. The first night had been clear, with a bright moon that transformed the accompanying light into a flickering tail. On the second night the dew point was higher

and the atmosphere was hazy so that no tail was visible, the balloon looked smaller, and showed an orange glow instead of a bright white.

The rapid climb of the first balloon could be attributed to a vertical air current, or to an air layer of variable density, or both. A balloon often develops leaks at high altitudes and then descends to an intermediate altitude where the loss of gas and the denser atmosphere cause it to hover. One wind balloon, released earlier from the same base, had developed a leak, started spinning, covered a horizontal distance of about a mile, and then dropped into the water. Similarly, the first balloon probably developed a large hole and fell very rapidly for a while until the loss of gas and the increase in atmospheric pressure caused it to shrink and close the hole, slowing its descent.

Some of his impressions, he decided, were the result of making tight turns at high speed: "The last fast descent could be due to the fact that I may have cut the balloon with my prop on the third run, causing the light to fall free. My last three-quarter turn was diving to port in a position northeast of the light, which could have produced the illusion of the light arcing across Caimanera and the Bay and settling into the water. The light's crossing from starboard to port could have been the result of my plane being in a vertical turn and the light descending straight down instead of going horizontally. At the time of intercept I thought my wings to be almost level, the light traveling in a flat circle, but due to the afore-mentioned vertigo, a pilot cannot rely on his senses to establish attitude."

The pilot concluded: "Considering all the facts and an observation of known light on the night of the twenty-fifth, it is my opinion that the light on the night of the twenty-fourth was a balloon, with its accompanying light, which had been released from the Naval Air Station." [2]

The Wallops Island UFO

Perhaps the most spectacular (and short-lived) UFO in history appeared at 6:55 P.M. E.S.T. on April 1, 1960, along the east coast.

A bright-yellow streak of fire shot up from the horizon into the eastern sky and slowly changed into a huge zigzag pattern. With the streak of fire appeared a large reddish sphere, reported by some observers to be as large as the full moon and many times brighter than a planet. Visible along the entire eastern seaboard, the brilliant object slowly moved eastward, followed by a trail of greenish sparks. While still at high altitude out over the Atlantic Ocean, it suddenly vanished—as though it had simply taken off into outer space. Switchboards in eastern cities were jammed as witnesses called newspapers, universities, and nearby observatories to report a comet, a fireball, or a flying saucer.

Newspapers immediately printed a full explanation of this April Fool's Day apparition: a scheduled but unannounced rocket launching from Wallops Island, Virginia. The yellow fire was debris from the rocket, reflecting the rays of the setting sun; contrary winds in the upper atmosphere produced the zigzag form. The luminous globe was a full-scale model of the Echo satellite—an inflated balloon 100 feet in diameter, carried aloft by the rocket. Dry powder escaping through holes in the balloon produced the greenish tail. The object had "vanished" when the balloon fell back into the earth's shadow and was thus no longer visible.

Although the newspapers published a full explanation within a day or two, some saucer enthusiasts continued to treat the apparition as a mystery. In its *Special Bulletin* for May the National Investigations Committee on Aerial Phenomena (see *Chapter XIII*) included the incident under "Recent UFO Sightings." Three months after the launching the organization conceded (*UFO Investigator*, July-August, 1960) that the UFO of April 1 was probably the giant balloon sent up from Wallops Island.

On August 12, 1960, the counterpart of this balloon went into orbit and became the satellite Echo, which is still circling the earth, shining like a star of the first magnitude near dawn or sunset.

Weather Balloons and Saucers

In the early years of the saucer era balloons accounted for some 25 per cent of the unidentified flying objects reported to ATIC. The

pattern of these sightings is unmistakable, and the identity of balloon and UFO is often certain—as certain as any evidence can be. Nevertheless many such identifications are resolutely rejected by the saucer enthusiasts. It would be pointless to discuss all the UFO reports of this class, but we can summarize a few of the most famous.

In the winter of 1953, a flying saucer was reported to have circled around a B-36 bomber and blinked a light as though signaling. Investigators from ATIC determined the following facts:

At 1:13 A.M. on February 6, 1953, the pilot of a B-36 plane bound for Spokane, Washington, was near Rosalia when he sighted a round white light below him, circling and rising at a speed estimated at 150 to 200 knots as it proceeded on a southeast course. The B-36 made a sharp descending turn toward the light, which was in view for a period of three to five minutes, but the pilot could not identify it.

At 1 A.M., thirteen minutes before the sighting, the United States Weather Bureau station at Fairchild Air Force Base had released a pibal balloon. Winds aloft at altitudes of 7000 to 10,000 feet were from the northwest with a speed of about fifty knots. Computations showed that the existing winds would have carried the balloon to the southeast, and it would have been over Rosalia, which is 12.5 nautical miles southeast of Fairchild Air Force Base, in about fifteen minutes. The plane sighted the unknown near Rosalia thirteen minutes after the launching. The balloon carried white running lights which accounted for the blinking described, and the circling climb of the UFO is typical of a balloon's course. Thus all the evidence supports ATIC's conclusion that the UFO was a weather balloon [2].

A similar sighting had occurred near Hamilton Air Force Base, California, on the afternoon of August 3, 1952—toward the end of the summer's saucer scare (*Chapter VII*)—when several pairs of saucers supposedly engaged in dramatic duels in full view of the base. Ample evidence supports the Air Force conclusion that the UFOs were balloons. The two objects were first seen at 4:15 P.M. Ground observers at the Air Force base, with the aid of binoculars, described them as silver in color, circular in shape, 60 to 100 feet in diameter, and traveling from east to west at an estimated speed

of 400 to 450 miles an hour. One object was at about 12,000 feet, the other at about 18,000 feet; as they moved to the west a distance of about fifteen miles, passing over the heads of the observers (but not circling the base), the higher object dived to about the level of the lower, and they bobbed about each other for about an hour and a quarter. Toward the end of this period they were visible only intermittently because they were seen against the sun. Three additional pairs of objects (a total of eight) came into view fifteen to twenty miles west of the observers and, buffeted by the winds, appeared to carry on a dogfight; momentarily they appeared in a "diamond" formation extending over an area of about four miles. Since the witnesses were looking into the sun at objects fifteen or twenty miles away, they found it difficult to follow the course of any one for any length of time.

The objects looked like balloons, behaved like balloons, and weather balloons had been released in the area that day. Conclusion: the saucers were weather balloons [2].

A number of other publicized cases listed as "Unknown" were in all probability balloons. Since a probability, however good, is not the same as an established fact, these sightings remain in the Unknown category even though their actual explanation is reasonably certain. Such a case was that near Hermanas, New Mexico, which, like that a few weeks earlier at Hamilton Air Force Base, may have been stimulated by the 1952 saucer panic in Washington (*Chapter VII*).

On August 24, 1952, an Air Force colonel was flying from California to Georgia in an F-84-G plane at an air speed of about 290 miles an hour. At 10:15 A.M. M.S.T., when near Hermanas, New Mexico, he observed two round, silvery objects about six feet in diameter some two miles north of him and traveling east at high speed; they showed no trail or exhaust. During the three minutes they were in view, one object suddenly began a right turn while the second accelerated rapidly; they changed in shape and in color, became elongated and gray, and then disappeared. A few minutes later over El Paso, Texas, he saw two similar silvery objects, also traveling east. During the ten minutes they were in view, one object seemed to climb straight up for 2000 or 3000 feet, followed immediately by the second one. Assuming that the same pair of ob-

jects was involved in both sightings, the observer concluded that they were going much faster than any plane, and reported the incident to ATIC.

The behavior described is typical of that of balloons. Rising into a new wind stream, they may move rapidly and change their orientation so that they look sausage-shaped instead of round; reflecting the sun at a different angle, they look gray rather than silver. Investigators checked with Biggs Air Force Base, White Sands, and El Paso International Airport; both White Sands and El Paso had released weather balloons at 8:00 that morning which had traveled southeast and burst some time before the sighting at Hermanas. Since no single recorded balloon could account for the sighting, it was listed as Unknown [2].

This inquiry can scarcely be called thorough. No check seems to have been made at Holloman Air Force Base or at more distant bases whose weather balloons might well have traveled into the area. The investigators apparently accepted the pilot's assumption that the objects in the two sightings were identical and were therefore traveling at incredible speeds; yet there was no evidence to support the assumption. It is far more probable that he was observing two sets of objects, not one. The estimates of size, distance, and speed are all uncertain because no fixed reference point existed. The report does not state whether the objects seemed to be above or below the plane, and does not give the exact heading of the objects.

The objects looked and behaved like balloons. Another possibility is that they were fragments from the balloons that had burst earlier. But the explanation of this incident remains unknown because too few facts were determined.

Plastic UFOs and the "Stack of Coins"

A burst balloon has caused many a saucer scare, but the invasion of Farmington, New Mexico, on Saint Patrick's Day 1950 was one of the most dramatic. The "saucers" began to fly about 10:15 A.M. M.S.T., and soon filled the air. In numbers estimated from 500 to thousands, for the next hour the gleaming saucer-shaped objects soared over the town, moving erratically at incredible

speeds, darting in and out among each other in what one writer has called "the greatest exhibition of magnetic flight that has ever happened in this universe." [6] (See *Chapter IX*.)

The explanation is more prosaic. A Skyhook balloon had been launched that morning from Holloman Air Force Base near White Sands, New Mexico. Near Farmington, in the cold atmosphere at 60,000 feet the balloon had become brittle, burst, and disintegrated into hundreds of tiny pieces of plastic. Light as feathers, shining in the sunlight, they floated over the town and away [1, p. 106].

A similar episode occurred on July 27, 1952, the day after the second Washington "invasion." The dramatically named "stack of coins" sighting at Manhattan Beach, California, was reported by an aircraft engineer, formerly a Navy pilot, and was confirmed by seven other witnesses.

At 6:35 P.M. P.S.T., just before sunset, a bright silvery object appeared high in the sky, elliptical in shape and apparently solid. The size was estimated to be about that of a dime held at arm's length. As the observers watched, it turned to the south and gracefully broke apart into seven smaller objects, as smoothly as a stack of coins separating. The three lead objects assumed a V position, the others followed in two pairs, and the whole formation then turned northeast and quickly disappeared. ATIC investigators, still buried in a mass of equally spectacular reports, could provide no solution to the mystery, and another fleet of saucers had apparently been added to the summer's list.

Immediately concluding that the objects were from outer space, UFO-philes pondered the meaning of the incident. One author suggested that the disks might have been seven different ships that, when first observed, had been stacked like coins and attached to each other by some magnetic force, so that all could be directed as one [5].

This sighting has remained technically an unknown chiefly because the descriptions fail to give the necessary information. What direction did the object come from? How long was it in sight? What balloons had been released in the area that day? At what time? What were the winds at high altitudes? The winds at low levels were from the west, and at altitudes from 20,000 to 50,000 feet they were from the east; but what were they in the region above 70,000

feet, the probable location of the object? Even without these facts, a reasonable explanation can be offered: the unknown was a radiosonde balloon that burst at a high altitude.

The sun was low on the western horizon. A balloon at a great height reflects the sun brilliantly from its rubber or plastic skin and gleams like a giant metallic sphere. These balloons usually soar to 70,000 to 90,000 feet before they burst from the cold. The fragments then disperse in an impressively uniform pattern, and may disappear quickly. The radiosonde package and attached parachute fall rapidly at such heights. They are not noticed by the witnesses because the chute usually does not open fully until after the package has fallen some distance into the beginning twilight near the earth's surface.

This explanation of the "stack of coins" cannot be proved, of course, but every detail of the incident is consistent with the behavior of a bursting balloon [2].

Jets and Contrails

Weather balloons are not the only air-borne objects that have been mistaken for interplanetary craft. Flying saucers reported over Durango, Colorado, early in August 1952 turned out to be four T-33 Air Force jets flying at 30,000 feet, so high that no sound reached the ground.

A low-flying jet, enveloped in an aura of cloud made by the jet itself, can look like a strange object. This condensation phenomenon, called a contrail, occurs when areas of low pressure develop on the wing surface; the air cools by expansion in the slowly moving boundary layer in contact with the wing. Both the depth of the boundary layer and the drop in pressure increase with increasing air speed, but each depends very closely on the aerodynamic qualities of the wing. An excellent photograph of one such disk produced by a Canberra jet was taken on February 4, 1956, along the coast of Africa near Accra on a morning when the condensation phenomenon occurred several times during air maneuvers. The weather was fine, the sky cloudless with a few patches of haze over the sea, and visibility was more than eight miles. During the display the air

speed of the jets was usually too low or the air too dry for the aura to form. "But over the cliff edge where the sea-breeze was just beginning to break through in patches the air would be moist enough to condense about $1\frac{1}{2}$ gm. of water droplets in each cubic metre of air, quite sufficient to produce the observed effect. The effect is increased by higher speeds at the end of a dive (when the angle of incidence of the aerofoil is least) . . . but it is likely that the patchy onset of the sea-breeze was the most important contributing factor." [7]

A flying saucer reported from Johannesburg, South Africa, on April 11, 1958, belongs in this category. Hundreds of witnesses reported a mysterious starlike object maneuvering in the northern sky on three successive nights at speeds in excess of 2000 miles an hour. Most observers agreed that "The Thing" could not have been any known aircraft because its speed was too great; it sometimes hovered stationary in the air, and repeatedly changed color from white to red to deep scarlet. One member of an Interplanetary Club who watched it through binoculars described the UFO as saucer-shaped, with a rim like a soup plate around the edge.

Members of the Council for Scientific and Industrial Research Minitrack Station, near Johannesburg, were amused by the variety of reports on "The Thing." The mysterious object in the night skies was in fact a South African Air Force Dakota aircraft, flying back and forth so that the Minitrack Station could test the calibration of its tracking instruments. In addition to the usual navigation lights, the aircraft had carried a bright, flashing light so that it could be photographed [7a].

A flight of bombers refueling in mid-air at night can be a startling spectacle and more than once has been reported as a gathering of flying saucers.

Such an incident occurred in Florida on October 31, 1955, when a disk jockey at Gainesville broke into his radio program about ten o'clock in the evening to announce that flying saucers were over the station. Many of his listeners hurried out of their houses to look at the Halloween visitors, clearly visible in the night sky. One reporter stated that he had seen four to six objects, oblong in shape, brilliantly glowing, red and orange, traveling soundlessly in a straight-line formation that later changed to a V [8]. Both the

radio station and the police station were swamped with telephone calls from frightened citizens, most of whom calmed down when they learned the explanation: a flight of bombers had been refueling at an altitude of 32,000 feet.

The Killian Case

The most famous UFO sighting of this type is the Killian case. On the evening of February 24, 1959, an American Airlines plane was flying from Newark to Detroit. At about 8:45 P.M., when the plane was near Bradford, Pennsylvania, the pilot, Captain Killian, noticed some puzzling lights above and to the left of his plane. There seemed to be three, their colors changing from yellow to light orange, dimming and brightening in intensity and shifting their relative positions. At first he supposed he was looking at the constellation Orion, for the lights had the same configuration as the stars in Orion's "belt," but when the lights changed position and he could see Orion itself in addition to the lights, he discarded his first theory. He considered the possibility of a jet tanker refueling operation, but decided the lights were moving too slowly. He couldn't think of any ordinary explanation—but he had long wondered what truth there was in the idea of flying saucers and had thought there must be something to it.

Over the loud speaker he remarked to the passengers that American Airlines had a special treat for them which they could see by looking out of the left windows. He continued to watch the lights as he flew west toward Detroit, and radioed two other American Airlines planes in the area. Learning that their pilots were also watching the unusual spectacle, he notified Air Traffic Control (ATC) in Detroit. The lights remained in view for about forty minutes, all the way to Detroit, and the pilot lost sight of them only when he began to let down through the haze for a landing.

Reporters and photographers were waiting to interview him, and next day's *Detroit Times* carried a banner headline, "Mystery Discs Trail Plane Here," over a picture of Captain Killian flanked by the plane's two pretty hostesses, all three smiling as they held up to the camera three ordinary kitchen saucers [9]. After checking

with the Detroit ATC, who did not know of any scheduled refueling operation, the pilot reported his experience to officials of American Airlines, and next day returned to New York where again he was besieged by reporters and photographers. Meanwhile, following standard CIRVIS procedure (Communication Instruction for Reporting Vital Intelligence Sighting from Aircraft), the manager of operations of American Airlines reported the incident to ATIC at Wright-Patterson Air Force Base.

In New York the day after the sighting Captain Killian gave a telephone interview to Radio Station WCHS, Charleston, West Virginia, describing his experience. Following the customary procedure, intelligence officers from Mitchell Air Force Base questioned him and filled out the usual report form [2]. In the radio interview and in the talk with intelligence officers Captain Killian made the same statements he had made to American Airlines officials: he didn't know what the lights were, and he couldn't tell how far away they had been because he didn't know their size or their altitude [10].

Not for months had such a good flying-saucer story appeared, and the newspapers made the most of it. Among the first to assert that the unknown lights had been flying saucers was the UFO Research Committee of Akron, Ohio (see *Chapter XIII*). Members of the committee had received the news by telephone, even before Captain Killian's plane landed at Detroit, from the pilot of a United Airlines plane who had watched the lights on his flight to Akron. During the days following, Captain Killian's copilot gave an interview on Long John Nebel's after-midnight radio program in New York. Captain Killian himself described the UFOs to members of a New York UFO organization, Civilian Saucer Intelligence (CSI), and appeared on several radio and TV programs. Both saucer addicts and newsmen besieged Air Force representatives, demanding an immediate explanation of the sighting. Finally, on February 28, only two days after receiving the report from American Airlines, ATIC yielded to public pressure and produced a tentative theory: it was possible that the pilots might have sighted the stars of Orion, as Captain Killian had first suggested. However, the release added, no definite conclusion could be reached until all the facts had been studied.

Promptly rejecting the possibility that he might have been looking at Orion, Captain Killian stated in an interview with the New York *Herald Tribune*, "I am sure there are people on other planets and that they have solved the problem of space travel. . . . I sincerely believe that their vehicles are coming close to earth."

While the saucer believers were keeping the story alive, applauding Captain Killian and denouncing the Air Force, the experts at ATIC had been collecting facts and trying to analyze them. The basic piece of evidence was Captain Killian's own report to American Airlines, made a few hours after the incident took place. After describing the circumstances of the sighting, the appearance and behavior of the lights, the statement continues:

"The only possible explanation other than flying saucers could be a jet-tanker refueling operation. Never having witnessed refueling operations at night, I am not aware of the lighting of the jet tanker.

"My air speed during this complete flight was 250 knots indicated. I also do not know the air speed of tankers during operation if this could be so. I contacted ATC to find out if they had any airplanes on a clearance and no three airplanes were given.

"In summary, it was difficult for me to believe they were jets because of low speed and configuration. If they weren't jets I still don't know any more than I did before even though I watched them for forty minutes before. Due to the dark and strong lights I was not able to ascertain any size or shape. The altitude of the objects was 30 degrees above my horizon. Distance away is unknown." [2]

Almost equally important was the evidence of other witnesses. During the forty-minute period of observation, the crews of five other planes, all flying west in the Pennsylvania-Ohio region, had watched the lights for varying lengths of time. Several persons on the ground in and near Akron had seen them between 9:15 and 9:30.

Air Force investigators methodically gathered the facts and made their analysis and on March 16, only twenty days after the sighting, they released a summary to the press. The mysterious lights belonged to normal terrestrial aircraft. Although ATC at Detroit had apparently not had the information when first asked, three B-47 bombers of the Strategic Air Command had been carrying out a

night refueling operation from KC-97 tankers at the time and place reported. The tanker has several groups of lights which, from a distance, can seem to be one or more lights, and would have looked very much like the three objects described by Captain Killian. Such a refueling operation takes from about forty minutes to more than an hour.

Captain Killian had been flying at an altitude of 8500 feet, and he had given the location of the unknowns as 30 degrees above his horizon; this agreed with the position of the tankers, which were operating at an altitude of 17,000 feet. Captain Killian had been flying west at an indicated air speed of 250 knots; the refueling tankers had also been flying west at a true air speed of 230 knots (ca. 270 mph). Since the courses of plane and tankers were roughly parallel, the tankers had remained in view and would have arrived over Akron at about 9:15, the time that ground observers reported the lights.

Everything checked. Every detail of the incident was accounted for [11]. Nevertheless the solution caused an explosion in the camps of the saucer enthusiasts, who called it, among other things, imaginative. Forgetting that the "Orion" theory suggested immediately after the sighting had been only tentative, UFO addicts ridiculed it and asked why the experts had later offered a different explanation—which they greeted with equal ridicule [12].

Captain Killian, too, had apparently forgotten his first report. On March 24, a month after the sighting, in an interview by the Long Island *Daily Press* he stated that the things he saw could not have been tankers; that he knew what B-47 bombers and KC-97 tankers looked like, and how they looked in operation at night. (Original statement to American Airlines: "Never having witnessed refueling operations at night, I am not aware of the lighting of jet tankers.") Also, he told the *Daily Press*, the objects he saw were at least triple the size of any known tanker or bomber. (Original statement to American Airlines: "Due to the dark and strong lights I was not able to ascertain any size or shape.") Furthermore, he asserted, the unknowns had been far too fast for a tanker, and had moved at a speed of about 2000 miles an hour. (Original statement to American Airlines: ". . . it was difficult for me to believe they were jets because of low speed.")

In rejecting the Air Force explanation of this incident, flying-saucer addicts ignored several embarrassing questions: If Captain Killian actually saw interplanetary craft, how did he fail to see the earthly aircraft operating at the same time and place? If the unknowns moved at a speed of 2000 miles an hour, how did Captain Killian and the crews of several other planes, flying at less than 300 miles an hour, keep the unknowns in sight for forty minutes? In that length of time the UFOs should have covered most of the distance to the Pacific.

Few persons, given the facts by responsible officials, would persist in denying the reality of the tankers and conjuring up a fleet of flying saucers to occupy the relevant cubic area of space. To the true enthusiast, however, these refueling planes remain incontrovertible proof that spacecraft are among us.

. . . And Kites and Soap Bubbles

Objects need not be as large as Skyhook balloons or jets to start a flying-saucer scare. Brightly illuminated advertising blimps have caused many UFO reports. Unfamiliar circumstances or a faulty perspective can manufacture spaceships out of things as small as seeds, spider webs, scraps of paper, or toy balloons.

In the autumn of 1947, during the first months of the saucer scare, many such UFOs were reported. One experienced observer, formerly a combat pilot, reported a flying saucer overhead at a height he estimated as 5000 feet. More careful study showed that that the object was at a height of only about 250 feet and was suspended from small balloons. Later he learned that, as a joke, some boys had launched a paper saucer carried by helium-filled toy balloons. During this same period when everyone was talking about flying saucers, spaceships reported over an Iowa town one night turned out to be glowing bits of paper drifting from a fireplace chimney [13].

On March 16, 1961, according to the British radio, a resident of East Suffolk reported to the police that he had seen a spaceship land in a nearby field. Investigators soon found the craft: a fuel tank that had fallen from a passing plane.

A fleet of UFOs appeared late one afternoon in July 1961 to an observer driving west along Highway 54 from El Paso, Texas, to Alamogordo, New Mexico. It had been raining in the mountains, and wind and dust storms had forced the driver to stop several times during his trip, but now the sun was shining between patches of dark cloud in the western sky. Driving toward the outskirts of Alamogordo, he was startled to see a V-shaped formation of huge saucers flying directly toward him. Stopping his car, he saw that they were glowing a deep red, were moving at high speed, and seemed to be as high as the clouds. When they had reached a point nearly overhead, they suddenly seemed to drop down toward the observer. Rapidly revising all his first estimates of size, height, and speed, he recognized their true identity. They were merely a group of tumbleweeds that had been carried aloft in the strong winds and were soaring past at a height of only 100 feet. Illumination from the setting sun had produced their weird reddish glow.

A spectacular flying saucer hovered near the Smithsonian satellite-observing station in Curaçao, Netherlands Antilles, on the night of October 17, 1961. The station crew observed it with binoculars, by apogee telescope, and photographed it with the Baker-Nunn satellite camera. A brilliantly glowing object, it shone in the eastern sky, moving erratically and fluctuating in brightness. After watching it for nearly an hour and finding that the nearby airport could not observe the object, the observers concluded that it must be less distant than it seemed, and set out by car to try to get a closer look. About a mile and a half from the station they stopped, and solved the mystery. A plantation manager and his servant stood in a field, hanging on to one end of a 1200-foot kite string. At the other end, high in the sky, soared a kite; hanging from it was a lighted pressure lantern [14] (see Plate IIa).

In 1954 malfunction of a sewage-disposal plant in western Pennsylvania produced one of the most spectacular saucer reports on record. An oversupply of detergent, whipped by a stiff breeze, foamed into a mountainous tower of bubbles. A sudden gust of wind broke the tower and launched a colossal mass of bubbles as large as a ten-story building. This brilliant, scintillating, super-giant bubble bath rose to great heights and drifted for miles. Widely reported as a UFO, this apparition was merely an unusual by-product of

modern technology. The UFOs photographed over Kentucky on July 7, 1947, were probably vapor trails, a less familiar sight then than now; or they might possibly have been the smoke trails from an exploding meteor (see Plate IIb).

A saucer incident that might have become a classic Unknown occurred in Denver at 10 A.M. on a summer's day in 1950. A man was sitting on the shady porch of his house, reading. Beyond the porch roof the sun shone brightly. Glancing up from his book, he was startled to see a formation of perhaps a dozen spherical objects, shining iridescently, traveling toward the distant mountains. As he watched, those in the front of the procession seemed to vanish instantly while others appeared out of nowhere to join the parade at the rear. Measuring their size against the mountain background, he decided they were "immense" and they moved at fantastic speed, covering the thirty or so miles to the mountains in a matter of five or six seconds.

Too stunned to take action, he was still numb from shock when he heard a faint "Hello," and looked up—to realize that the little girl across the street was blowing soap bubbles. If the man had jumped up when he first saw the objects and had rushed into the house to telephone the nearest saucer club, he might never have found out that the "spaceships" were only bubbles [15].

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[2] Air Force Files.

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[6] Scully, F. *Behind the Flying Saucers*. New York: Popular Library, Inc., 1951, p. 144.

[7] Sarson, P. B. "Aircraft Condensation Aura," *Meteorological Magazine*, London, Vol. LXXXV (1956), p. 217.

[7a] *Johannesburg Star*, April 14, 1958.

[8] Case 142, *CRIFO Orbit*, Vol. II (March 2, 1956).

[9] *Detroit Times*, Feb. 25, 1959.

[10] Barker, G. "Chasing the Flying Saucers," *Flying Saucers* (July 1959), p. 24 ff.

[11] Kirsch, F. A. "Air Force Right on Killian 'Saucer'?" *Flying Saucers* (August 1960), p. 17 ff.

[12] "Report on Unidentified Flying Objects Observed Feb. 24, 1959, by American-United Airline Pilots." Compiled by Unidentified Flying Objects Research Committee, Akron, Ohio, Feb. 24, 1960.

[13] Wylie, C. C. [Speech] *Popular Astronomy*, Vol. LVI (1948), p. 217.

[14] Smithsonian Astrophysical Observatory, *The SAO News*, Vol. I, No. 6 (November 1961).

[15] Dean, C. W. Personal communication.

Chapter iv

THE SPANGLED HEAV'NS: STARS AND PLANETS

Shortly before dawn on March 3, 1955, a spectacular flying saucer appeared over Alaska. The witness, a civilian scientist with the rank of Commander in the United States Navy, was returning from the North Pole on the daily Air Force Ptarmigan weather flight; his mission had been to study the effect of the aurora on radio propagation, for the Department of Defense. He described his experience as follows:

A Mirage of Sirius

"We were flying southwest of Point Barrow, Alaska, not far from Bering Strait, en route to Eielson Air Force Base in Fairbanks, and our course was roughly southeast. The night was clear and the stars shone brilliantly. I was looking out of the western bomb blister when suddenly I saw a bright object shoot in at tremendous speed from the horizon, directly toward the plane. At first I thought it was a meteor or a fireball and I instinctively ducked, but the object came to a sudden skidding stop about 300 feet away, thereafter riding along with our plane and keeping pace with our speed. I could scarcely believe my eyes. The thing possessed green and red signal lights that flashed back and forth, and something that looked like a lighted propeller on the top. Beyond question, it was a flying saucer.

"I wondered if the thing might be a hallucination, brought on by fatigue. After all, we had been in the air almost seventeen hours. I cleaned my spectacles and rubbed my eyes, but the Saucer was still there, pacing the plane and bobbing up and down as the plane itself occasionally wove or dipped. My next thought was to eliminate

all possible chance that the thing was an internal reflection. I pulled my fur parka up over my head and put my face smack against the bulging surface of the blister that formed the window. Thus shielded from all internal illumination, I could still see the glowing object. I next drew a pencil from my pocket and held it out at arm's length, and was surprised to find that the glowing disk was somewhat smaller than the eraser. I made a rapid calculation and concluded that if the sphere was actually 300 feet away, as it seemed, then it was only a foot or two in diameter, not much larger than a basketball. My next thought was whether one of the radio parachutes had somehow or other got attached to the plane by the string. These objects, brilliantly lit by an electric light, can be quite startling. But it had been nearly half an hour since the last parachute release and the meteorologists were just getting ready to lower another through the trap. I decided to call the meteorologist to look at the thing. But before I could call out, as if it had read my mind the object suddenly took off at top speed and disappeared. Now I was really concerned. In less than two seconds the UFO had vanished over the coast of Siberia, some 200 miles away. It must have been traveling at the fantastic speed of more than 100 miles a second. The Korean War was over but our relations with the Soviet Union were still tense, and I wondered if the object might be a secret Russian missile on reconnaissance. I kept my eyes glued to the point where the saucer had disappeared and suddenly, a couple of minutes later, it shot back toward the plane, more brilliant and spectacular than the first time.

"You can perhaps imagine my relief when I suddenly realized what the object was, and at the same time realized that I had hit on the answer to a great many flying-saucer reports of a similar nature. Only someone familiar with the constellations could have identified the object. It was a mirage of Sirius, the brightest star in the heavens. Actually Sirius was slightly below the horizon at this time, but the bending of the light had raised the image above the horizon and had diffused the beam into the saucerlike form. The flashing red and green lights were common phenomena associated with star twinkling, and the apparent structure, including the whirling propeller, resulted from distortion by the earth's atmosphere.

"But why had the image taken off the way it did, and then rushed back? The moving plane of course was continually changing position relative to the ground features. A mountain peak on the distant horizon had briefly come between the plane and the star, obscuring the light. The light was not cut off all at once, however. Thus as the image dimmed it seemed to shrink, as though it were racing away. This temporary barrier also explained the sudden stops and starts and the tremendous instantaneous acceleration the object seemed to make at the instant it appeared. The large atmospheric lens was simply focusing the light of the star in the general direction of the plane and thus it was centered with my eye. That is why the object seemed to duplicate the motion of the plane.

"I watched the object for several minutes after its return. I was able to get full confirmation of this identification when the star rose over the western horizon; it rose in the west because the southward motion of the plane more than compensated for the westward rotation of the star. And as Sirius came up from the horizon, the 'flying saucer' sank back into the brilliant hemisphere of stars, where it belonged." (The witness in this case was the senior author of this book.)

Sirius has inspired many UFO reports. On December 10, 1952, at 7:15 P.M. P.S.T., the pilot and radar observer of an F-94 on routine patrol duty were over the town of Odessa, Washington, at about 26,000 feet when they saw a large white light in the east [1]. Dim reddish-white lights seemed to be coming from "windows," and no trail or exhaust was visible. The pilot attempted to intercept but the object performed amazing feats—did a *chandelle* in front of the plane, rushed away, stopped, and then made straight for the aircraft on a collision course at incredible speed. The pilot banked away to avoid collision, and afterward was not able to locate the object. The radar man then got a brief return but soon lost contact. Although the visual and radar contacts had not coincided, both men assumed that they referred to the same object [2, p. 65].

Investigators suggested at first that the object might have been one of the Telemuk balloons, but this idea had to be discarded and the sighting was listed as Unknown. A review of the evidence by the present authors suggests a highly probable explanation. Above the low cloud cover at 3000 feet the night was clear and

moonless. In the east, Sirius was just rising over the horizon at the exact bearing of the unknown object. Atmospheric refraction would have produced exactly the phenomenon described. The same atmospheric conditions that caused the mirage of the star would have caused anomalous radar returns (see *Chapter VIII*).

Earth's Distorting Atmosphere

In everyday life we often look at familiar objects through a distorting medium. Houses and persons seen through a pane of poor window glass look peculiar and wrongly shaped, and images of trees and clouds reflected in a pool or a stream of rippling water may continually shift and break, but these distortions do not deceive us because we are used to them. The child who stands before the crazy mirrors in an amusement park may laugh at himself for looking so fat or so thin, so tall or so short. Knowing that the image is only a ludicrous approximation to his real appearance, he is able to recognize himself without difficulty. But a stranger, placed so that he could see only the distorted image and not the person who made it, could not make the necessary corrections and probably would not recognize the child if they met in the street.

Like window glass, water, or mirrors, a mere layer of air can distort an image. For the astronomer, the earth's atmosphere is a lifelong frustration. Acting as an imperfect lens, it continually falsifies the true position, color, size, and shape of the heavenly bodies he tries to study. Under certain conditions it can change the image of a star or a planet into an unrecognizable stranger. When light enters the atmosphere, the rays are bent or "refracted" so that the image is moved upward, somewhere above the true position of the star (see Figure 6). When we are admiring a sunset and think we are watching the very top rim of the sinking sun as it drops below the horizon, we are actually seeing only its projected image. The sun itself has already set, but its light is bent upward by the air that clings to the earth's surface. The greater the density of the air, the greater the displacement of the image. If there were no air at the earth's surface, the sun would vanish and darkness would come instantaneously, with no intervening period of twilight.

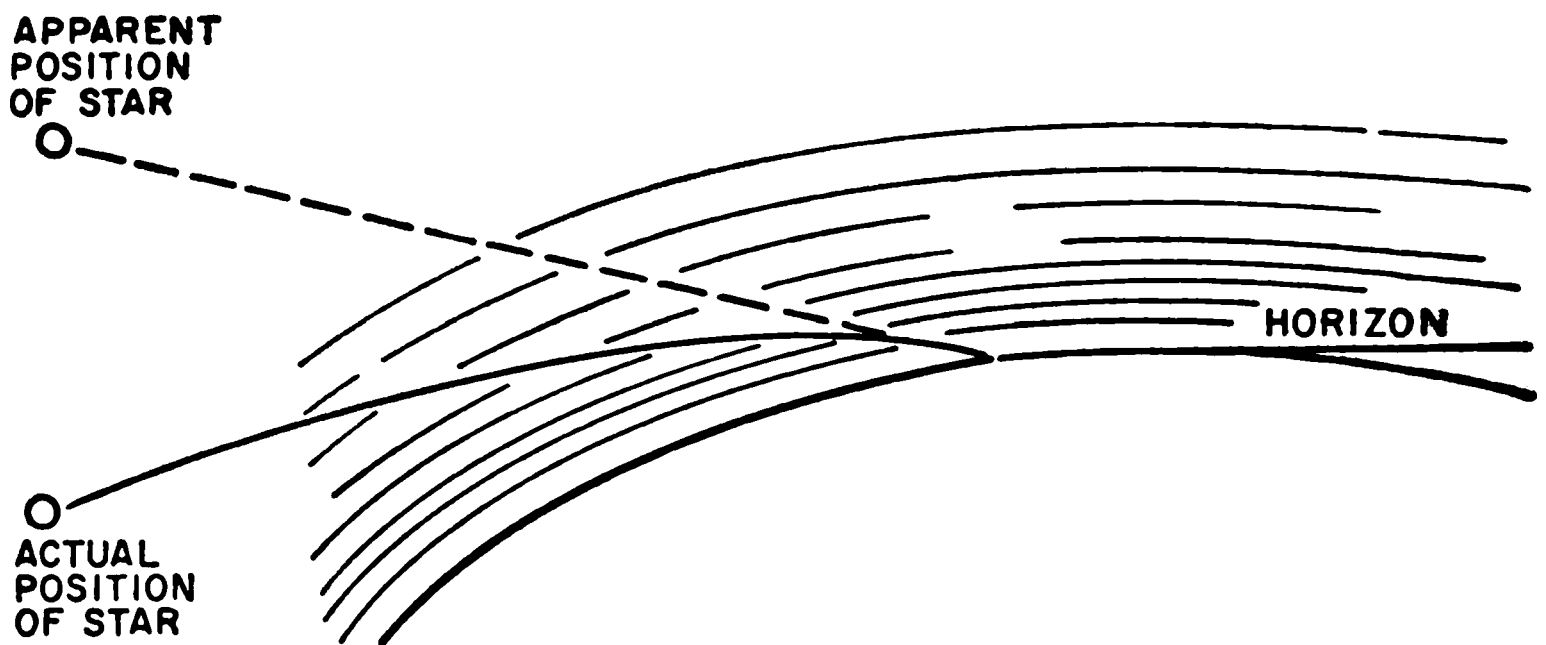


Figure 6. Bending of light by the atmosphere. A star below the horizon is visible because refraction raises the image.

A star's light does not bend uniformly, however. Light rays of different wave lengths bend at different angles, so that when white light is scattered or "dispersed" into its component colors, the blues and greens are bent more than the reds. The density and the temperature of the air also affect the beam, so that as a star's light travels from the thin upper atmosphere to the denser air near the earth, the colors shift constantly and the star seems to twinkle, flicker, and change in color and brightness.

Such changes are most noticeable when a star is low on the horizon at dawn or at dusk, so that its light reaches us only after traveling through miles of dense atmosphere. The sun displays these effects dramatically. At sunrise and sunset its scattered light may illuminate the entire horizon. Clouds turn red and gold, hills and the tops of buildings take on a ruddy glow, and the entire sky may flame. The red wave lengths remain, while most of the blues and greens have been scattered out of the beam or may appear briefly at the top of the sun's disk, as a "green flash," at the instant it sinks below the horizon.

Similarly, a star or planet observed low on the horizon at sunrise or sunset may appear extraordinarily large and brilliant. It may seem to have structure, showing an intense red glow at the bottom and bright blue at the top. Watching it, the startled observer may see the object apparently in motion, hovering, pulsating, and flashing red and green lights. If he is so inclined, he can easily interpret the image as a strange machine, the red as the glow from an exhaust,

and the blue as the illumination system of an interplanetary craft.

Normally the air is warmest at the surface of the earth and steadily gets colder at greater and greater heights. Sometimes this condition is reversed, particularly in the broad deserts and prairies of the Southwest, where the changes between the day's heat and the night's cold may be sudden and extreme. The ground cools off rapidly during the night and imparts this coldness to the layer of air immediately above. Thus the air may be warmer some distance above the ground. When such a "temperature inversion" occurs, light going through the air bends in a peculiar way (see Figure 7), so that the image is displaced far more than normally. The inversion may produce fuzzy or greatly distorted images, and when there are several layers of alternating hot and cold air, the effects may be spectacular. At the boundaries between the layers the distortion and displacement increase greatly. A star or a planet seen through such an atmosphere may display apparently violent motions, peculiar shapes, and fantastic color changes; light clouds drifting over the bright stars may increase this illusion of motion [3].

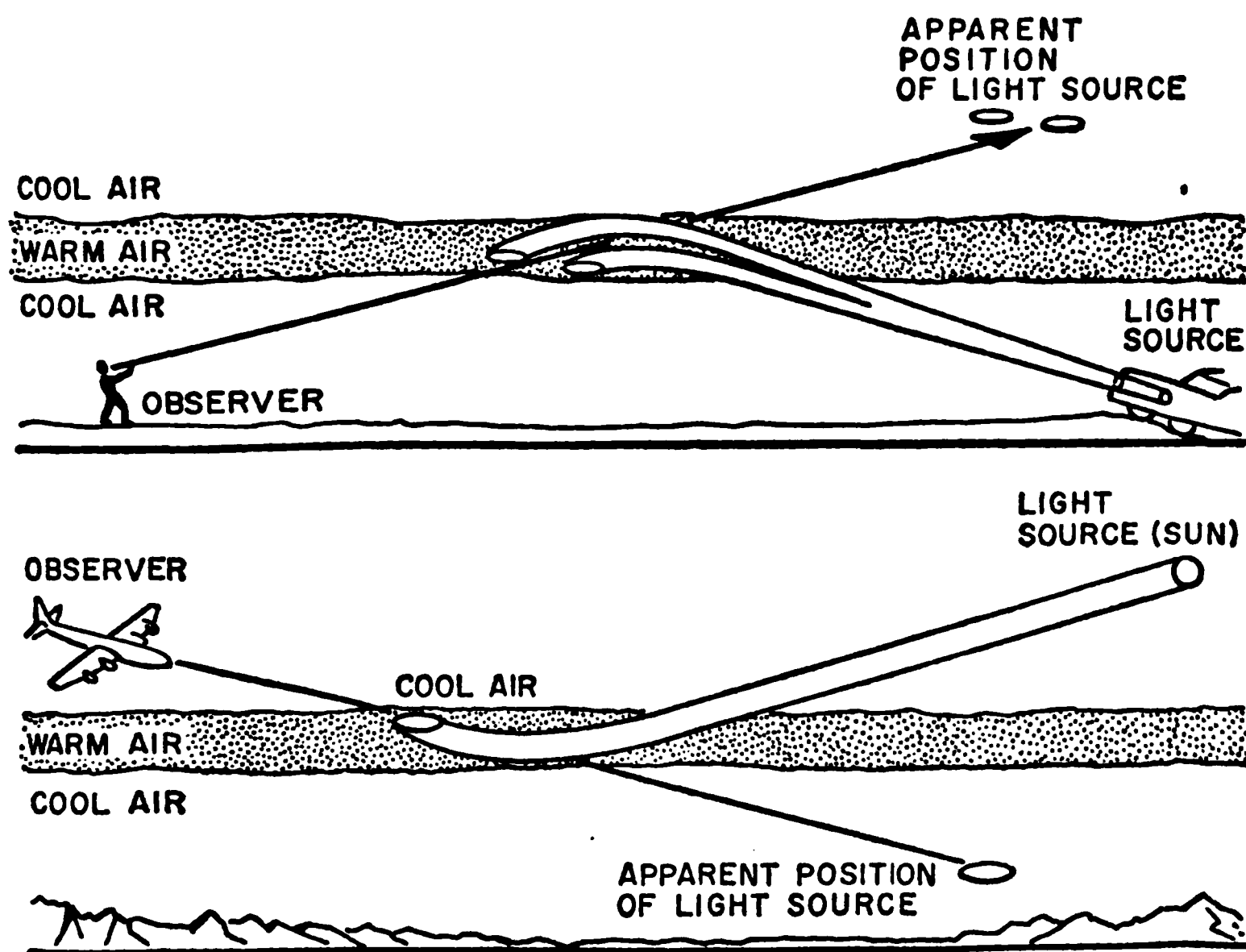


Figure 7. Displacement of light image by temperature inversion.

The rising or setting sun, although actually below the horizon, may project upward several images of itself, one on the top of another, to form a kind of Chinese pagoda, or a "bell pepper." And the twinkling top rung of the pagoda may simulate a whirling propeller.

The "Whipping Girl" of Saucerdom

The planets are wanderers. Each day they move to a new position among the constellations. Astronomers and navigators have learned the paths of the planets and the positions of the brightest fixed stars, but most of us, when we look up at the night sky and see a brilliant stranger among the familiar star groups, must cudgel our brains to account for it. According to our dispositions, we may consult a newspaper or telephone an observatory to find out the name of the intruder, or we may conclude that the unknown is an alien spacecraft.

The planet Venus has been chased at least once by patrolmen in a squad car, has several times caused the scrambling of jet interceptors, and has been named the culprit in so many UFO mysteries that saucer enthusiasts somewhat cynically refer to it as "the whipping girl" of saucerdom.

The brightest of the planets and the closest to earth, Venus never moves more than 45 degrees from the sun and thus is most often visible in our skies near sunrise or sunset, preceding or following the sun. The apparent size of the planet varies according to its distance from the earth and its phase. When it is farthest from the earth, the disk has a diameter of ten seconds; at its closest, the diameter has grown sixfold, to sixty-four seconds. The human eye and the ordinary camera see it as a brilliant white star. Being nearer the sun, Venus receives almost twice as much light from the sun as does the earth, and when at greatest brilliance, can be seen in the daytime sky. Viewed momentarily through rapidly moving cirrus clouds, it may seem to be racing across the sky like a flying saucer, but a longer look will reveal that the object is actually making very slow progress, like a planet [4].

To the airman in the cockpit of a plane, the planet in the dawn sky can be a breathtaking sight. As one veteran pilot has described

the experience, "Venus rose to signal me from the eastern horizon, so brilliant and inconsistent in color, changing at once from yellow to green to purple and then reversing the show, that I thought for a time it was another aircraft equipped with special lighting devices. But Venus steadied in time, proving its identity." [5]

During the spring of 1956 Venus stimulated an unusual amount of flying-saucer excitement. About 9:00 E.S.T. on the nights of March 20, 21, and 22, dozens of persons in Cincinnati, Ohio, telephoned the newspapers and the local headquarters of Civilian Research Interplanetary Flying Objects (CRIFO), to report an unidentified flying object that was burning "like a beacon" in the western sky. A reporter for the Cincinnati *Enquirer* stated: "To the naked eye, the object appeared to be an extraordinarily intense bluish white light . . . through binoculars, the object appeared to be a compact galaxy of lights, changing form as they revolved slowly. At one point, with binoculars set slightly out of focus, it assumed the appearance of a diamond brooch ringed with emeralds turning lazily on an eccentric axis." The object was visible for nearly an hour, moved slowly to the northwest, and disappeared.

Astronomers quickly identified the unknown as Venus. To the saucer enthusiasts, however, it appeared as a low-flying luminous object with swept-back wings, hovering in the west, making no sound, and displaying colors that changed from red to white. While admitting that some of the reported sightings might have been Venus, the editor of *Orbit* (the official publication of CRIFO) argued that an object that changed shape and sparkled like diamonds and emeralds could not possibly be Venus. He stated "that the public should know that out of seventeen UFO reports received for a three day period, ten were explainable as Venus but *six were not!* These stubborn six defied all conventional explanation." [6]

While the fate of the seventeenth UFO may require further explanation, the flying saucer reports did not offer a real puzzle. The time, the position, the colors, and the apparent motions of the object were entirely consistent with those expected for the planet under the prevailing atmospheric conditions. Dr. Paul Herget of the Cincinnati Observatory had easily identified the "mysterious" object. He added that Venus would continue to get brighter and brighter until

the middle of May, and that the number of UFOs sighted would probably increase correspondingly.

He was right. Less than three weeks after the excitement in Cincinnati, Venus inspired one of the most notorious "Unknowns" in the history of saucerdom, one that evoked charges of fraud, falsehood, and conspiracy on a grand scale.

The Ryan Case

An American Airlines plane had just taken off on a flight from Albany to Syracuse, New York, on the night of April 8, 1956. The sky was clear with a very thin overcast. At 10:15 E.S.T., while at about 6000 feet over Schenectady, Captain Ryan and his first officer sighted an unidentified flying object and reported it to Griffis Air Force Base. Bright orange in color, it glowed ahead of the plane in the northwestern sky. At first it seemed to be traveling at great speed, 800 to 1000 miles an hour. Then it appeared to slow down to the plane's speed, about 250 miles an hour, and thereafter kept a steady distance ahead. The tower operators at the Albany and Wattertown airports also saw the object, as did the crews of four other plane flights, who decided it was probably a star or a planet.

The shift supervisor on duty in the tower at Griffis Air Force Base, alerted by Captain Ryan, was able to observe the unknown through binoculars. He described it as apparently round, larger than any star, at an estimated altitude of 3000 or 4000 feet; when first sighted it looked white with an orange tint but after about ten minutes changed to orange with a red tint. During the twenty-three minutes he watched it, the unknown slowly descended over the horizon. Interceptors from Griffis Air Force Base were scrambled (Air Force jargon meaning to take off and pursue as quickly as possible) at 10:48 and 10:52, but returned to base without finding anything. Captain Ryan, having watched the object during most of the flight, landed his plane at Syracuse and made the customary report.

The newspaper accounts that followed caused a short-lived flying-saucer scare, but when officials from ATIC investigated they had no difficulty in solving the mystery. The evidence was plain and

unmistakable. The object was the planet Venus. According to the reports of Captain Ryan and the other observers in the air and on the ground, the object was low in the northwest; estimates of its azimuth varied from 290 to 330 degrees. A plot of the planet's actual position at 10:20 P.M., when the UFO was first picked up by the tower operator at Griffis Air Force Base, showed that Venus was slightly above the horizon at an azimuth of 301 degrees, and that it set at 304 degrees at about 10:42 (when allowance is made for the effects of atmospheric refraction)—the time the UFO disappeared from the view of the Griffis observers. Of the four other commercial and military pilots who reported the object, all described it as essentially stationary, and all positively identified it as Venus. In confirmation, the glowing light reappeared the following night at the same time and position. The intercepting jets had not been able to find the alleged UFO because by the time they left the ground, around 10:50, the planet had already set [1].

There the matter should have ended. The puzzle was solved, and forgotten by all but a few saucer addicts. Some twelve months later, however, Major Donald Keyhoe reopened the case. As the new Director of the National Investigations Committee for Aerial Phenomena, commonly known as NICAP (see *Chapter XIII*), he charged the Air Force with concealing the true facts of the incident, and himself tried to get in touch with Captain Ryan to obtain information to support the charge. Receiving no answer to letters or telephone calls, Major Keyhoe then gave his story to certain government agencies. Using as evidence a newspaper account [7] and interpretations of Captain Ryan's remarks in a TV interview, NICAP alleged that the object sighted on April 8, 1956, had been a UFO; that the captain, on orders from Griffis Air Force Base, had abandoned his scheduled route to chase the unknown craft, had lost it somewhere over Lake Ontario, had then turned back and landed at Syracuse and, finally, that his flight log must have been falsified to conceal the facts of this pursuit [8].

The original question, the identity of an unknown object, was all but forgotten. In letters, telegrams, and telephone calls to various officials of American Airlines, Congress, the Air Force, the Civil Aeronautics Board, and the Civil Aviation Authority, NICAP requested an official investigation of the incident. The first requests

evoked no response but continued efforts were successful. After hints of publicity and of possible senatorial interest, the beleaguered agencies at last yielded to NICAP pressure and reopened the case. Captain Ryan, a reliable officer with twenty-three years' experience as a pilot, was subjected to official interrogation. Busy government bureaus were forced to invest further time, money, and energy to confirm facts that had never been in doubt.

To the Civil Aviation Authority (CAA), Captain Ryan replied that he had observed an unidentified object, but that he had not altered the course of his flight. He repeated this explicit statement to officials of the Civil Aeronautics Board (CAB) and of American Airlines. Airline records provided independent confirmation. Since the scheduled time of the flight between Albany and Syracuse had been 49 minutes, and the actual time elapsed on the night in question had been 48 minutes, he could not possibly have spent time in making a detour over Lake Ontario as alleged.

These declarations, according to NICAP, were worthless. They merely proved that Captain Ryan had given false answers to his questioners; that the government agencies involved knew the answers were false; and that a gigantic conspiracy existed to suppress the truth. Among those suggested as possible members [8] were the American Airlines Company, the Civil Aeronautics Board, the Civil Aviation Agency, the United States Air Force, and possibly even the Central Intelligence Agency and the National Security Council.

Saucer publications still list this sighting of Venus as an Unknown.

Venus as a Morning Star

One of the "best" UFOs of the year 1950 appeared when Venus performed in plain sight of the ATIC offices at Wright-Patterson Air Force Base, Dayton, Ohio [2, p. 103].

About midmorning on March 8 a TWA plane, coming in to land at Dayton municipal airport, was circling to get into the traffic pattern when both pilot and copilot noticed an extremely bright light hovering in the southeast. Much brighter and larger than a star, it appeared and disappeared in the high, thick, scattered clouds. The tower operators, who also saw it, immediately telephoned the Ohio

Air National Guard and officials at ATIC. Within minutes the UFO had attracted an audience of exceptionally well-qualified observers. Air Force experts on unidentified flying objects watched it from the ground, technicians studied returns on the radar screens at the laboratory at Wright Field, and the pilots of two hastily scrambled F-51s tried to intercept it.

The radar operators, who reported returns from both UFO and pursuit planes, called the pilots and vectored them in toward the target. Both pilots could see the light at first, but when they had climbed to about 15,000 feet they found themselves in clouds so thick that neither could see the other plane, and the unknown was no longer visible. Since ground radar reported that the planes were getting closer to the target, the pilots decided to continue, on instruments, but they separated to avoid the danger of colliding with each other. In a few seconds they were deep in dense cloud. Flying conditions were far worse than they had expected and the planes were icing up fast. Nevertheless the pilots kept climbing until ground radar advised them that they were almost on target. Realizing that if a solid object actually were ahead of them they would hit it before they could see it, the pilots immediately descended to below the clouds and circled, hoping for a break in the overcast, until ground radar reported that the target was fading fast. The planes then landed. When the clouds broke momentarily, after about an hour, the UFO was not visible.

A conference took place at ATIC that afternoon to discuss the identity of the mysterious light and the cause of the radar echoes. A check showed that the position of the UFO had been identical with that of Venus. The light, the conference concluded, had been Venus. One pilot later disagreed, arguing that the light had not looked to him like a planet and that if the object had been Venus it should have appeared, but did not, at the same time on the following day. But the weather conditions the first day would have distorted the image and made it unlike the pale light of Venus occasionally visible in the daytime. It was not visible at all the following day because of different weather conditions.

The radar returns, the investigators found, had come from the ice-laden clouds and were unrelated to the light. Both planes had encountered unexpectedly severe icing conditions which increased

as they approached the center of the cloud. Radar, tracking their course during these moments, had shown the planes approaching close to the unknown target. All the evidence, the radar experts agreed, indicated that the unknown target was ice [1].

Venus as an Evening Star

In the spring of 1959 Venus again, this time in the evening, caused reports of flying saucers. At 6:20 P.M. on March 13, a clear evening with visibility of about fifteen miles, an unidentified flying object was sighted in the western sky near Duluth, Minnesota [1]. Witnesses described its shape as tubular or round and its color as red, orange, green, or white. Two interceptors of the Air Defense Command were scrambled to investigate and headed for the object at top speeds, but they could get no closer and eventually gave up the chase and landed. Military personnel at ground stations and in the air observed the object visually and picked up radar returns; it disappeared, after about thirty minutes, by fading from sight. Although this spectacular unknown had seemed to keep pace with the aircraft, at times rushing toward the planes on a collision course and at other times reversing direction and racing away, all witnesses agreed that the object had remained at a magnetic bearing of approximately 300 degrees.

The radar screen at the ground station had been photographed and the film was forwarded to ATIC at Dayton. Analysis showed that the echoes had not come from a real target but were "angels" caused by interference (see *Chapter VIII*). Some operators had reported sharp contacts, others fuzzy; on some sets the target had faded suddenly, on others it rushed off the scope at incredible speeds. Contact was intermittent, for short periods of from ten seconds to a minute, and each new contact gave a different position for the target.

At the time of the sighting Venus was just on the western horizon, at the same position occupied by the unknown, and probably would have been invisible except for the refraction by the earth's atmosphere. Layers of air with different temperatures had produced

the apparent motion and changes in color. The object had maintained the same size and relative position during the entire period of observation; it disappeared by fading from sight, sinking farther below the horizon. The following night, under similar atmospheric conditions, the object reappeared in the same position. The unknown was positively identified as Venus.

Venus was again reported as a UFO on the night of October 19, 1959, in Korea. An observer reported a crescent-shaped silver object moving very slowly toward the west. Observing it for three hours and twenty minutes through the telescope of a transit, he obtained very exact data on the bearing and altitude, which provided the facts required for identification. The object moved westward at a rate of approximately 12 degrees an hour, a rate close to the rotational velocity of the earth and the apparent rotational velocity of the stars. Venus at the time occupied exactly the same position as the object, and went below the horizon shortly after the reported sighting [1].

The Rotating Lights of Japan

One of the most famous exploits of Venus took place over Japan and Korea in December 1952 and January 1953. The resulting UFOs, publicized as "The Rotating Lights of Japan," were automatically identified as spaceships by saucerians. Noting the similarity to the "foo balls" often seen by airmen during World War II, however, Dr. Menzel concluded that the lights were probably a type of foo ball, "an exceptional mirage." [9, p. 96] The rotating cycle of colors suggested that the atmosphere was acting to break up and disperse the component colors of a luminous image, displaced from its true position. Without precise information on the time, position, and direction of motion of the unknown, this theory could not then be substantiated. During the preparation of this book, however, the authors were able to examine the original data on file at ATIC and to obtain the facts necessary for a complete solution.

The drama began on December 29, when UFOs were reported at many points over northern Honshu, the main island of Japan, and continued with similar sightings, particularly on January 9 and

January 21. On the evening of December 29 the pilot of an F-84-G plane, engaged in local-area night flying, overheard a radio-telephone conversation between another plane and a radar station on the ground reporting an unusual light in the western sky. Although the sky was thinly overcast at 8000 to 10,000 feet, he was far above the clouds, flying in brilliant moonlight with a visibility of at least forty miles. At 7:48 P.M. local time, while at 27,000 feet, he observed an unidentified object above and almost due west of his plane. Turning off all his lights to make sure that the object was not merely a reflection of his own canopy, he climbed after the unknown and kept it in view for three minutes, then lost it briefly. He soon located it again at 35,000 feet, when he seemed to be level with the object and tried to close in on it. During this second sighting he observed it for about five minutes before the light disappeared in the west.

The pilot was a man of unusual experience, in command of a fighter escort wing, and well aware of the illusions a flyer can experience at night. He was also a remarkably accurate and resourceful observer, so that his report to Intelligence investigators is a model of exact statement. If all such reports were similarly precise and complete, few UFOs would remain unidentified and the civilian saucer groups would have to disband (see *Chapter XIII*). Carefully separating what he observed from what he concluded, the pilot stated that the object looked larger than the stars or any planet; he assumed that it was circular, but could not determine the actual shape. He could not determine whether the object was silent or noisy because the noise of his own motors would have prevented his hearing any sound from the unknown. The object seemed to show a cluster of lights, red, white, and green, which slowly rotated in a counterclockwise direction from east to west; one complete cycle of revolution required a time estimated at four to eight seconds. The shifting of the three colors during the cycle resembled the rotating colors in some jukeboxes, and the effect was phenomenal. "As these colors rotated in the body of the object, at times the entire body was one solid color, either white, green, or red, but in the process of completing a revolution the body was frequently fractionally red, white, or white-green, plus the other possible combinations of the three colors." Also there seemed to be three beams of

white light radiating out from the main body in straight shafts which, unlike the colors, did not change their relative positions but remained constant at positions of roughly 11:00, 5:00, and 7:00. No phenomenon that might be an exhaust was observed. As to motion and behavior, the object seemed to travel exactly parallel to the plane and maintained a constant distance in spite of the pilot's attempts to intercept it at speeds of around 500 miles an hour. At no time did it execute any maneuvers except for a gradual change of direction during the two observations. The sighting ended when the lights vanished in the west [1]. These rotating lights were also seen by the crew of an F-94 interceptor who watched them for about forty minutes, by the crew of a B-26 bomber who watched them for about seven minutes, and by various ground observers.

To make a positive identification, the investigator must know the weather conditions, the bearing of the observing aircraft, and the position of the object. Atmospheric conditions were found to be conducive to the formation of mirages. At the time of the first sighting on December 29, the observing plane was headed slightly to the east of north; the UFO was in the west, apparently traveling north on a course parallel with that of the plane. After the pilot lost sight of the object, he circled and hunted and was flying slightly east of south when he again picked up the object, which was still in the west.

A check of the astronomical situation showed that the sun had set about three hours before the sighting. Venus was following roughly three hours behind the sun and was extremely brilliant, with a magnitude of nearly -4.0 . At 7:48 P.M., when the pilot sighted the unknown, the planet was about 3 degrees above the western horizon. When Venus finally sank beneath the horizon and disappeared, the "unknown" also vanished.

The similar UFOs reported from Japan during the same period, on January 9 and January 21, 1953, were also mirages of the planet Venus. The cases of "The Rotating Lights of Japan" in the Air Force file on UFOs have now been shifted from the category "Unknown" to the category "Solved." In many other UFO cases of the "rotating lights" variety, the Air Force has positively identified the unknown as the planet Jupiter.

UFOs and the Opposition of Mars

Venus is not the only heavenly body to simulate a flying saucer. Jupiter and even Mercury, the smallest of the planets, have inspired their share of UFOs. Mars, which can also be very bright, has frequently been reported as a spaceship.

On June 21, 1952, an F-47 aircraft was on routine patrol over the Atomic Energy Commission installation at Oak Ridge, Tennessee, when at 10:58 P.M. a spotter from the Ground Observer Corps informed the pilot that a slow-moving craft was moving in the area at very high altitude. At about the same time the pilot observed a blinking white light, of no definite shape and with no exhaust or trail, apparently making passes at him. For the next eighteen minutes the pilot tried vainly to intercept the unknown. The plane was at 15,000 feet, moving at about 250 knots. As the pilot turned to meet the pass, the UFO would pull up some 4000 to 5000 feet above the plane and then move in again. When the plane reached 22,000 feet, the UFO appeared to make a final dive from 28,000 feet, pulled back up to its previous altitude, and then disappeared. The pilot's reaction is indicated by his answer to one of the routine questions on the Air Force report form: "Did you stop at any time during the sighting?" His reply read: "Ha Ha!"

Investigating the incident, officials from ATIC at first suspected that the object might have been a balloon, released as a hoax; only a few weeks earlier a crank had launched a flight of balloons near Oak Ridge and had been caught. But after interviewing the witnesses, the investigators concluded that the UFO was far more probably the planet Mars. As so often happens, however, they could not convert the "probable" into a "positive" identification because they lacked one essential fact: the bearing of the aircraft [1].

Some flying-saucer enthusiasts consider Mars as the probable home port of many spaceships, which allegedly visit the earth in particularly large numbers when Mars is in opposition—the point in its path that is nearest the earth; these ships supposedly seize the chance to hop over to earth when the distance between the two planets is at a minimum.

It is to be hoped that the Martians, if any, are more competent navigators than the terrestrial saucerians who propose this theory. No sensible Martian would plan a journey scheduled to land him on earth during the few weeks when the two planets are closest. Traveling between Mars and earth is not like jumping across a mountain stream where the banks remain stationary: the jumper, of course, chooses the narrowest part of the stream and leaps across in a straight path. But in space travel both planets are moving; they travel in elliptical orbits of different sizes and at different speeds. To reach earth, the Martian, too, must get into an elliptical orbit of a size and shape that will eventually intersect the earth's orbit. According to calculations by terrestrial rocket experts, the path that requires the least fuel is about 735 million miles long—some twenty times the distance between the two planets when they are closest. To follow this course, which takes 260 days of travel, the Martian must leave 260 days before the day that his ship and the earth will converge and meet at a particular position in space. Therefore he plans to blast off at a time when earth in its orbit is 76 degrees of arc behind Mars in its orbit (see Figure 8). By the time he lands on earth, the planet Mars is lagging 44 degrees of arc behind the earth [10].

Any increase in UFO reports that may occur when Mars is in opposition should be attributed not to spaceships but to the heightened brilliance of the planet itself glowing in the night sky.

The Gorman "Dogfight"

One of the most puzzling of the classic saucer mysteries began on the evening of October 1, 1948, when George F. Gorman, manager of a construction company and a lieutenant in the North Dakota Air National Guard, was returning to Fargo, N.D., from a cross-country practice flight in an F-51 fighter. About 9:00, Lieutenant Gorman called the control tower at the local airport for landing instructions, and asked the identity of a moving light that was blinking on and off in the air below him. Informed that a Piper Cub was coming in from the south, he continued to circle, and at 9:05 again called in to report that he could see the Cub below him at about

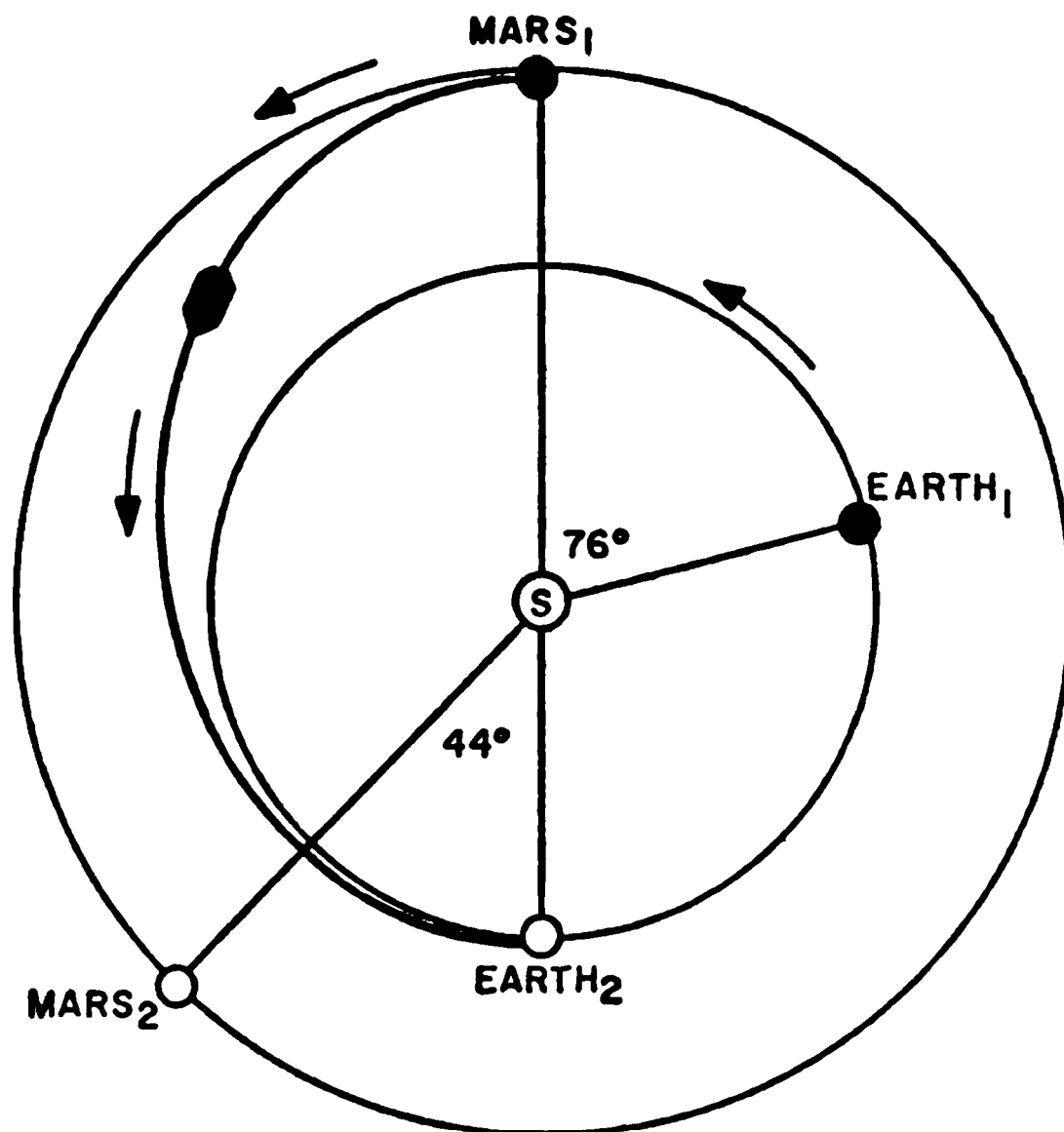


Figure 8. Orbit of spaceship. Mars₁ and earth₁, positions of planets when ship leaves Mars; Mars₂ and earth₂, positions when ship lands on earth.

1000 feet. He could also see an unidentified light moving rapidly at about the same altitude.

The assistant traffic controller then walked to the south window of the tower and looked out. He could see the Cub in the air and, a little above it, a clear white light. The light was moving swiftly to the north, then shifted and continued in a straight line toward the northwest. After watching it for several seconds, he returned to his post. A few minutes later Gorman called the tower for the third time to say that he was going to try to close in on the unknown. The traffic controller then stepped to the south window of the tower. Through his binoculars he could see a light moving rapidly over the field in a straight line toward the northwest. It had no particular shape and was merely a clear white light about the size of a plane's tail lamp. After a few seconds he returned and resumed communication with Gorman.

The pilot of the Cub glimpsed the light briefly as he was landing his plane. He supposed it to be the tail light of another ship going very fast in a straight line in a westerly direction, and was puzzled

by the fact that an army plane seemed to be pursuing it. After landing he delivered some bottles of Coca-Cola to the tower operators and, overhearing the conversation between them and Gorman, stepped to the balcony at the southeast corner of the tower to see what was happening. From there he could see the light going west, with the army plane after it. The light shifted briefly to the southeast but almost immediately resumed its northwest course and disappeared after a few seconds.

Lieutenant Gorman, meanwhile, had begun a weird "dogfight." The UFO seemed to be at an altitude of about 1000 feet, was traveling about 250 miles an hour, and was blinking off and on. As he approached, the light banked to the left. Gorman dived after it but could not catch up. The light then began to climb in a rapid turn. Attempting to turn with it, Gorman blacked out temporarily from the excessive speed.

Continuing the chase, this time at 5000 to 7000 feet, Gorman noticed that the light was now traveling fast, apparently faster than the F-51 could go, so he began trying to cut it off in turns with his fighter at full power. As the object circled to the left, Gorman cut back to the right for a head-on pass. When collision seemed inevitable he dived and the light seemed to pass over his canopy at a distance of about 500 feet. According to the description he later gave the Air Force, the unknown at this closest approach seemed to be a round white light, somewhat flattened, from six to eight inches in diameter—about a quarter the apparent size of the full moon. Gorman then made a climbing turn. When he could see the light again it suddenly reversed direction and headed straight for the plane, attempting to ram. It was no longer blinking off and on but was a steady white. Just before collision it pulled up and Gorman, too, pulled up. The light went straight up, with Gorman following until, at 14,000 feet, his plane went into a power stall while the object circled some 2000 feet above him. As he resumed the battle, the light seemed to retreat, then attack. Gorman dodged and circled to the left to get in position for another intercept. Finally, when these maneuvers had taken him some twenty-five miles southeast of Fargo, he was at 14,000 feet with the object below him at 11,000 feet. He dived after it. The UFO turned and started a head-on pass, then broke it off, climbed straight up, and disappeared. The time was

9:27. Gorman returned to the Fargo airport and landed, convinced that some intelligence had been controlling the actions of the unknown [1].

With the memory of the Mantell tragedy (p. 33) and the Chiles-Whitted sighting (see *Chapter* v, p. 109) still fresh in mind, officials from ATIC arrived at Fargo in less than twenty-four hours to investigate this new incident (2, p. 63 ff.). They carefully questioned Lieutenant Gorman and the three other witnesses, but could find no obvious explanation. No other aircraft had been in the neighborhood at the time of the sighting. The weather had been clear, visibility unlimited, with some auroral activity in the northeast. When tested with a control group of five other F-51s that had flown during the same period, Gorman's plane showed no more radioactivity than did the control group—the slightly higher amount shown by all planes after flight. Gorman's report was confusing, in parts, and reconstructing the exact sequence of maneuvers by UFO and plane proved impossible. There were almost as many theories offered in explanation as there were investigators, but eventually a reasonable solution did appear.

A lighted weather balloon had been released from the weather station at Fargo at 8:50, ten minutes before Lieutenant Gorman's first call. As observed from the station, the balloon had traveled west and then northwest. At 9:00 it would have been near the airport about where the unknown light was first reported. A balloon could well have accounted for the events described in the first phases of the incident, but less well for those in the last. Officially, however, the cause was listed as a lighted weather balloon [2, p. 67]—an answer that was not entirely satisfactory.

Only a Balloon?

A review of the evidence, made by the authors during the preparation of this book, emphasized some puzzling inconsistencies. Lieutenant Gorman had had the UFO in view for about twenty-seven minutes. During the first five or ten minutes it had traveled horizontally at low altitude in a fairly steady course. Then it had suddenly changed tactics, had climbed to high altitude, turned, darted in and out, and performed both evasive and aggressive ac-

tions. The three witnesses on the ground, however, did not see the UFO perform *any* of these combat maneuvers. It had been traveling steadily north and northwest and had disappeared from view ten or fifteen minutes before the aerial dogfight ended.

These differences strongly suggested that two unknowns were involved in the sighting. According to this theory, the light seen by the ground observers was the weather balloon; the light first seen over the airfield by Gorman was also the weather balloon. His adversary during the major part of the dogfight was a second unknown, not a physical object but some kind of optical phenomenon, very probably a mirage of the planet Jupiter. The reconstruction based on this theory would account for all the puzzling aspects of the case.

As first described by Lieutenant Gorman and by the three witnesses on the ground, the light was small, bright, and clear; no structure was visible; it made no noise and left no trail or exhaust. It was south of the control tower, was traveling horizontally west and northwest, seemingly at high speed, on a straight course, at low altitude. On these points all the witnesses agreed.

They did not agree in their estimates of its actual distance and height—a fact that is not surprising when we consider the circumstances. The night was clear and cloudless. It was also dark. The sun had set more than two hours earlier and there was no moonlight (new moon on October 2). On a dark night, the height and distance (and hence the speed) of a moving light of unknown size are notoriously difficult to estimate. According to Lieutenant Gorman, the light when he first saw it was about 1000 feet above the ground and 1000 yards—a little more than $\frac{1}{2}$ mile—from his plane. The three men on the ground saw the UFO, for a few seconds, at different times during a period of less than ten minutes. Like Gorman, they were experienced airmen but they differed from him and from each other in their estimates. According to the assistant traffic controller, the altitude and distance from the control tower were 2000–2500 feet and 1–2 miles. According to the traffic controller, they were 4000–5000 feet and $\frac{1}{2}$ mile; according to the Cub's pilot, they were 5000–6000 feet and 1 mile.

In spite of the discrepancies, these estimates are in general agreement and, together with the details of the UFOs appearance, are

consistent with the description of the weather balloon that had been released at 8:50, about ten or fifteen minutes before the UFO was sighted from the ground. The balloon carried a small white light, moved west and then northwest, was at low altitude and slowly climbing, and would soon have disappeared from the view of ground observers.

The object that Lieutenant Gorman first saw and pursued was also the balloon, climbing and turning. As it bobbed and swayed in the air currents it would have seemed to blink off and on, just as he reported. Underestimating its height and distance and overestimating its velocity as did the pilot in the Cuban dogfight (p. 42), he tried to follow its apparent climbing turn and, as he stated, blacked out briefly because of his excessive speed. During this interval, short as it may have been, he of course lost track of the object. Shortly afterward, when the UFO passed over his canopy and he dived, he again lost sight of the object.

When he resumed the chase he supposed that he had located the same object he had been following earlier—but the evidence suggests that he had picked up a different target. The unknown was going much faster than before, was at a much higher altitude, and shone with a steady brilliance instead of blinking off and on. In such a tense situation he could understandably have mistaken one strange light for another. Pursuing an apparently hostile unknown, less than a year after the still mysterious death of Mantell in a similar encounter, he might justifiably have been frightened.

The most probable source of the second light is the planet Jupiter. The sun had set at 6:24 P.M. Following some three hours behind the sun, the planet had a magnitude of -1.7 and was thus brighter than Sirius, the brightest star. Shortly after 9:10 when the UFO began its violent maneuvers (the exact time is not known), Jupiter was very low in the southwest sky, between two and three degrees above the horizon, at a bearing of about 231 degrees. The UFO was also attacking from the southwest, as is shown by Gorman's tactics: in trying to cut it off in circles to the left, he gradually moved to the southeast.

The weather bureau records for that evening, obtained from radiosonde observations, show that temperature inversions existed both near the ground and at higher altitude. Thus conditions were

ideal to produce a furiously twinkling planetary mirage. When a planet is close to the horizon this twinkling, together with the defocusing action of the earth's atmosphere, can spread out the image so that it looks huge, with an apparent diameter as great as ten minutes of arc. Under such conditions, both the size and the intensity of the light fluctuate. When they diminish, the object seems to be racing away from the observer; when they increase, it seems to be rushing directly towards him on a collision course. The peculiar lens-like action of the atmosphere makes the image seem to be, not at infinity, but only a few hundred feet away from the observer.

Seen through the distorting atmospheric lens, the image of Jupiter could have performed exactly as Gorman described: it would have darted back and forth, seemed to attack, retreat, and carry out the "controlled" maneuvers that actually depended partly on the movement of the plane itself. Gorman apparently assumed that he was dealing with a material object (as indeed he was in the beginning), and therefore did not consider the possibility that he was seeing merely an optical image.

The geographical situation would have helped produce the illusion. Fargo lies at an elevation of about 900 feet and the land rises gradually to the west. Due west is Bismarck at 1670 feet. To the south lies a series of buttes, some of them as high as 3500 feet. Thus in the southwest where Jupiter was setting and where the UFO attacked from, the buttes would repeatedly have cut off the planet from view as Gorman maneuvered, so that the image would have seemed to race in and out and perform evasive actions, just as did the mirage of Sirius in Alaska (p. 60). Since Jupiter was very low, however, the buttes served to conceal it from the observers on the ground.

The times involved provide the last piece of the puzzle. The dogfight ended at about 9:27. The time of the geometrical setting of Jupiter was 9:25. The usual lag due to refraction is between two and three minutes (see Figure 9). The planet therefore remained visible for about two minutes longer. The image actually sank below the horizon and disappeared from view between 9:27 and 9:28, the same time that the UFO climbed straight up into the sky and dis-

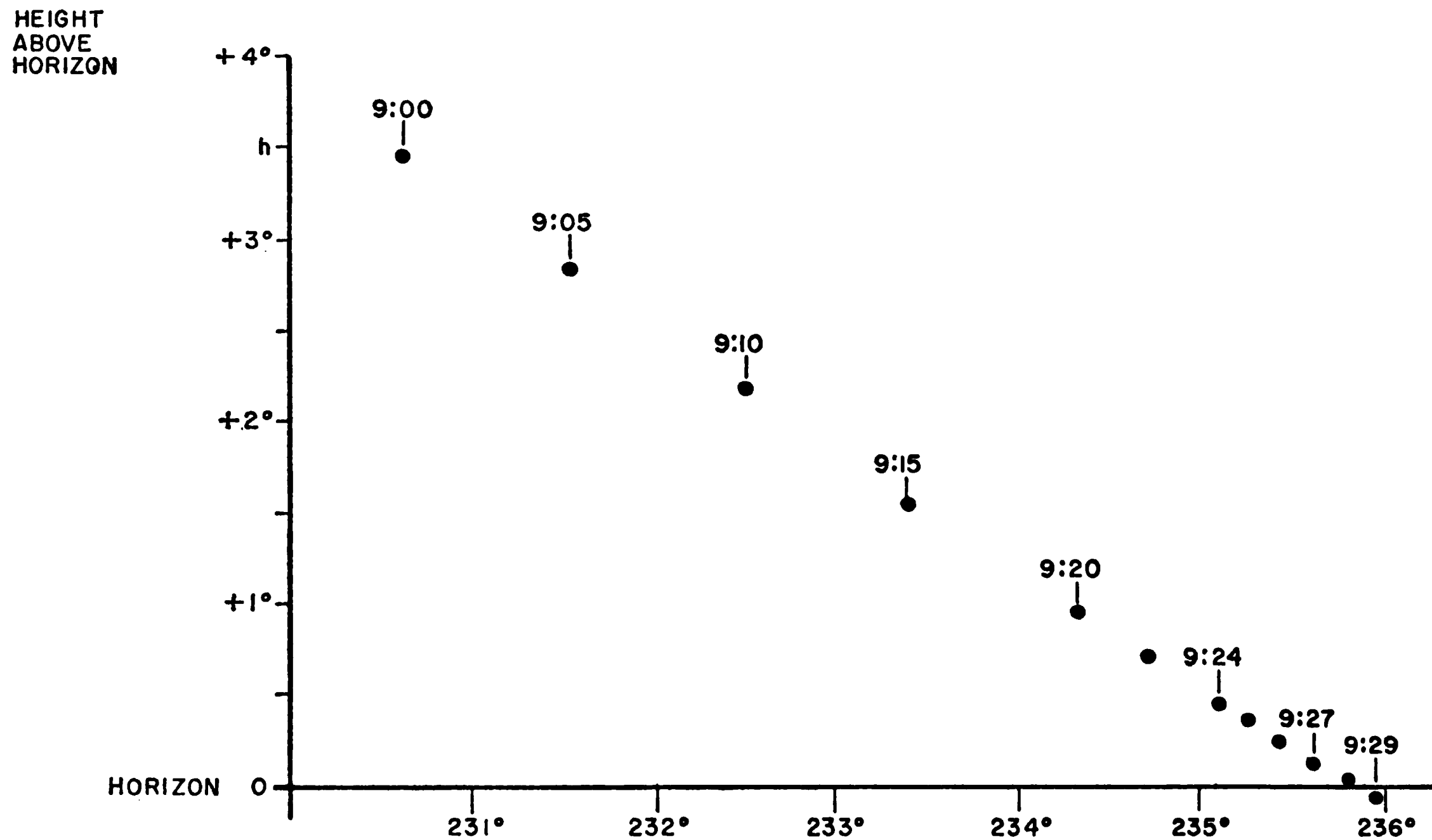


Figure 9. Positions of refracted image of Jupiter from 9:00 to 9:29 P.M. at Fargo, North Dakota, on October 1, 1948. Azimuth measured north through east.

appeared. When Jupiter vanished, the unknown also vanished and did not return.

Absolute proof of this solution is of course impossible. Nevertheless, the description of the UFO, its behavior, its direction, its time of disappearance—all are consistent with its identification as Jupiter. The Gorman case might reasonably be removed from the “Balloon?” category and listed as “Balloon plus planetary mirage.”

Jupiter through a Jet Trail

Venus, Mars, and Jupiter seen under unusual conditions can mystify even the most hardheaded witness. Unrecognized air turbulence and increased scattering of the light can easily create the illusion of a flying saucer.

An ex-army man, a trained observer with a good knowledge of physics and optics, reports the following unnerving experience [11].

“On January 30, 1954, my buddy and I had been fox hunting in southwestern Indiana. We hunted until well after sundown and headed for the car. As we neared it, a jet plane thundered through the darkening sky, from north to south. Placing game and guns in the car, I walked around it to see if the tires were OK. Happening to glance skyward, I let out a yell. There it was, and no mistaking it. A flying saucer blazing in the sky. A real illuminated spaceship. Only it wasn't moving, just hanging in the sky. Football-shaped, about as long as the apparent diameter of the full moon, it showed red, yellow, and bluish green. [Here he sketched a football shape, glowing red knobs placed at the two ends, yellow lights girdling the middle, and yellow and green arcs curving between the two ends (see Figure 10).] I carry an eight-power field glass when hunting and I immediately trained this on the celestial wonder. The result was weird. It seemed to be pulsating with a quivering, twinkling light. We watched it for some five minutes, trying to figure out what we were seeing. Then the spaceship began to get smaller, simply reducing in size without moving. Smaller and smaller it became and in another five minutes it suddenly contracted into a planet—Jupiter, I believe it was. [Jupiter was in the eastern sky 50 to 60 degrees above the horizon.]

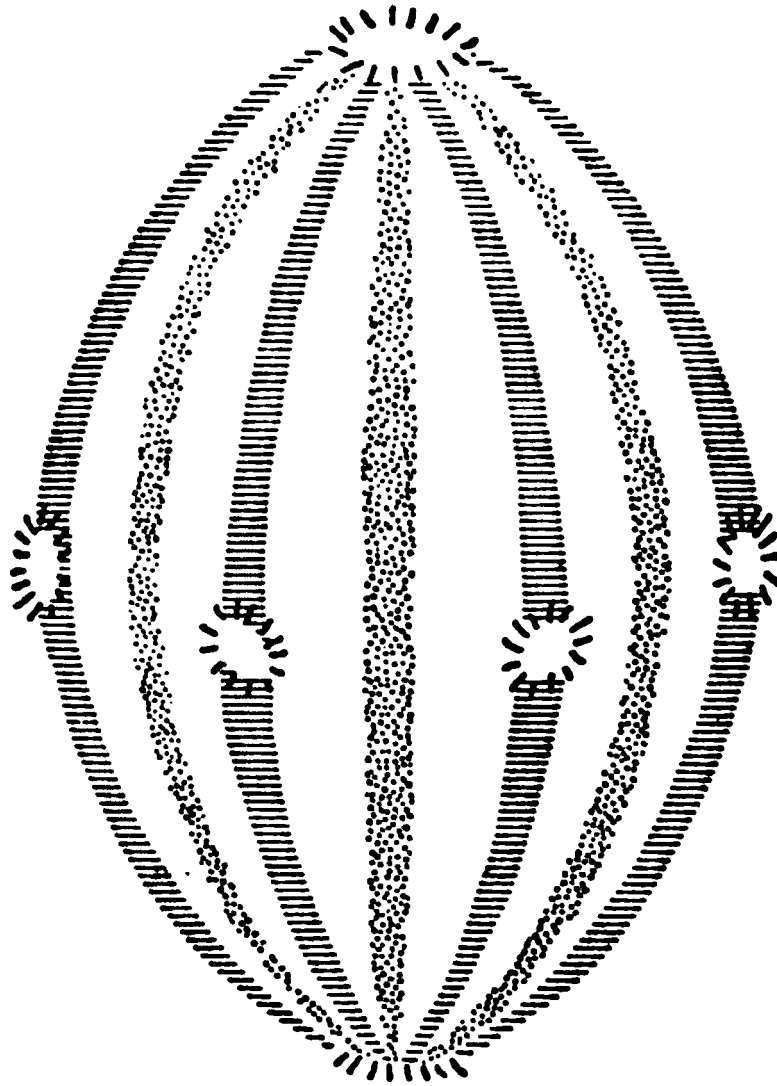


Figure 10. Witness's sketch of Jupiter seen through a jet trail.

"When we realized what we were watching we began to try to figure out the 'why.' Suddenly we realized we were looking directly through the path of the plane at the planet and our best guess was that the atmospheric turbulence and temperature change caused by the passage of the jet was to blame for the strange aberration we had witnessed. And we wondered if refraction of the golden light could cause the reds, greens, and blues. Since neither of us uses snake-bite medicine in any form, we figured our observations were about as substantial as our feeble scientific understanding would permit.

"But anyway, I found out how people may see flying saucers and be perfectly honest in their incomplete observations. Had a person inclined to the supernatural taken a good look, jumped in his car, and headed for home at high speed, he would steadfastly have believed he had seen a flying saucer which was evidently observing the earth preparatory to an attack from outer space."

[1] Air Force Files.

[2] Ruppelt, E. J. *The Report on Unidentified Flying Objects*. Garden City, N.Y.: Doubleday & Co., 1956.

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[6] Case 151, CRIFO *Orbit*, Vol. III (April 6, 1956).

[7] *Buffalo Evening News*, April 10, 1956.

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[11] Main, O. Personal correspondence.

Chapter v

OUT OF THE SKY: METEORS AND FIREBALLS

About one o'clock in the afternoon on November 30, 1954, a spectacular meteor flared across the southeastern part of the United States and exploded. Many persons in Alabama, Georgia, and Mississippi saw the bright flash high in the sky, followed by a trail of smoke, and heard three violent detonations. Over the town of Sylacauga, Alabama, a nine-pound fragment of the falling meteoric body crashed through the roof of a house, bruised the left arm and hip of the unlucky resident, and came to rest on the floor. Members of the American Meteor Society collected detailed descriptions of the event from many witnesses and added this daylight fireball to the official list of observed meteorite falls from which meteorites are recovered [1, p. 128].

UFO addicts, however, apparently regarded both the meteor and its fragments as unnatural phenomena, implied some doubt that the fragment was really a meteorite, and characterized the incident as peculiar [2].

To the astronomer who specializes in the study of meteors the only peculiar aspect of the episode is that saucer publications list so few mysterious UFOs for that particular week when similar spectacular fireballs were almost a commonplace in the southeast states. On November 29 a meteor flew over Alabama at 5:30 P.M., and about two hours later another with a long trail soared over Florida. On November 30 at 5:00 P.M., a few hours after the fall at Sylacauga, another bright fireball flashed over Alabama. Shortly before midnight the same night a meteor flamed over North Carolina, so brilliant that its copper-green light illuminated the interior of cars on the highway; blue-green fire shot out above the treetops, changed

to magnesium white, and then slowly faded. Detailed observations of all these appeared in the scientific journal *Meteoritics* [1, p. 128].

Stones from Heaven

Until roughly a hundred and fifty years ago meteors and meteorites had the status of cosmic orphans, unacknowledged members of the astronomical family. Few persons doubted the existence of the fixed stars, the solar planets, comets, or even of “new stars” or novae, but they rejected a natural explanation for meteors and interpreted them as falling stars, flying dragons, or fountains of fire in the sky. Most astronomers as well as laymen laughed at the recurrent idea that “stones from heaven” could fall on the earth. Then in 1803 the French scientist J. B. Biot described an extraordinary rain of meteorites that fell at L’Aigle on April 26 [3]; he convinced the French Academy of Sciences that the stones had indeed pelted from the sky during the great meteor display. Meteoritics is thus a relatively young science. Much remains to be learned about these cosmic visitors, but certain basic facts have been established [4].

Meteors enter the earth’s atmosphere continually, by day as well as by night, and they show great variety. Some are so brilliant that they are visible even in broad daylight. Some are so faint that even in darkness they can be seen only through a telescope. Others, still fainter, can be detected only by radar specially designed for this purpose. Because of the friction created when they penetrate the earth’s atmosphere, most meteors vaporize and vanish many miles above the ground. We see them as only bright streaks of light, quickly extinguished. If the meteoric body is large enough, has the right chemical constitution, and enters the atmosphere at a favorable angle and velocity, some of it may survive the journey and fall to the earth as a meteorite. A distinct odor sometimes accompanies the fall—the smell of sulphur, onions, or cyanide. About 40,000 tons of meteoritic material fall on the earth each day, most of it in the form of fine dust. The object may be a chunk of metal or stone the size of a pebble or a boulder, or it may be a mass weighing several tons, so enormous that it gouges out a crater at the place where it hits and comes to rest far beneath the earth’s surface. Some me-

teors, fortunately extremely rare, apparently can strike the earth and devastate a large area but, like the wind, leave behind no physical trace. According to present theory, members of a regular shower are probably remnants of comets, which have an icy structure, and the minute bits of frozen debris vaporize in a flash of light high in the atmosphere. Meteors that survive to reach the earth as meteorites are thought to be fragments of asteroids, or tiny planets. Meteorites vary so widely in their physical and chemical structure that they require a complex system of classification. Nevertheless the specialist can distinguish between a meteorite and earthly rocks and stones by laboratory tests [5].

Meteor Streams and Showers

Any clear night displays its quota of meteors. But at certain times, when the earth happens to collide with a stream of cosmic debris moving in an elliptical orbit, a shower of meteors takes place. (For a list of the major night meteor streams, see TABLE I.) Most meteor streams probably result from the breakup of comets; if the debris is distributed uniformly in the comet's orbit, a meteor shower occurs each time the earth crosses the orbit. For example, the Perseids, fragments of Comet 1862 III, have reappeared every August for more than 1200 years, and the Leonids, debris of Comet Temple (1866 I), regularly return around the third week in November. Like the Taurids, another dependable stream, the Leonids are notable for their brilliant fireballs, which have deposited some of the largest meteorites ever found on the earth.

Some regular showers produce great numbers of meteors at intervals of several years. For nearly a millennium, A.D. 902 to 1866, a marked increase in the number of Leonids occurred every thirty-three years. The display in 1833 was one of the most spectacular in history, and witnesses said that the "stars were falling" as thick as snowflakes. Before the scheduled major shower of 1899, however, the main stream was deflected by passing close to the planet Jupiter and the periodic spectacle did not take place. Since then, the Leonids have been considered a "lost" stream, but some members of the shower have continued to appear each November. On November

TABLE I
MAJOR METEOR STREAMS

<i>Name of stream</i>	<i>Dates of occurrence</i>	<i>Date of maximum</i>	<i>Parent comet</i>	<i>Remarks</i>
Quadrantids	Jan. 1-4	Jan. 3		Observed longer than 100 years.
Lyrids	April 19-23	April 21	1861 I	Observed longer than 2500 years.
η Aquarids	May 2-5	May 4	Halley (1835 III)	
δ Aquarids	July 14-Aug. 19	July 30		
ι Aquarids	July 16-Aug. 25	July 30		
Perseids	July 29-Aug. 17	Aug. 12	1862 III	Observed more than 1200 years.
α Capricornids	Aug. 1-21	Aug. 17	1948 n	
Cygnids	Aug. 9-22	Aug. 17		
Taurids	Sep. 15-Dec. 2	Nov. 12	Encke (1957 c)	
Draconids	Oct. 9-10	Oct. 10	Giacobini-Zinner (1946 V)	13-year period; great showers in 1933, 1946; none in 1959.
Orionids	Oct. 18-26	Oct. 22	Halley (1835 III)	
Leonids	Nov. 14-20	Nov. 17	Temple-Tuttle (1866 I)	Observed since A.D. 902.
Geminids	Dec. 7-15	Dec. 14		
Ursids	Dec. 17-24	Dec. 22	Temple (1939 X)	

16 and 17, 1961, they produced an unexpectedly awesome display with many brilliant fireballs.

The close approach of a comet sometimes causes a fantastic shower of "shooting stars," and hundreds or even thousands may be counted in a single night. At the approach of the debris of Comet Biela on November 27, 1885, some 75,000 meteors were visible from a single place during a period of an hour. Irregularly occurring or sporadic meteors not associated with a known comet also occur and pelt the earth unexpectedly.

The Green Fireballs

On the evening of September 18, 1954, a group of astronomers and their wives from the observatory at Sacramento Peak, New Mexico, were having a picnic at the White Sands National Monument, near Alamogordo. In this great desert of pure white gypsum the air is extremely hot during the daytime but cools to a pleasant warmth after sunset. Supper finished, the picnickers had taken off shoes and stockings to wade in the soft warm sand. By 8:30 it was dark and some of the astronomers had already left but others (including Dr. Menzel) had lingered to watch the stars, which stand out sharply in the clear skies over the desert.

Suddenly, far to the north, appeared an enormous green fireball. Of blinding brilliance, it was moving slowly and majestically from east to west in a substantially horizontal path about seven degrees above the horizon, leaving behind a luminous trail that persisted for at least fifteen minutes. At about the same time thousands of other persons on the ground in New Mexico and Colorado, as well as the crews of several planes in flight, were observing the fireball. It passed over a crowded football stadium in Santa Fe, interfered with radio and TV transmission as it appeared over Albuquerque, and over Denver turned night into day. A United Airlines pilot at about 15,000 feet near Laramie, Wyoming, saw the blue-green ball crossing his course and for some ten minutes observed the luminous cloud it left behind [6]. At almost the same instant, the fireball was sighted in the Bay of San Francisco, 1000 miles away. One publica-

tion cited this meteor as two separate UFOs, one flying over San Francisco, the other over New Mexico and the Southwest [2].

When telephone calls swamped the newspaper offices, reporters interviewed Dr. Lincoln La Paz of the Institute of Meteoritics at the University of New Mexico. Although he had not observed this particular specimen, he had seen similar green fireballs a few years earlier and he commented that this was no ordinary meteor but something unusual. A new wave of UFO excitement began to sweep the country. Were mysterious machines from outer space again patrolling New Mexico?

The astronomers who had admired the fireball at White Sands were amazed at the public reaction. As professionals who had spent their lives in observing and analyzing astronomical phenomena, they agreed that the object had been unusual in its slow movement, its color, and its brilliance. But an unusual meteor is still only a meteor, not a spaceship, and they easily recognized it as a green fireball of the type that had appeared over the Southwest a few years earlier.

The first epidemic of green fireballs had begun in early December 1948, and for nearly two months the brilliantly burning objects had appeared almost every night in the skies over New Mexico [7, p. 71]. Their apparent collision course startled plane crews in the air, and their steady, seemingly purposeful motion frightened observers on the ground. The fireballs showed a family resemblance in their bright-green color, their great size and brilliance, their level flight path, their noiseless disappearance, and their failure to leave material fragments on the ground.

New Mexico was a particularly sensitive area, studded with military bases and research installations carrying out vital work in ballistics, guided missiles, atomic energy, and space science in general. Since the unusual meteors seemed to be concentrating on New Mexico, Air Force Intelligence had to face the question: Were the fireballs natural astronomical phenomena or were they experimental guided missiles from another country, perhaps Russia?

After consulting Dr. La Paz and hearing his evaluation of the evidence, the Air Force felt growing concern. Perhaps unconsciously influenced by the general hysteria of the past year, Dr. La Paz concluded that the objects were not meteors but must be "something

unusual" because they differed from "normal" meteors in their color, trajectory, velocity, size, brilliance, and apparent lack of fragments.

With very little knowledge of meteors and great faith in machines from outer space, saucer enthusiasts reasoned that since the fireballs were not normal meteors they must be artificial objects. Since they were artificial, they must be under intelligent control. Since they were intelligently controlled, they must be unmanned missiles or manned vehicles launched from an alien spaceship hovering hundreds of miles above the earth whose purpose might or might not be destructive, or they might be merely ranging devices sent as a warning to earthmen.

The Air Force was not particularly worried about interplanetary visitors, but it was concerned with the possibility that the fireballs were man-made vehicles, a potential danger to the country. One scientist had suggested that the Russians might have constructed a guided missile whose nose cone, the final stage in a multistage rocket, was made of ice and various other chemicals. In re-entering the earth's atmosphere, such a cone would burn up; the vaporizing ices would account for the green color observed, for the silent disappearance of the object, and for the lack of material traces on the ground. Whatever the true explanation, members of the Air Defense Command could not afford to guess; they had to know.

In mid-February 1949 they assembled at Los Alamos a conference of military and intelligence officers, physicists, and astronomers, to discuss the problem of the green fireballs. After two days of studying the evidence, most of the members agreed that the fireballs were meteors of an unusual type and, as natural phenomena, not a threat to national security. To take care of the extremely remote chance that this conclusion might be wrong, the conference turned over the problem to the scientists at Air Force Cambridge Research Center which, in the late summer, organized Project Twinkle to equip and establish three cinetheodolite stations in New Mexico. Fitted with a diffraction grating to split the spectrum into its component colors (and thus identify the chemical elements present), the cameras were to photograph and record the altitude, size, speed, and spectrum of the luminous objects.

Since the green fireballs, meanwhile, had all but vanished from the skies, enthusiasm for the research project diminished. Only one

camera (designed by Dr. Menzel) was ever put into operation and it never found anything to photograph. After two months of futile searching, the Air Force finally abandoned Project Twinkle as a waste of time.

In the years following, green fireballs occasionally appeared. An astronomer observed one over Lafayette, Colorado, at 7:45 P.M. on June 4, 1950. One soared over the New England states and eastern Canada on November 2, 1950, and a year later, on November 2, 1951, a plane crew over Texas sighted another which was dramatically publicized in *Life* magazine, and described in another publication as a missile that ejected flaming balls. Few other fireballs made the headlines until the one of September 18, 1954, but even that caused only brief excitement and the Air Force expressed no alarm.

Meteors in the Records

The American Meteor Society, whose members specialize in the study of meteors and meteorites, for years have collected reports of such phenomena. From a large enough number of good descriptions of a given meteor, astronomers can analyze the data mathematically and determine the meteor's radiant—the point in the heavens from which it seems to come. The meteor is then identified by its radiant and given an AMS number. For several years the data were published in *Meteoritics*, a journal issued jointly by the Meteoritical Society and the Institute of Meteoritics of the University of New Mexico. Dr. Charles P. Olivier, president of the American Meteor Society, was a contributing editor.

The records in *Meteoritics* for the years 1950 to 1955 list dozens of fireballs, many of them green, that were somehow overlooked by saucer enthusiasts. On August 11, 1950, during the maximum of the Perseid shower, a blue-green fireball (AMS 2336) apparently oval- or cigar-shaped appeared over Washington, Oregon, and Idaho at 7:30 P.M. and was reported by more than 100 witnesses. So brilliant that it showed a noticeable disk, it flew in a horizontal path, silently broke into three pieces, and disappeared [8, p. 379].

September 20, the same year, was a big day for meteors. At

1:35 A.M. a giant fireball (AMS 2326) roared over southeastern Illinois from north to south, leaving a luminous train visible in five states and illuminating the sky and countryside from St. Louis to Louisville and from Memphis to Knoxville. The final detonation, over western Kentucky, was heard over an area 1000 miles square and shook buildings from Paducah to Memphis. Fragments showered farms over a twenty-five-mile area, struck five buildings, and penetrated one roof. About fifty pounds of meteorites dropped in Murray, Calloway County, Kentucky, and are now in the Smithsonian Institution in Washington. That same night about 10:45 P.M., fireballs were reported by plane crews flying over a six-state area—Idaho, Wyoming, Utah, Colorado, Arizona, and New Mexico [9, p. 115]. Similar fireballs that vanished without trace were reported on September 28, 1953 (AMS 2331); October 4, 1953 (AMS 2330); May 15, 1954; and October 27, 1954 (AMS 2337).

The green fireballs still appear now and then, as they always have. None of them has yet changed into a spaceship.

Fallacies about Meteors

Most flying-saucer enthusiasts still refuse to believe that the green fireballs were natural phenomena. Misinterpreting or distorting the statements made by professional astronomers, they cite the unusual nature of these meteors as proof that they were not meteors at all but machines from another world. Advocates of this belief need more than a refresher course in logic; they also need to learn some facts about meteors.

The space-vehicle interpretation rests on a series of mistaken beliefs and illogical conclusions about the nature and behavior of meteors. These false premises may be summarized as follows:

1. *Color.* Meteors do not contain copper; since the peculiar shade of green shown by the green fireballs could come only from copper, the fireballs were not meteors but spacecraft.

2. *Speed and trajectory.* Meteors do not travel at a slow rate of speed and do not follow a horizontal path; since the green fireballs did both, they were not meteors but spacecraft.

3. *Size and brilliance.* Meteors do not show such great size or

brilliance as did the green fireballs, which were therefore not meteors but spacecraft.

4. *Sound*. Meteors produce a loud noise; since the green fireballs moved silently, they were not meteors but spacecraft.

5. *Fragments*. Meteors deposit material fragments on the earth which can be located if the investigator maps the flight path and makes a search; since the green fireballs left no fragments, they were not meteors but spacecraft.

In the pages that follow we shall attempt to correct each of these mistaken ideas in turn, to present the actual facts known to astronomers, and to show clearly that the green fireballs were not spacecraft, but meteors.

Facts about Meteors

1. *Color*. Copper-green meteors are not a new phenomenon. This unusual shade of green is only one of the many possible colors that meteors may display—white, green, blue, yellow, orange, red, and all shades in between. Descriptions received by the Meteoritical Society include adjectives such as bright-green, copper-green, blue-green, fiery white, green-white, orange, blue, yellowish, silver, red-orange. Perceptions of color vary greatly among different observers, so that several witnesses may choose different words for the color of the same object. The most common adjective used is “brilliant”; an observer who has only a few seconds to look at the object often has real difficulty in deciding just what color accompanied the brilliance. Very common phrases are blue-green, greenish-white, orange-yellow, orange-red, greenish-yellow, yellow-green.

Both the chemical structure and the velocity of the meteoric body help determine its apparent color. As the burning object plunges through the atmosphere and vaporizes, the chemical elements produce their typical colors. At higher velocities, atmospheric friction heats the body to higher temperatures and whitens the color; as the body slows down and becomes less hot, it is apt to appear redder.

In a few instances astronomers have been able to photograph the color spectrum of a meteor in flight, to analyze the spectral

lines and determine exactly what elements were present [10]. As a rule, however, the chemical content must be found from a laboratory analysis of recovered meteorites. Some meteors do contain traces of copper, and free nodules of pure copper have been found in several meteorites [5, p. 81]. Magnesium occurs in fairly high percentages in most meteorites and the amount is unusually high in green meteors [11]. It produces a color almost identical with that from copper. Seeing the green of a vaporizing meteor, no observer could tell whether the color came from copper or from magnesium unless he could photograph the spectrum or make a chemical analysis of the meteorite.

The color displayed by the New Mexico fireballs may have come from copper, but more probably from magnesium. Another possible source is frozen nitrogen. Laboratory experiments relating to problems of satellite re-entry [12] have shown that when frozen nitrogen vaporizes, it emits a brilliant green glow whose wave length is almost identical with that of the New Mexico fireballs, as judged from the paintings made by witnesses. One of the prevailing theories suggests that meteors of this type may be icy "cometoids"—cometary debris, chunks of ice, and frozen gases (including nitrogen) at very low temperatures. When they enter the earth's atmosphere and are slowed down to speeds of several hundred miles an hour, they become heated and vaporize, and the surface alternately melts and refreezes; the vaporizing nitrogen would produce the green color seen in the fireballs. Such a process would account for the color, the short lifetime, and the lack of fragments of the New Mexico meteors.

To summarize: Meteors *can* exhibit the particular green color shown by the New Mexico fireballs. It can result from copper, magnesium, or frozen nitrogen, which can normally occur in meteors.

2. *Speed and trajectory.* Meteors vary widely in their velocities and flight paths. They plunge from space into the earth's atmosphere at speeds estimated to range from seven to forty-five miles a second relative to the earth—from 25,000 to more than 150,000 miles per hour. Members of a particular meteor stream usually show a characteristic velocity. The Perseids, for example, travel at high speed, some thirty-six miles a second, while the Geminids saunter in at a mere twenty-one miles a second. Most of these "falling stars" be-

come visible to us when they have descended to around sixty or seventy miles above the earth. Flashing down in a steep path, they usually burn up and vanish by the time they have fallen to around fifty or forty miles. The larger the meteor's body, the longer its life and the lower its point of disappearance. Most meteors maintain a straight course as they descend toward earth. A typical path is that photographed by Smithsonian astronomers in New Mexico on the night of November 23, 1960 (see Plate IIIa). Some fireballs have been reported to change course after exploding. More probably, the witness is actually observing the shifting pattern of the smoke cloud left by the meteor. The Puerto Rico fireball of January 12, 1947, left an erratic trail of this type, which was photographed ten to twenty minutes after the meteor had disappeared (see Plate IIIb).

The original entrance velocity, angle of entry, size, and chemical structure all influence the shape of a meteor's path and its time of survival. The apparent angle of descent as seen by the observer depends on the distance and the direction the object is moving relative to the observer. When the meteor travels parallel to the observer's line of sight, it seems much slower than when it passes the line of sight at right angles. The greater the distance between the observer and the meteor, the slower its apparent motion [13].

Some meteors move very slowly; traveling at an almost leisurely rate, they soar through the sky on a long, level path almost parallel with the earth. The slow fireballs in the great meteor procession of 1913 maintained a horizontal course over a distance of several thousand miles, from western Canada to Brazil [14].

Astronomical records show that green meteors are usually slow. Some 230 persons reported to the American Meteor Society that on November 28, 1953, at 6:30 P.M., a fireball moved slowly through the sky from Massachusetts to Pennsylvania. Described as blue-white-green, changing to orange-yellow-red, it was huge, disk-shaped, and vanished silently without depositing fragments [1, p. 273]. On May 15, 1954, at 11:22 P.M., more than 100 persons observed (and reported) a slow-moving fireball, blue-green changing to red, of luminosity so great that it woke sleeping people. Toward the end of its course it seemed to stop, spiraled a couple of times, and then simply vanished without leaving fragments [8, p. 336].

To summarize: Meteors *can* travel at low velocities and in apparently horizontal paths.

3. *Size and brilliance.* Giant meteors of great luminosity have been recorded throughout history. Some fireballs have been visible to observers throughout an area of thousands of square miles. Typical descriptions are: dazzling, like an airplane falling in flames, bigger than the full moon, of blinding brilliance, so bright it turned night into day, like the headlight of a locomotive, as big as the setting sun but three times as brilliant.

The luminosity does not depend on the actual size of the meteoric body. A fragment no larger than a pinhead can create a brilliant flash as it vanishes. A spectacular fireball that lights up the country over hundreds of miles may have a small body that burns up completely miles above the earth. A larger body can survive longer, so that it continues to flare for several seconds or more. The larger, long-lasting fireballs may explode into smaller fragments and cascades of sparks. In exploding, they can produce a luminous cloud of particles that remains visible for fifteen or twenty minutes and then peppers the ground with meteorites that fall like hail or buckshot. A giant fireball can deposit chunks of metal weighing a ton or more like those found in Mexico, or can leave a truly enormous body that penetrates the ground and carves out a great crater like those in Arizona and Texas.

To summarize: Huge fireballs of great brilliance are not new.

4. *Sound.* Some meteors produce noise; others do not. Most meteors silently vaporize high above the earth. When one does reach the ground, it may strike with no noise but the faint thud of its impact. Shooting through the air, it sometimes makes weak noises that have been described as rumbling, crackling, rustling, whistling, or hissing.

Meteors sometimes explode with one or more crashing detonations that rattle or even break windows. The noise has been described as like a heavy clap of thunder, the explosion of a volcano, or a whir as if a million bumblebees had been disturbed. The noise from the explosion of the Siberian meteor in 1908 was heard over a distance of 600 miles, and the shock registered as an earthquake in England.

Many meteors, like the Pennsylvania fireball of January 29, 1952,

(AMS 2328) are completely silent. This blue-green object, so large that it showed a definite disk, was reported to the American Meteor Society by more than 400 witnesses from Maine to Virginia and from New York to Ohio; none of the observers heard any noise [1, p. 264].

To summarize: Some meteors end with a bang, but most of them don't even whimper.

5. *Fragments.* Most meteors burn up high in the atmosphere. A few, if they are large enough in size (at least ten to twenty pounds) and tough enough in structure, survive to reach the earth as stony or metallic fragments. Marked differences characterize the various meteor streams. The Taurids (maximum November 12) are relatively rigid structures, unusually tough, and show little tendency to break up in their flight. The many Taurid fireballs show that fairly large bodies have survived. The Geminids (maximum December 14) are of average strength but appear to be very dense, while the Draconids (October 10) are featherlike and fragile, with low density. Some of the most brilliant fireballs may be structures of ice and frozen gases which quickly vaporize on reaching the earth and hence leave no detectable fragments. The fiery object that struck Siberia in 1908 may have been such an "icy cometoid"; although it devastated an area of hundreds of square miles and uprooted or knocked down some eighty million trees, it apparently left no physical trace [15].

If some of the physical body does survive to reach the earth's surface, finding it is still a problem. Recovery is rare even when the fall occurs in daylight over well-populated country and the flight path can be charted from the accounts of reliable witnesses. When the fall occurs at night, recovery is even rarer [5]. After dark, even experienced observers find it difficult to judge true directions and distances, and they may plot a place of fall that is many miles from the actual point of impact. Meteoriticists know that there is small chance of finding meteorites that fall at night except in regions where most of the land is under cultivation. In the fifty years between 1898 and 1948, of forty-eight recoveries from observed meteorite falls in the United States, only seven were made from falls occurring after 8 P.M. [5].

Recovery depends on many factors: the number of persons who saw the event, the accuracy of their estimates of distance and direc-

tion, the size of the meteorites, the patience of the searchers, the time and money available for the search, and, most important of all, just plain luck.

The Norton County fall of February 18, 1948, illustrates both the detective work and the luck required. At about 4:56 P.M. C.S.T. a brilliant detonating fireball soared over an area including Kansas, Nebraska, Colorado, Oklahoma, and Texas, and left a large white cloud that was visible for about an hour afterward. Newspapers publicized the phenomenon as a flying saucer and a few excited witnesses agreed. One man affirmed that shortly before the explosion the strange craft hovered over his yard at eye level, belching fire and showering sparks, then suddenly took off, climbing fast, and exploded.

Meteoriticists at once recognized the characteristic pattern of an exploding meteor and determined to find the remains. From newspaper reports and personal interviews with the witnesses, H. H. Nininger of the American Meteorite Museum in Arizona plotted the path and determined that the probable point of explosion was thirteen miles west and three miles north of Norton, Kansas [16]. From similar investigations, Lincoln La Paz of the Institute of Meteoritics in New Mexico determined the probable place of impact as an area eight miles long and four miles wide, about thirty-two square miles, on the Kansas-Nebraska line.

During the Easter vacation a field-survey party from New Mexico drove north into Kansas to hunt for the meteorite, but blizzards and snow-blocked roads stopped the work. A second search, begun on April 27, suggested that the main mass of the meteorite must have fallen somewhere in Furnas County, Nebraska. When persistent hunting failed to reveal it, the searchers moved south into Kansas, where a farmer had found a strange stone that smelled of sulphur and contained metallic specks. Although many stony meteorites of various weights turned up in this area, the main mass remained hidden until July 3 when a farmer located it, by accident, in a field that the official party had already examined and abandoned some three months earlier. This meteorite, although it weighed more than a ton and had dug out a six-foot crater in the ground, had eluded the hunters because "at the time of the fall the only dwelling close to the point of impact was unoccupied and

. . . the impact occurred in a field so overgrown with weeds and stubble that even the large crater made by the record-breaking main mass of the fall was finally located only when by chance a caterpillar tractor started to fall into it." [17]

To find these meteorites, several highly trained searchers had spent days of effort, made a number of field surveys, driven more than 10,000 miles, and interviewed hundreds of persons who observed the flight of the fireball. Even so, they counted themselves lucky because many "meteorites of such composition and structure, although large enough to produce spectacular light and sound effects in the intermediate layers of the atmosphere, might disintegrate so completely during transit through the denser lower atmosphere that only dust would survive to reach the earth."

The green fireballs of New Mexico were silent; they were probably icy structures and hence produced no meteorites. Even if they had, locating the place of fall would have been nearly impossible because the meteors appeared at night in a sparsely populated area.

To summarize: Many meteors do not leave fragments. Even when they do, finding the meteorite requires luck as well as hard work.

Unusual Fireballs

The officers and crewmen of a plane in flight have a front-row seat at the drama of the heavens, where astronomical events seem doubly vivid against the dark night sky. The pilot has been trained to recognize the major constellations, the brightest stars, and ordinary phenomena such as meteors and the Aurora Borealis. As a rule, however, he limits his study to the needs of the job. The few who have an astronomer's intimate acquaintance with the heavens have often made valuable contributions to our knowledge. Comet 1957d was first observed by an airman and Comet 1948l was discovered by a pilot flying from the Fiji Islands to Australia. Comet Wilson, discovered on July 23, 1961 (and reported to the Air Force by some persons as a UFO), was first recognized by A. Stewart Wilson, navigator on a Pan American flight over the Pacific. All members of the crew were skilled and experienced fliers, but he alone

was equipped to see the significance of the intruder in the constellation Gemini [18].

One of the most fantastic apparitions to confront a pilot is a group of luminous objects flaming through the air in more or less geometrical formation. The objects often seem to be heading directly toward the plane on a collision course but, as though under intelligent control, seem to veer off at the last possible instant and then disappear at incredible speed. The pilot usually recognizes this frightening phenomenon as an exploding meteor or a cluster of fireballs. Occasionally the sight is so extraordinary that he insists it could not have been a mere meteor but must have been some weird spacecraft. Airmen of unquestioned competence have made this mistake, sometimes because they more than half believed in extraterrestrial visitors, but more often because they knew less than they supposed about meteors.

In trying to identify the alarming objects approaching his plane, the pilot often thinks first of a meteor, then rejects the idea with some form of the remark, "Whatever it was, it was certainly not a meteor; I've seen meteors and I can't be fooled." He usually adds that no meteor could travel so fast (or so slowly) as the one he saw; so high (or so low); could have such a color; steer so "obvious" a collision course; fly as part of so orderly a group; move in so level (or so steeply angled) a path; maintain so steady a course; change course so abruptly; move so silently; or create so loud a detonation.

Such an incident occurred on a Pan American flight from New York to San Juan early on the morning of March 9, 1957. At about 3:30 A.M. when the plane was off Jacksonville, Florida, the pilot and the flight engineer saw a burning, greenish-white, round object coming out of nowhere, seemingly only a half mile away and headed across their nose on a direct collision course [19]. In such a situation a plane's captain cannot waste time in analyzing what he sees, but must act. In a violent evasive move he put the plane into a climb of about 1500 feet, during which several passengers were thrown out of their seats and injured. At the same moment the crews of at least seven other flights within an area of 300 miles were reporting the same object. One witness saw it split in two and the fiery rear section drop away. About an hour earlier, the pilot

of another plane in the area had seen the breakup of a similar meteor but had not reported it. In spite of all the evidence that the unknown was a normal meteor, breaking apart as many meteors do, the Pan American pilot, "having seen thousands of meteors," could not accept the object as a natural phenomenon although he did realize, after he heard the other reports, that he had greatly underestimated its distance. The object showed all the characteristics of a typical fireball, but the flying-saucer cultists have still tried to convert this undoubted meteor into an unknown object.

The number of meteors reported as flying saucers or spaceships has diminished in the last few years, but the Air Force has continued to investigate all doubtful or puzzling sightings to determine whether they in any way represent a possible threat to the nation's security. Every sure identification of a UFO as merely a meteor, not a ballistic missile, brings a certain amount of relief.

A typical case, successfully solved, is that of June 20, 1959. About 2:15 A.M. the pilot of a United Airlines flight over the Pacific reported by radio to Flight Operations that he had observed an apparent rocket firing about thirty-five miles west of the plane position; radar detected the presence of a surface vessel at about the same position. The pilot first noticed a flash of light, then the entire sky lighted up and he saw four round, fiery globules, of an intense bluish-white color, with no tails. Flying two by two in a straight line, they made no sound and disappeared after about two seconds. The weather was clear and calm, the visibility excellent. The copilot, sitting at the right, saw only the first flash, but the pilot of another plane some 120 miles to the west reported seeing the same objects at the same time [19].

Because this sighting occurred in a very sensitive area where military officials were expecting a Russian test firing of an ICBM, the Air Force made an exhaustive study of this report and identified the object as a meteor. Their evaluation proceeded as follows:

The United Airlines pilot estimated the distance of the objects as only about thirty miles and their rate of travel as about 15 degrees in two seconds. These figures indicated a velocity of approximately 14,500 miles per hour, about the speed of a ballistic missile. But the relatively low altitude, the flat trajectory, and the fact that a visible "power plant" was apparently still operating at this stage of

flight ruled out the possibility of a missile. However, if the observer had underestimated the distance and the objects were actually hundreds of miles away, then the data would indicate a speed of about 50,000 miles an hour, in the range of meteor velocities. The descriptions given closely matched that of the classic fireball, whose colors range over white, blue, green, red, and yellow, and whose luminosity may be as great as -3 magnitudes. The Air Force concluded that the object sighted was, in all probability, a meteor.

A similar sighting, which saucer enthusiasts have publicized as a brilliantly lighted UFO that appeared to hold a definite course, occurred at 3:02 A.M. on July 11, 1959, also over the Pacific [19]. The pilot of a Pan American Airlines flight reported that a mysterious bright object accompanied at its left by four smaller lights had approached his plane at "inconceivable speed," made a sharp right turn, and then disappeared. The objects seemed to be flying evenly spaced in formation, and the pilot, who had never seen anything like it in all his years of flying, told the newspapers, "I'm a believer, now."

The official investigation began immediately. Four other commercial flights had reported seeing the object at the same time. In each case, the pilot stated that the objects seemed to head straight at his plane at high speed on a collision course, then made a 90-degree turn and disappeared. The various reports, however, showed significant disagreements. Some witnesses gave the color as white, some as orange-yellow. Of the several pilots, each gave a different description of the "formation": a big light with four smaller lights flying at the left; a big light surrounded by a cluster of six or seven smaller lights; a big light followed by four smaller lights; a big light in the center of a rectangle formed by four smaller lights. Of the five pilots who made official reports, one said the phenomenon was definitely not a meteor, two said it could have been a meteor, and two did not venture an opinion. The pilots of several other flights stated, on landing, that they too had seen the object but had not radioed a report because they assumed it to be a meteor.

After mapping and correlating all the observations, ATIC completed the analysis and released the result to the press on July 14, only three days after the sighting, a remarkably efficient piece of work. Conclusion: the object was a fireball [20].

The literature of flying saucers contains dozens of similar incidents that fit perfectly into the meteor pattern. Pointing to this list of "unidentified" flying objects, saucer addicts still abuse the Air Force for concealing the "fact" that these UFOs are actually spaceships!

Great Meteor Processions

Even more dramatic than the ordinary exploding meteor whose fragments naturally fall into a pattern around it, a cluster of fireballs or a great procession of meteors occasionally startles the world. On December 21, 1876, about 8:45 P.M. such a swarm of fireballs appeared over Kansas and disappeared some three minutes later over Pennsylvania, having traveled the thousand-mile distance at a velocity of 20,000 to 25,000 miles an hour. Hundreds of persons in Kansas, Missouri, Illinois, Indiana, Ohio, and Pennsylvania saw the display, which included nearly 100 separate fireballs; the leader was more brilliant than the full moon and many of the followers were brighter than Venus or Jupiter. Perhaps fortunately for the nerves of the public, the most recent such display occurred before the saucers began to fly (March 24, 1933). This cluster of fireballs was visible chiefly in the skies over New Mexico and left a great cloud that was visible for at least three hours.

The most spectacular of such formations was the great meteor procession of February 9, 1913. At about 9:05 in the evening the leader or leaders appeared in the sky over western Canada, their fiery red bodies followed by long streaming tails. These immense fireballs showed no tendency to fall toward the earth but, like the green fireballs of New Mexico, "moved forward on a perfectly horizontal path with peculiar, majestic, dignified deliberation," and disappeared in the distance to the southwest. No description can surpass that given by Professor Chant [21] who spent two weeks in locating and interviewing many of the witnesses.

"Before the astonishment aroused by this first meteor had subsided, other bodies were seen coming from the northwest, emerging from precisely the same place as the first one. Onward they moved, at the same deliberate pace, in twos or threes or fours, with tails streaming behind, though not so long nor so bright as in the first

case. They all traversed the same path and were headed for the same point in the southeastern sky.

"Gradually the bodies became smaller, until the last ones were but red sparks, some of which were snuffed out before they reached their destination. Several report that near the middle of the great procession was a fine large star without a tail, and that a similar body brought up the rear.

"To most observers the outstanding feature of the phenomenon was the slow, majestic motion of the bodies; and almost equally remarkable was the perfect formation which they retained. Many compared them to a fleet of airships, with lights on either side and forward and aft; . . . Others, again, likened them to great battle-ships, attended by cruisers or destroyers."

No other recorded meteors have persisted for so great a distance. Thousands of persons saw this great procession as it soared over Saskatchewan, central Canada, Toronto and the Great Lakes region, New York and Pennsylvania, the shipping lanes from New York to Bermuda, and on over the South Atlantic, where before it vanished it was observed by ships as far south as Brazil—a distance of some 5000 miles, one fifth of the earth's circumference. The descriptions do not vary significantly and they all mention the slow, level flight, parallel to the earth's surface.

Some astronomers have suggested that these unusual meteors may have been a group of natural satellites deflected by the earth's gravitation, slowing down and finally disintegrating as they made their final revolution [14]. But if the UFO cult had existed in 1913, the flying-saucer enthusiasts would probably have regarded the fireball procession as a fleet of spaceships, and would have speculated on the problem of what planet dispatched them and for what purpose.

The Chiles-Whitted Sighting

The Chiles-Whitted UFO, sighted on July 24, 1948, is one of the most publicized of the classics. Although the object appeared, passed, and vanished in an interval of roughly ten seconds, and the descriptions given by the three witnesses differed on several vital points, Dr. J. Allen Hynek, astronomer consultant to ATIC, in his

report of April 30, 1949, identified it as an undoubted meteor. Nevertheless, not until 1959 did the Air Force officially accept this solution, and the literature of saucerdom still cites the incident as indisputable proof of alien spaceships.

On the evening of July 23 an Eastern Airlines DC-3 took off from Houston, Texas, en route for Boston, with an experienced pilot and copilot in the cockpit. By 2:40 A.M. C.D.S.T. July 24 the plane was a few miles southwest of Montgomery, Alabama, flying at an altitude of 5000 feet. The night was clear, and a bright moon just four days past full shone through a layer of broken clouds about 1000 feet above the plane. At 2:45 A.M. the pilot, Captain C. S. Chiles, noticed a dull red glow some distance ahead, approaching from a little above and to the right of the plane. He remarked to his copilot, Lieutenant J. B. Whitted, "Look, here comes a new Army jet job." [19] In the next few seconds, however, he changed his mind about the identity of the object. As both men watched, the brilliantly glowing unknown continued to approach with incredible swiftness, apparently on a collision course; it seemed to veer slightly, passed the plane on the right almost level with and parallel to the flight path, then seemed to pull up sharply and disappear into the clouds. Captain Chiles estimated that the object was in sight for about ten seconds. The one passenger who was awake, sitting at the right of the cabin, saw the light for only an instant as it flashed by.

The brief impressions of these three witnesses were the sole foundation for newspaper stories that the plane had narrowly escaped collision with a spaceship.

In their official report both pilots agreed on the general appearance of the UFO: it looked like a wingless aircraft with no fins or protruding surfaces, was cigar-shaped, about 100 feet long, and about twice the diameter of a B-29 superfortress. It seemed to have two rows of windows through which glowed a very bright light, brilliant as a magnesium flare. An intense dark-blue glow like a blue fluorescent factory light shone at the bottom along the entire length, and red-orange flames shot out from the rear to a distance of some fifty feet. Neither man heard any sound and neither saw any occupants. In their original report to ATIC both men agreed that "no disturbance was felt from the air waves, nor was there any prop

wash or mechanical disturbance when the object passed." The third witness, the passenger, did not report any turbulence or rocking of the plane. Some of the later versions of the incident gloss over these facts, however, and thus exaggerate the startling nature of the sighting. One account subtly implies the presence of a pilot in the UFO and several state that, as the object passed, the plane hit turbulent air [7, p. 61] or was "rocked" by the UFO [20, p. 21].

Like most eye-witness descriptions of a startling event, the testimony of the three men differed. Chiles stated that at the front of the UFO was a lighted pilot compartment or cockpit with a "snout" similar to a radar pole, and that a kind of nozzle projected from the rear from which the flames fanned out to a width of twenty or thirty feet. Whitted did not see a cockpit, a snout, or a rear nozzle; he thought the flames flared out from the entire rear and were never any wider than the width of the UFO itself. The third witness, the passenger, saw no shape or form, only an intensely brilliant streak of light that appeared and vanished before he was able to focus his eyes. As responsible officers, both pilots had obviously tried to separate the observed phenomena from their interpretation. They differed widely on the estimated distance of the UFO (the passenger did not offer an estimate). Chiles thought it passed them with a margin of only about 700 feet, but Whitted believed the distance to be more than ten times greater, about a mile and a half. However, when we remember that these men had the UFO in sight for only a small fraction of a minute and that their study of the side view ("windows," "cockpit," etc.) must have been limited to the instant of passing, these disagreements are not remarkable.

When Captain Chiles and Lieutenant Whitted reported their frightening experience, the Air Force made a prompt investigation. Since Captain Chiles explicitly stated his belief that the UFO was under intelligent control, the case required careful consideration. A check of the air traffic showed that no other planes had been in the area at the time, so the object could not have been a normal aircraft. Furthermore, other equally reliable witnesses reported seeing unusually bright meteors in the Southeast that night. Since the bare physical description of the UFO, apart from the inferences made,

was identical with that of a fireball, Dr. Hynek concluded that it was an unusually bright meteor.

But the climate at ATIC that summer was not friendly to a prosaic explanation. Remembering the tragic death of Captain Mantell some six months earlier while he was chasing a UFO, then unidentified (p. 33), some officials were more than half ready to believe in invading space fleets as the answer to every puzzling phenomenon in the sky. They rejected the fireball explanation. Instead of accepting the Chiles-Whitted UFO as a meteor, they identified the other two meteors seen that night as UFOs!

And yet the evidence is overwhelming that the UFO *was* a fireball.

The major meteor showers that occur on schedule every year have accounted for hundreds of alleged UFOs over the last fifteen years. Several of these showers begin in mid-July; thus July 24 falls in a period of greatly increased meteor activity, when the earth is moving through the Aquarid streams and is encountering the forerunners of the Perseids. All during the year, and particularly during these weeks of shower meteors, amateur astronomers throughout the country spend many evenings watching the sky, counting meteors, mapping their paths, and reporting the data to various observatories. On an average night outside the shower periods, if there are few clouds and no moon, an experienced watcher may count about half a dozen meteors in an hour's time, but during a shower he usually sees many more. For the week of July 23 to 30, 1948, the records of the American Meteor Society, the Harvard College Observatory, and the Flower and Cook Observatory show that, in spite of the interference of a bright moon, large numbers of meteors were counted and the paths of many of them were mapped and plotted.

The reports from the Southeast for that week have particular interest for the Chiles-Whitted case. A regular observer in Alabama counted fifteen meteors in one hour's watching on the evening of July 24, and twenty-one in two hours the following night [22]. On the evening of July 26 he apparently took a holiday, but many other persons saw a huge fireball that flashed over North Carolina and Tennessee at 9:36 P.M. E.S.T.; its radiant (AMS 2322), plotted from many reports, showed it to be a member of the Delta Aquarid

stream, then approaching its maximum. Early on the morning of July 27 another fireball soared over Tennessee and apparently exploded [23]. On the night of July 28 the Alabama watcher recorded fifteen meteors, from which he obtained the radiants AMS 3269, 3270, and 3271 [9, p. 521].

These facts alone—the occurrence of scheduled showers and the number of well-plotted meteors observed during the period—point strongly to the probability that the Chiles-Whitted UFO was a meteor. The probability becomes virtual certainty when we examine the available records for the night of July 23 and morning of July 24, the period when this particular UFO appeared. The watcher in Alabama was not on duty, but another observer in Iowa counted fourteen meteors in one hour [22], more than double the rate for an average night. About an hour before the UFO appeared in Alabama, ground observers at Robins Air Force Base near Macon, Georgia, reported an unusually bright meteor going from north to south. A few minutes before the Alabama sighting, two Air Force officers flying between Blackstone, Virginia, and Gainsborough, North Carolina, reported an unusually bright meteor traveling in a southerly direction.

When Chiles and Whitted observed their UFO, its appearance and manner of motion were identical with those of many other bright meteors but the pilots, startled by the sudden apparition, misinterpreted what they saw. They probably overestimated the length of time the meteor was in view and they almost certainly underestimated the distance. Meteors notoriously mislead even the experienced observer, who often sees them disappearing “just behind the next hill,” when they may actually be fifty or a hundred miles away. Although the night was moonlit and clear except for broken clouds, the witnesses had no fixed reference point by which to determine either distance or size.

There can be no doubt that Chiles and Whitted misinterpreted the appearance of an unusually brilliant meteor, its body glowing to white (the momentarily persisting luminous train of a meteor often has a veined or fibrous structure that could easily have suggested the “lighted window” and “cockpit”) and blue incandescence (the glowing “undercarriage”) as it rushed through the atmosphere some fifty miles or more away, shooting off flaming gases (the “exhaust”)

and vaporizing from the friction of the atmosphere. Flashing beyond their range of vision ("pulling up into the clouds"), it probably burned and disintegrated before it reached the earth.

This fresh analysis, based on meteor records for July 1948, has led ATIC finally to remove the Chiles-Whitted UFO from the category of Unknowns and, as Dr. Hynek suggested originally, add it to the file of recorded meteors.

A more recent sighting that closely resembled the Chiles-Whitted incident occurred on the evening of January 8, 1959, and was promptly reported to ATIC [19]. Two Air Force pilots were flying in a C-45 type of aircraft from Phillipsburg to Brookville, Pennsylvania, at an altitude of 8000 feet. The night was clear and moonless. At 6:14 P.M. E.S.T. they observed what appeared to be a brilliantly lighted solid object rushing toward them. Bluish green in color, shaped roughly like a teardrop and about 200 feet in diameter, it made no audible sound. Glowing like a small sun, it seemed to be flying level with the aircraft, less than a mile away and headed straight for the plane.

The frightened pilot jerked on the controls in an attempt to dodge the object, but almost before the plane could respond the unknown had disappeared. It had been in sight about three seconds. In his official report he estimated that the object had been the size of a pool ball held at arm's length and that it had been not more than a mile away. The copilot, however, did not agree. A man with special training and unusual experience in the study of UFOs, he estimated the object to be the size of the head of a pin held at arm's length and the distance to be at least 300 miles. The extreme brilliance of the object against the night sky, he thought, had made it seem larger. In his opinion, supported by Air Force investigation, the unknown had been a fireball at least fifty miles high that had burned out and vanished as they watched.

As in the Chiles-Whitted case, ground observers also saw the object and thus provided independent confirmation of the analysis. A member of the Ohio State University reported to the Harvard College Observatory that on the night of January 8, at approximately 6:15 P.M. E.S.T., he had watched a brilliant bluish-white meteor streak across the sky over Columbus and vanish within a few sec-

onds. The fireball must indeed have been high and spectacular to be visible at the same moment from points nearly 300 miles apart.

Other Flaming UFOs

Not all spectacular UFOs are meteors, of course, any more than they are all planets or balloons or rockets. Sudden brilliant illuminations of the night sky can have any one of a dozen or more explanations. The atmosphere is crowded with potential Unknowns, more than at any time in man's history. The air surrounding our planet plays host not only to meteors and fireballs, birds and insects, but also to military and commercial planes, private planes, jets, helicopters, weather balloons, experimental rockets, and an ever-growing number of artificial satellites. An ear-shattering detonation that rattles a house or breaks a window may come from an exploding fireball or it may come from a jet penetrating the sound barrier. Without an exact knowledge of all the circumstances, only the foolhardy would attempt to say positively what caused any given unusual aerial phenomenon.

Let us consider a sighting that might have received various wrong interpretations and would probably have become one of the most famous of the UFOs cited by saucerdom, had investigators lacked full information.

Shortly after midnight one spring morning reliable witnesses on the east coast, particularly in Connecticut and Long Island, reported a brilliant bluish-white object flying at high altitude and incredible speed. As it flashed overhead, it changed color to become reddish, and several smaller objects apparently detached themselves from the main body and followed it in orderly fashion. About five minutes later more than fifteen ships in the Caribbean area observed similar objects soaring overhead but the reports varied in many details. Ship number two saw brilliant short flames darting about behind the main body, which had a long, tapered tail. Ship number four saw a flaming white object more brilliant than the full moon. Ship number seven reported a flaming green ball followed by a group of several small objects. Ship number nine observed at least fifteen smaller objects that suddenly separated from the main body and

fell into formation behind it. Ship number eleven saw an object with a trail several miles long, brilliant as a peacock's tail, so luminous that the deck and sea around were bathed in pale light as the mass crossed overhead. Ship number twelve reported, "The main body appeared to have a blue-white head, then a short dark space before the glowing orange-yellow tail. Twenty-seven separate particles were actually counted as they appeared in the main plume. Each followed the main body and each developed its own glowing tail on leaving it." The main body was several times brighter than Venus, while the offshoots were each twice the magnitude of Sirius. One observer described it as round on top and bright blue-white, while the lower half, which was emitting sparks, seemed to be flattened and reddish in color.

During this period of less than five minutes, similar objects were observed from the ground by witnesses in the Virgin Islands. One man in Martinique saw a luminous green globe, brighter than Venus, followed at a slight distance by a flaming red, enormously long, cigar-shaped object. Observers in Barbados saw two huge objects followed by from twelve to eighteen "offspring" shaped like the main body; some of the offspring subdivided to form two small cometlike objects. The object disappeared into a cloud bank and vanished. No observations were reported from areas farther south.

These unidentified objects were reported over an area stretching from Connecticut to the coast of British Guiana, a distance of about 2700 miles. They flew in a straight course. All of the objects were noiseless. They were remarkably brilliant. They seemed to have one or more leaders, to discharge smaller objects, and to fly in formation. They maintained a substantially horizontal path, and only the last observers, who saw the things disappear into the cloud bank, noted any tendency to descend. No fragments were ever found, and all witnesses agreed that the objects were not like meteors. If all the observers were describing the same single phenomenon, it was flying at the incredible speed of more than 16,000 miles an hour.

What was it?

With only these facts to build on, an investigator might interpret the sightings according to his own prejudices: an invasion fleet from another planet making a reconnaissance in force, the mother

ships discharging the smaller craft at intervals; a mass hallucination; a peculiar meteoric display.

Without knowledge of one essential fact, some hundreds of landmen and seamen in the United States, the Caribbean islands, and the British West Indies might now feel firmly convinced that they had witnessed a genuine "Unknown." The date was April 14, 1958. The privileged observers had witnessed the death of Sputnik II, the Russian satellite launched on November 3, 1957 [24].

The UFO reports inspired by this event presented no problem to the Air Force. All information on the re-entry of artificial satellites is immediately accessible to ATIC. Whenever a reported UFO shows any possible resemblance to a falling satellite, Air Force investigators check at once with Spacetrack. Astronomers who had been tracking this satellite as it circled the earth had predicted more than a month in advance that it would spiral toward the earth and fall sometime between April 12 and April 15. A few days before the actual event they had refined their estimate and predicted the time of the fall within a few hours.

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Chapter vi

LIVING LIGHTS

A gamekeeper in Norfolk, England, in the year 1897 observed the flight of an unusual luminous object. According to his story, he was “. . . out one very dark night stopping up fox-earths. While I was so engaged I saw a very bright blue light pass close to my face and was very much startled as I saw it going away from me . . . I put it down as some insect.” After the mysterious light reappeared a few nights later, the gamekeeper prudently began carrying his gun and eventually he managed a shot at the light. To his amazement he brought down “a poor old half-starved barn owl, *Tyto alba*, whose body continued to glow for some hours after death.” [1]

The Luminous Owls of Norfolk

Some ten years later, on the night of February 3, 1907, another Englishman and his son while taking a walk observed a similar luminous phenomenon. Apparently about a quarter of a mile away, it moved horizontally over a course several hundred yards in length, reversed direction, then rose into the air to the height of forty feet or more. “It then descended and again went through the same evolutions many times. The light was slightly reddish in the centre, and resembled a carriage lamp for which we at first mistook it. We watched it for twenty minutes and were quite at a loss to ascertain its cause.

“On December 1st, 1907, when again reaching the top of Twyford Hill, I noticed what I took to be the lamp of a motor bicycle moving rapidly along the Bintree road to the south. The light suddenly

stopped, rose into the air above the trees and retraced its course. This it did several times, sometimes rising twenty to forty feet into the air, and then rapidly descending. I called my groom and his wife from their cottage a few hundred yards away, and they watched it with me for several minutes. I then went to my house about half a mile off, and from one of the attic windows watched it with my son and three servants for a short time . . .”

The mysterious light appeared frequently for a period of weeks, maneuvering silently, its luminosity sometimes so great that “it literally lighted up the branches of the trees as it flew past them.” Attempts to identify it through a telescope were unsuccessful but eventually one observer was lucky enough to hear a sound as the light soared past, and at once identified it by its unique call as a white owl, *Strix flammea* [2].

If these sightings had occurred half a century later, the witnesses might well have called them flying saucers.

Things That Glow in the Dark

The luminous owls of Norfolk have appeared at intervals since 1866 to frighten the superstitious and puzzle the naturalist, but ornithologists managed to solve the mystery some years ago [3]. The birds acquire their temporary luminosity from contact with a common fungus, *Armillaria mellea*, popularly known as “honey-tuft.” This mushroom, which mycophagists prize for its delicious flavor, grows in large clumps on dead trees and stumps. The dark-brown cap is rough, with fibrous scales, while the white gills are hooked or toothed at the end and the spores are white. The dense white lacework of the root system or mycelium, which gives off a phosphorescent light, may permeate the entire tree and extend even into the fibers at the base of the tree. Wood infested with the fungus can glow in the dark, sometimes so brightly that a man could read his watch by its light.

Many of the tales of fox fire, corpse candles, and lanternmen undoubtedly come from glimpses of this fungoid phosphorescence. Owls that seek refuge in the dark interiors of hollow trees during the daytime may brush against the veins of the mycelium, which ad-

heres to the feathered body. Flitting about at night, the luminous bird becomes the dancing flame of the will o' the wisp.

Other luminous mushrooms abound in woods, swamps, and marshy areas. Decaying, they may produce an unearthly light and can give off a peculiarly unpleasant odor. Unexpectedly seeing and smelling a bird touched with the substance, on a dark night, a witness might well feel bewildered and even frightened. *Polyporus sulfureus*, which grows in dense masses on dead trees, often phosphoresces brilliantly in the early stages of its decay, as does *Clytocolle illudens*, the jack-o' lantern. In the tropics these fungi may produce enough light to read by. Birds, insects, and animals that brush against them can carry away some of the luminous material and thus, for a time, appear to be luminous themselves.

Most of us recognize fireflies, lightning bugs, or glowworms—which are not worms but beetles. The wingless females must creep on the surface of ground or branch, but the winged males flit through the air. These sparkling creatures form part of the diet of birds and bats, and when carried aloft to be consumed in flight can make one more mysterious, swiftly moving light to frighten the apprehensive. The earth teems with other self-luminous organisms such as frogs' eggs, which most of us have never seen and would not recognize. Luminous parasites sometimes live in the feathers of birds and make them glow. The plumage of the great blue heron, a North American bird, can emit a pale light sometimes known as the bird's "lantern" because it is supposed to help him while fishing. Fish or meat when decaying can become infected with luminous bacteria and thus shine brilliantly in the dark. The sea is filled with phosphorescent fish and plants which help perpetuate tales of sea serpents. Some waters in the Caribbean contain so dense a population of phosphorescent algae that a bird, dipping its wings to snatch a meal, will glow for minutes after it soars again into the air. These luminous birds, innocently fishing for dinner, probably account for many reports that flying saucers come and go from underwater [4].

Many of the erratically behaving UFOs observed at night over wooded areas, swamps, and marshes have undoubtedly been one of these will o' the wisps—winged creatures glowing with borrowed fire. Unfortunately proof of this explanation is rarely possible. Before

the startled observer can recover his wits the flitting "saucer" has gone, taking with it the evidence of its identity.

Fear of the unknown is not confined to *Homo sapiens*. A news item published in England a few years ago reveals that the animal kingdom, too, may have its ghosts. Under the headline, *Owl Attacks Luminous Man*, the article reads:

"A Bournemouth long-distance runner, Ken Baily, was attacked by an owl last night when he was running through the centre of Bournemouth in a luminous track suit. The bird ripped the front of his suit before it flew back into the trees.

"Baily said afterwards: 'I heard it hooting before it attacked. The suit is luminous so that motorists can see me, but if it attracts owls like this I'd rather take a chance with the traffic.'" [5]

Sea Gulls as UFOs

Early in the afternoon of December 10, 1941, three days after the attack on Pearl Harbor, a research technician standing at the fourth-floor window of a laboratory in Boston saw a number of bright objects maneuvering high in the sky and slowly descending over the city. Making a quick guess at their distance, size, and speed, he concluded that the objects were parachutes, the first of a Japanese invasion. Only after they had dropped to the level of a nearby church spire was he able to gain the right perspective, correct his estimates, and identify the objects as sea gulls drifting down with the winds.

A decade later, the public was no longer worried about danger from Japan but was concerned about possible invasion from outer space. Sea gulls flashing in the sun were interpreted not as parachutes but as flying saucers.

Many luminous UFOs have in fact been ordinary living creatures, normal inhabitants of the earth—owls that had acquired a temporary luminosity, sea gulls reflecting the sunlight, flights of birds reflecting the lights of a town. But in trying to identify them, the witness is influenced by the pattern of his time. In 1897 and 1907 the world seemed reasonably secure. Observers of mysterious lights made fairly accurate estimates of their distance and size and compared

them to familiar, everyday things—an insect and a carriage lamp. In 1941, three days after Pearl Harbor, the world was at war and the observer's imagination, stimulated by a hundred rumors of imminent Japanese invasion, transformed cruising sea gulls into parachutes. By 1950, when space travel had become at least a theoretical possibility and scientists were discussing ways to reach the moon, uneasy persons fantastically overestimated the height and size of mysterious lights in the sky and sometimes saw birds as spaceships from another planet.

A well-publicized incident took place on the morning of July 16, 1952, when a Coast Guard photographer at Salem, Massachusetts, happened to glance out of a window and see four bright, egg-shaped objects moving in the sky. Grabbing his camera, he managed to take a picture before the objects were lost from view. According to some saucer enthusiasts, certain reproductions of the photograph show typical UFOs shaped like two saucers arranged face to face, as though joined by a ring at the mid-line [6]. The official Coast Guard photograph however, shows merely four bright, fuzzy-edged blurs arranged in a rough V formation. Only imagination could convert these spots of light into spaceships. Many readers of this book have probably seen similar objects gleaming briefly in the sun, mysterious for the moment, and then identified them as gulls or airplanes when a shift in orientation cut down the reflection.

On the morning of the Coast Guard photograph the day was exceptionally clear, the sun extremely bright, and the sky a deep blue unusual on the Massachusetts coast. Under these circumstances, objects reflecting the sun look larger and brighter than normal. Because the picture was taken with a dirty lens through a window, the images were further distorted. Since the UFOs did not produce highlights on the tops of the cars in the foreground, as luminous objects overhead would have done, they were probably not in the sky at all. Elaborate Air Force experiments with photo-flood lamps showed that the images were reflections in the window glass from an interior light source behind the camera (see Plate IVa).

Weird and frightening apparitions do occur; Air Force files bulge with reports suggesting that unfamiliar objects are moving around us day and night, by land, sea, and air. Imagination endows them with life or turns them into mysterious, saucer-shaped craft manned

by creatures from Mars, Venus, or even from some planet of a star beyond our solar system. The UFO photographed over France on October 2, 1954 (a weekend when every French village was reporting saucers by the dozen), shows no details and might be almost anything: a bird, a balloon, a cloud of gossamer, the sun, a plane, or merely the result of a lens defect (see Plate IVb).

How many of the UFOs listed in the saucer publications originate from birds, insects, and animals we cannot know, but the number must be large. Most of us have only a sketchy acquaintance with the non-human forms of life that share the earth with us. Seeing an unfamiliar creature suddenly, or a familiar creature under unusual circumstances, we often imagine it to be whatever we most fear—vengeful spirits of the departed, fire-breathing dragons, devils, parachutes, or flying saucers.

The Lubbock Lights

The luminous objects sighted in Texas during the last week of August, 1951, would probably have been explained and forgotten in a week's time, except for the publication of alleged photographs of the unknowns. This complication converted a simple incident into a conglomerate of puzzles which, though actually unrelated, were lumped together to form a classic Unknown. The most detailed published account of this case [7, p. 133 ff.] contains a number of statements that differ in detail from those in the official files. When discrepancies exist, the facts as given in this chapter are those in the original Air Force reports [8].

The Saturday night of August 25, 1951, was uncomfortably hot in the Southwest, and many persons spent the evening in the relative coolness out of doors. In the town of Lubbock, a professor of geology was sitting in his yard with two guests, fellow members of the faculty, discussing micrometeorites and counting meteors, which for several nights had been more numerous than usual. The sky was clear and cloudless and seeing conditions were ideal. About 9:20 the men noticed a group of fifteen to twenty lights passing silently overhead, going from north to south. They were obviously not meteors or planes, but disappeared too quickly to be identified.

About an hour later a second group of lights appeared, forming a rough semicircle or crescent like a string of beads. Shortly before midnight a third group soared overhead in a random pattern (see Figure 11).

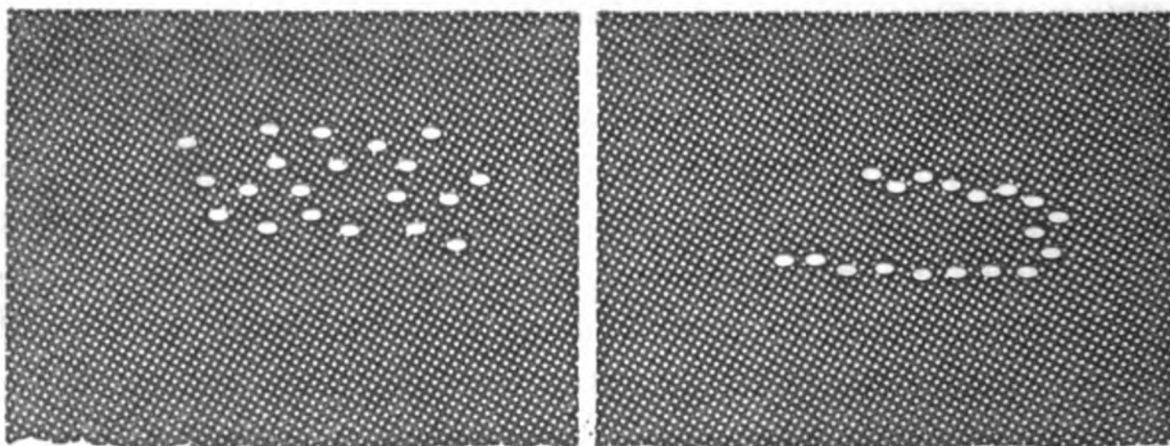


Figure 11. Schematic sketch of lights observed by the professors at Lubbock, Texas. Left, pattern in the first and third sightings; right, pattern in the second sighting.

Trying to account for the phenomenon, the men agreed that all three flights had appeared suddenly, not gradually, in about the same part of the sky. Only the second had shown any sort of pattern, all had moved silently from north to south, their luminosity was not constant but had varied in intensity, and all had disappeared suddenly, not gradually, at about the same point in the sky. The men did not agree on the color, which they described as yellowish to white, with a soft glow. The lights had passed too swiftly for the men to locate them in relation to specific stars and there were no clouds in the sky; thus they had no known reference points by which to judge altitude, distance, or size. Since the lights had apparently moved over about 30 degrees of sky in one second, however, and the observers estimated the altitude as 5000 to 50,000 feet, the unknowns must have had an enormous size and an incredible speed of from 1800 to 18,000 miles an hour—typical flying saucers.

Understandably curious, the host telephoned the managing editor of the local newspaper, the *Lubbock Evening Avalanche*, hoping that a printed account would elicit more information from other persons who had noticed the mysterious lights. The report appeared

in the Sunday paper, August 26, but in the days that followed, no reader responded.

Then on Friday August 31, five days after the original story had appeared and apparently died, it suddenly came to life. A college freshman who occasionally sold news photographs to the Lubbock paper brought in five pictures of a group of mysterious lights he had photographed the night before. He had been lying in bed next to an open window, he explained, and shortly before midnight he had observed a formation of brilliant lights moving rapidly across the sky. Grabbing his camera, a Kodak 35-mm., he had rushed out into the yard and, after a brief wait, had been able to photograph two similar flights that raced overhead a few minutes apart. Each light had been brighter than Venus, they had maintained a perfect V formation, and had sped from horizon to horizon in a mere four or five seconds. Yet this amazing apparition had apparently gone unnoticed by all except the lucky amateur.

Fearing a hoax, both the editor and the staff photographer hesitated but, since the negatives displayed no obvious evidence of fraud, they finally bought and printed the pictures and distributed them over the country through the United Press.

People all over the nation could now argue the question: What were the Lubbock lights? A few said flying saucers. Many Texans said ducks, plover, or other migratory fowl. But the things in the pictures didn't look like birds; and if they weren't birds, what were they? Some persons bluntly called them a hoax.

Impelled perhaps by the growing publicity, the staff photographer of the *Evening Avalanche* several times tried to duplicate the pictures by photographing flights of birds at night. He allowed himself better equipment—a Speedgraphic camera loaded with a tungsten ASA 80 film, and a GE no. 22 flashbulb in a concentrating reflector. Opening the camera to f 4.7 at $\frac{1}{10}$ second, he went up to the roof of the newspaper building to try his luck. After a brief wait he was able to photograph a flock of birds that appeared high overhead, reflecting the mercury-vapor lights of the street, flying noiselessly in a “ragged” V formation, but the image on the negative proved too faint for use. The next night he tried again, using a Kodak Reflex set at f 3.5, Super XX film, at $\frac{1}{10}$ second, plus the flashbulb and concentrating reflector. The birds appeared on schedule, but

again the images proved too faint for use. The experimenter concluded, probably correctly, that the amateur must have photographed something much brighter than birds.

Not until late October, nearly two months after the original incident, did the Air Force receive official notice of the mystery at Lubbock, and Captain Ruppelt of ATIC arrived to interview witnesses in Lubbock and the neighboring towns of Lamessa, Brownfield, and Big Spring. He quickly discovered that he had two mysteries to solve instead of one since, according to the witnesses who had started all the excitement, the objects shown in the pictures were wholly unlike the luminous phenomena observed by the three professors. The pictured lights formed a perfectly geometrical, flat V, while the original objects had formed a random pattern. Furthermore the pictures showed brilliant, sharply outlined lights as intense as unshaded electric bulbs, while the original objects had been softly glowing.

Meanwhile the professors themselves had been trying to solve their own mystery. During September and October they had observed at least a dozen similar flights, and in an attempt to obtain the true altitude of the objects they had organized a field survey, operating in the country to achieve better seeing conditions. Two groups of observers were stationed at two different points, a measured distance apart, with radio communication between the two. By making simultaneous observations, they hoped to calculate the true height of the objects and thus obtain accurate estimates of size and speed. This well-planned experiment failed because the lights never appeared to the watchers in the country even on nights when they were clearly visible in the town. Nevertheless the scientists did establish one fact: the altitude could not be as high as 50,000 feet, their original estimate. An astronomer in the group, calculating from the few data available, showed that the height must have been only 2000 to 3000 feet, less than a tenth of the first estimate.

Continuing his investigation, Captain Ruppelt found that other persons had seen the lights on the night of August 25—and identified them.

At Brownfield, Texas, some thirty miles from Lubbock, a rancher and his wife had been sitting in their back yard when they noticed

a group of fifteen to twenty lights flying overhead from north to south, silently, in no particular formation. They appeared to be very high and had "a kind of glow, a little bigger than a star." Some time later a second group flew over. When a third group appeared, flying lower, he could see that they were birds; as they moved on to the south and one of the birds emitted a cry, he recognized the familiar call of the plover. Plover have a wing span of a foot and their oily white breasts form an excellent surface for reflecting the lights beneath them.

Like most old-time residents of the area, the rancher was accustomed to the yearly exodus of migratory fowl. Traveling at night in groups of six to twenty, they usually flew at 1000 feet or lower at a maximum speed of about fifty miles an hour in the weeks from late August to mid-November. The rancher had read about the professors' sighting, which sounded exactly like his own. It would have baffled him, too, he said, if he had not gotten a good look when the third flight circled the house and if he had not happened to hear the single call.

Another resident reported, much later, that he had often seen such lights and recognized them as birds. One night he had noticed "a formation of ducks pass over so low that you could actually see the whole bodies with their shiny white undersides glowing." At other times he had seen ducks flying at low altitudes with only the undersides glowing and creating an illusion of objects moving very fast at a high altitude [9].

In spite of the overwhelming evidence that the original objects had been birds, probably plover, reflecting the city's lights, Captain Ruppelt chose to regard them as mysterious and listed the professors' sighting as an Unknown. Several years later he wrote that a natural explanation did exist but, for some reason, he had promised not to divulge it [7, p. 150]. Still later, he asserted without amplification that the lights had been night-flying moths reflecting the bluish green of mercury-vapor street lights [10, p. 276]—a surprising anticlimax, in view of his earlier secrecy. In a reanalysis of the facts made in 1959, Major (now Lieutenant Colonel) R. J. Friend of ATIC and Dr. J. Allen Hynek, science consultant, determined beyond doubt that the objects had been plover.

The Lubbock Pictures

The problem of the photographs remained. In Dayton, Air Force experts studied the four available negatives.

The photographer had used a Kodak 35-mm. camera, lens at 3.5, Plus-X film, and an exposure time of $\frac{1}{10}$ second. The negatives were badly scratched and dirty from much handling. According to the photographer's story, each flight of unknowns had moved from horizon to horizon in four to five seconds and had passed directly overhead; he had "panned" his camera with the movement of the objects and had managed to snap two pictures during one flight and three during the next.

Analysis yielded no suggestion that the negatives had been tampered with but they offered no clue to the background, identity, height, distance, or speed of the things shown. The images themselves, however, aroused some doubts. Each frame showed twenty bright spots against a uniform dark background. No trace of stars or starlight could be found, although the sky that night had been clear and cloudless. The spots showed evidence of slight motion during the exposure but the amount of blurring was amazingly slight, considering the speed with which the photographer claimed to have moved his Kodak. Professional cameramen tried repeatedly to duplicate the performance, but failed. The most successful try produced only two pictures, badly blurred, in four seconds.

The most crucial discrepancy between negatives and story, however, was revealed by the pattern of the spots, which formed a flat V. The orientation of the V was the same on all the negatives. If the formation had actually passed directly overhead and the photographer had panned with it, as he claimed, then he must have taken all his pictures either as the lights approached him or as they receded. If he had taken two successive pictures, one as the formation approached and the next as it receded, the V would have reversed position in the second picture—V would have changed to Λ —unless he had managed to stand on his head while taking the second picture. And if he had actually taken all his pictures either as the lights approached or as they receded, he had per-

formed the incredible feat of obtaining two clear, sharp photographs, while panning, in a mere two seconds.

Although these facts suggested that the explanation given for the pictures was at least highly improbable, Air Force experts refrained from labeling them frauds. Professional photographers can undoubtedly make various guesses as to how the pictures were made and the possible identity of the V of bright spots, but proof is impossible. In the Air Force files they remain in the category of Unknowns.

Other Winged UFOs

During the era of the saucers, winged creatures were responsible for many UFO stories. But winged creatures do not stay put, and in flying away they usually take with them the evidence that the alleged spaceships were actually only birds or insects.

One such incident occurred at Downey, California, on May 29, 1951. Late in the afternoon three technical writers for North American Aviation were standing outdoors chatting and looking at the sky when suddenly they noticed about thirty glowing, meteorlike objects moving in the east, about 45 degrees above the horizon. They made no sound and left no trail. Emitting an intense electric-blue light, the objects made fantastic right-angled turns and swept across the sky in an undulating vertical formation, apparently covering about 90 degrees of sky in about 25 seconds. The diameters of the objects were estimated at 30 feet and the speed at 1700 miles an hour [11].

Many persons concluded that the unknowns must be interplanetary in origin because, as *Life* magazine commented, no natural object hurtling at such a speed could execute a right-angled turn, and no known machine could fly so fast without making a sound or leaving a trail. No one could quarrel with this statement, but it has no obvious relation to the incident in question. Technical writers are not necessarily trained observers, and these witnesses had no way to make a reliable estimate of the height of the objects. Without an accurate estimate of at least one quantity—true altitude, true size, or true speed—the others are meaningless. The unknowns

were probably birds, but they could equally well have been butterflies, bits of paper, or merely ashes blowing over the two-story building.

Winged creatures sometimes avoid the interplanetary label only by staying in sight long enough to be examined. About sundown on May 19, 1955, switchboards at police stations in the Los Angeles area were swamped by telephone calls reporting a fleet of silvery flying saucers, changing formation with incredible speeds "as if playing tag in the sky." One witness, however, had the presence of mind to get out his binoculars and look at the objects; they were birds with dark wing tips. Thinking they might be geese, he called the State Division of Fish and Game, which identified the "saucers" as a flock of *Pelicanus erythrorhynchos*, an inland species of pelican that float on the prevailing wind currents [12].

Sometimes an observer identifies such objects correctly, but later begins to doubt his own judgment. About 7:30 in the evening of August 26, 1956, a man driving along a highway in California noticed a flock of about nine small birds flying northward, dark against the blue sky. In a random group, they moved freely among themselves as birds do but continued in a northern direction. The witness watched the birds as carefully as possible, but the intermittent glimpses possible when a man is driving a car did not allow him to make good estimates of their size or height. Nevertheless, he guessed at their distance and calculated that they covered an arc of 60 degrees in five seconds, which would mean a speed of about 1000 miles an hour.

Instead of questioning the accuracy of his estimate, for some reason he doubted his first identification. If the objects could fly 1000 miles an hour, he reasoned, then they were not birds after all, and must be flying saucers! [13]

The Tremonton Movies

One of the most famous controversies resulting from a flight of birds centered on the Tremonton, Utah, films of UFOs.

On the morning of July 2, 1952, a Navy photographer and his family were on their way to California, driving near the town of

Tremonton, Utah, not far from the Great Salt Lake. At about 11:10 A.M. the man's wife noticed something unusual in the sky. Stopping the car, the man observed about a dozen shiny, disklike objects "milling around the sky in a rough formation." Getting out his movie camera, a Bell and Howell 16-mm. equipped with a 3-inch telephoto lens, he started photographing the group. Just before it disappeared toward the west, one object left the main group and headed east. The photographer obtained about forty feet of film before the objects vanished. After developing the film, he sent it to the Air Force for evaluation, together with his opinion that the objects had been huge and had traveled at very high altitude at supersonic speeds. This was only an impression, however, for as he told investigators from ATIC: "There was no reference point in the sky and it was impossible for me to make any estimate of speed, size, altitude, or distance." [8] The pictures are of such poor quality and show so little that even the most enthusiastic home-movie fan today would hesitate to show them to his friends. Only a stimulated imagination could suggest that the moving objects are anything but very badly photographed birds.

The movies show nothing that can be recognized—merely bright blurs of light moving at random. Their luminosity is not constant, and the spots fade out and then become bright again. The frames include no clouds, no trees, no house, no hill—no known reference point by which to calculate the altitude, size, or distance of the moving lights. After exhaustive study the photographic experts concluded that the negatives had not been tampered with and that, unlike the Lubbock stills, the pictures had been made exactly as described. But pictures of what? The objects were not balloons and not planes. At the time, the experts also rejected the theory that they might be birds because, in their [mistaken] opinion, birds could not produce such bright reflections.

If the Tremonton movies contained no proof that the objects were birds, still less did they contain proof that they were round machines from outer space, and ATIC finally classified the sighting as "Unknown." Later, however, Captain Ruppelt noted the strong resemblance to sea gulls he observed "riding a thermal" in the sky above San Francisco. They were "so high that you couldn't see them until they banked just a certain way; then they appeared to be a bright

white flash, much larger than one would expect from sea gulls.”
[10, p. 290]

Air Force investigators later concluded that the famous Tremonton movies show merely the large white gulls that soar near Utah's Great Salt Lake. The objects were photographed shortly before noon on a hot summer's day, against a deep-blue sky without any clouds to obscure the high sun. The fading and brightening of the lights, their individual motion within the group, and the one object that suddenly left the group, all are consistent with the behavior of a flock of birds, probably gulls, whose plumage is reflecting the sun. The glossy feathers of these birds can flash as brilliantly as a satiny metal surface as they circle and change position with respect to the sun. The birds can be dazzling against the clear, dark-blue sky of the western states. So brilliant is the flash that it wholly obscures the object that is reflecting the light.

Like many other puzzling UFO reports, the objects in the Tremonton movies were living lights—a case for the ornithologist rather than the Air Force.

A bright light moving erratically as it crossed and recrossed the field of view caused an experienced pilot and copilot to execute violent and evasive maneuvers in a flight over the dark Pacific. [14] The errant UFO proved to be only a firefly inadvertently trapped between the panes of the double windshield.

[1] Rolfe, F. *Eastern Daily Press*, January 16, 1908.

[2] Purdy, R. J. “The occasional luminosity of the White Owl (*Strix flammea*),” *Transactions of the Norfolk and Norwich Naturalists Society*, Vol. VIII (1904–1909), p. 547.

[3] Gurney, J. H. *The Zoologist*, No. 802 (April 1908), p. 121.

[4] *Boston Traveller*, Oct. 30, 1961.

[5] *London Daily Telegraph*, November 8, 1958.

[6] Maney, C. A., and Hall, R. *The Challenge of Unidentified Flying Objects*. Washington, D.C., 1961.

[7] Ruppelt, E. J. *The Report on Unidentified Flying Objects*. Garden City, N.Y.: Doubleday & Co., 1956.

[8] Air Force Files.

[9] Menzel, D. H. Personal files.

[10] Ruppelt, E. J. *The Report on Unidentified Flying Objects*. Garden City, N.Y.: Doubleday & Co., reprint, 1960.

[11] *Life* magazine, April 7, 1952.

[12] *Los Angeles Times*, May 21, 1955.

[13] Case 201, CRIFO *Orbit*, Vol. III (Oct. 5, 1956).

[14] Major William T. Coleman. Personal communication.

Chapter VII

PANIC

The summer of 1952, the period that Captain Ruppelt called "the big flap," offers a history of the UFO mania in capsule form. If the newspapers were to be believed, the heavens were crowded with armadas of spaceships both visible and invisible. There was even a monster story to add spice to the tales.

Yet the panic was largely an artificial creation. All spring the nation's movie-goers had been flocking to see a well-made thriller, *The Day the Earth Stood Still*, in which a mysterious glowing object appears in the sky over Washington, D.C., and lands in the middle of the city. The object proves to be a flying saucer from another planet, whose inhabitants want only to help the human race. Looking something like a huge poached egg, a hump in the center sloping down to a circular rim, the pictured vehicle offered a dramatic example to anyone in the mood to see a spaceship but not quite sure how it should look. In fact, many of the saucers described in the months and years following were obviously based on this model.

The summer's hysteria was also nurtured by the fears of some Air Force investigators who were convinced that UFOs were intelligently controlled craft originating outside the earth [1, p. 286]. Although these officials realized that whenever an unusually good saucer story appeared in the papers the number of sightings increased sharply in the days following, they apparently did not consider the possibility that the increase resulted from the power of suggestion. This apprehensive attitude, plus three publications in the spring of 1952, made the summer's panic almost inevitable.

Growth of a Panic

On April 4 *Life* magazine published an article whose title might well have alarmed the most stolid: "Have We Visitors from Outer Space?" Presenting ten "insoluble" cases, the article managed to suggest without exactly saying so that interplanetary visitors were among us. The very next day, April 5, the Air Force announced a new directive, ordering the commanding officers of all Air Force installations to make immediate, high-priority reports of all UFO sightings in their areas [1, p. 178]. Reasonably inferring from the *Life* article and from the new directive that Defense officials were concerned by the threat of UFOs, newspapers gave space to all tales of flying saucers. *Look* magazine then jumped on the bandwagon and on June 24 published an article, "Hunt for the Flying Saucers!" The public responded enthusiastically. Hypnotized by the prestige of these magazines, whose saucer articles seemed to have the support of the Air Force, thousands of well-intentioned but poorly equipped observers joined in the hunt, watched the skies, and began to cry "Tally-ho!" at every streak of light.

Nature cooperated. As in every summer, she offered a rich display of regular meteor showers. By mid-July Aquarids in large numbers are streaking through the sky, to continue into mid-August, and by the beginning of August the Perseids have arrived to join the summer's parade. The records of the American Meteor Society reflect this rise in the number of meteors. In the nights from July 10 to 31, 1952, five observers stationed in California, Oregon, Missouri, Iowa, and Long Island, New York, counted a total of more than 2000 meteors in some eighty-five hours of watching. The smallest number reported by a single observer in any one hour was nine; the highest was fifty [2].

Nature not only offered dramatic fireworks in the sky; she also produced exactly the right conditions for viewing them. During June and July an unprecedented heat wave lay over the entire East, driving sweltering citizens out of doors to savor the relative coolness of the night air. Furthermore, the nights were dark. The moon began to wane on July 7, and until nearly the end of the month there

was little moonlight to dim the brilliance of the meteors flashing through the heavens. No wonder that frightened people hunting for saucers should have had so little trouble finding them, when the sky seemed to be teeming with UFOs.

By the middle of July the nine-man investigating force at ATIC was all but buried in saucer reports—more than forty a day, far too many to handle either promptly or adequately. Only a very lengthy history of the saucer era could describe and account for each one of the hundreds of UFOs reported during those weeks. A few of the most publicized incidents are listed here:

July 2. A group of UFOs photographed with a movie camera near Tremonton, Utah (p. 130).

July 5. A UFO reported over an atomic plant at Hanford, Washington. (A Skyhook balloon.) [1, p. 203]

July 7. Flying saucer reported by hundreds of persons in the Pacific Northwest. (This spectacular daytime meteor was visible for a distance of 500 miles on either side of its path and was reported from Washington, Idaho, Montana, Oregon, California, Nevada, Utah, and Wyoming. It made no sound and was so brilliant that observers called it the "Sunshine Fireball.") [3]

July 12. A flying saucer, glowing blue-white, was reported over Indiana. (Another fine meteor.) [1, p. 203]

July 13–18. Flying saucers reported from all states in the Union. (Observers for the American Meteor Society counted an average of fifteen meteors per hour on those nights.)

July 14. A group of saucers over Chesapeake Bay and Norfolk, Virginia (p. 256).

July 16. Saucers photographed by Coast Guardsman, Salem, Massachusetts (p. 122).

The sighting hysteria was approaching the critical mass, and no special wisdom was required to see that an explosion was inevitable. The only question was: Where would it occur? The panic finally reached its climax in the nation's capital:

July 19. Flying saucers (invisible) invade Washington, D.C. (See *Chapter VIII*.)

July 26. Saucers again invade Washington (p. 155).

July 27. Saucers over Manhattan Beach, California (p. 49).

July 29. Saucers over Port Huron, Michigan (p. 160).

August 1. Saucer over Bellefontaine, Ohio (p. 162).

Most of these and hundreds of other UFOs were eventually identified as meteors, stars, balloons, jet planes, birds, searchlights, and radar angels. About the only aerial phenomenon that was not mistaken for a flying saucer during these weeks of panic was the planet Venus. Until the end of August it was too near the sun to be visible.

The Scoutmaster's UFO

True to the pattern set during 1947, the first summer of the saucers, the panic of 1952 did not end without an elaborate hoax and a good monster story.

The famous "Scoutmaster" incident occurred at West Palm Beach, Florida, on the night of August 19 [1, p. 229]. According to the report given the Intelligence officer at the local air base, the scoutmaster (an ex-Marine) had offered to drive four of the boys to their homes at the close of the evening's meeting. While traveling over a country road bordered by scrub pine and palmetto thickets, he had noticed some mysterious lights among the pines and decided he must investigate. Leaving the frightened boys in the car with instructions to go for help if he had not returned in fifteen minutes, he took his machete and two flashlights and bravely set off into the dangerous woods. He was found some time later by the boys, the constable, and the deputy sheriff, and was apparently terrified. When he entered the woods, he said, he noticed a peculiar odor and felt an oppressive sensation of heat. On looking up, he saw hovering above him a dark circular object with a turretlike dome in the middle, so large that it blotted out most of the sky. When he went closer, a door opened, a ball of fire emerged and drifted toward him, enveloped him, and rendered him unconscious. He called on the boys to confirm the presence of the strange lights and the huge machine, and as further proof he exhibited burns in his cap and on his face and arms.

Since scoutmasters are traditionally upright citizens, the story seemed to merit attention. Investigators from ATIC visited the

scene, interviewed all persons concerned, and sent the cap and the machete to Dayton for analysis. Very soon, however, the drama began to fall apart. The scoutmaster, after being interviewed by Air Force investigators, assumed an aura of mystery and stated publicly that he had been warned not to talk. At the same time he hired a press agent and offered to sell his story to the newspapers. A study of the landscape showed that the boys could not have seen any "machine" from the road. The townspeople did not consider the woods dangerous. Aircraft preparing to land at the airport regularly flew over the area in question with their landing lights on; to a person on the road, the lights might seem to be flitting through the woods. Furthermore the study showed that the scene had been set in advance for a frightening incident. As they drove along the lonely road, the scoutmaster had been talking about flying saucers and, after he stopped the car, had warned the boys that they might need to go for help. The man's reputation for veracity, too, began to melt away, and one townsman remarked that if the scoutmaster claimed that the sun was shining, he'd look up to see for himself before accepting the statement. The knife and cap showed no radioactivity. The laboratory report from the Federal Bureau of Investigation showed that the burn on the cap was made by a cigarette, and the "burns" on the hand and arm proved to be only superficial scorching of the hair and could easily have been produced by the flame of a kitchen match.

This investigation cost the usual amount of time and money, but it was unquestionably a hoax [4].

Monster in West Virginia

The final incident in the summer's panic occurred on the evening of September 12 when a family group near the town of Sutton, West Virginia, saw a flaming object flash across the sky and apparently land on a nearby hill. Taking their flashlights, they set out to investigate and, on reaching the hill, smelled an unpleasant odor. When they turned on their flashlights, they stated, they saw two red eyes glaring at them; a huge monster, ten feet tall, breath-

ing fire, with a bright-green body and a blood-red face, waddled toward them, and they turned and ran [5].

Air Force investigators concluded immediately that the flaming object first seen was the meteor observed that night by thousands of persons in Virginia and West Virginia and reported officially to various observatories. What the frightened family saw when they reached the hilltop and flashed the light was probably the glowing eyes or body of some mundane creature of the woods. A local group of civilian saucer investigators rejected this explanation, as usual, and after making its own study concluded that the monster story could very well have been true!

The monster is now enshrined in West Virginia history [5], and forms the subject of a new ballad written by Cindy Coy and set to the tune of "Sweet Betsy from Pike." One verse and the chorus will suffice:

The size of the phantom was a sight to behold,
Green eyes and red face, so the story was told.
It floated in air with fingers of flame.
It was gone with a hiss just as quick as it came.

Chorus:

Oh, Phantom of Flatwoods, from Moon or from Mars,
Maybe from God and not from the stars,
Please tell us why you fly o'er our trees
The end of the world or an omen of peace?

The Panel of Civilian Scientists

When after three months of constant threat no flying saucers had yet tried to invade the country, the acute phase of the panic subsided. Nevertheless, responsible officials in the Department of Defense were uneasy, and Air Defense was particularly worried by the problem of the radar phantoms, whose cause was not fully understood (see *Chapter VIII*). Even if UFOs proved to be normal phenomena, other very real dangers existed in the situation. If the public believed in the possibility of extraterrestrial antagonists, a clever enemy on earth simply by fabricating a few incidents could easily induce a mass hysteria that might paralyze the country. Also,

if the number of saucer reports should be greatly multiplied by some artificial stimulus, their sheer numbers would clog communication channels, interfere with the Early Warning System, and at a time of imminent attack from another part of the globe might cause a disastrous three- or four-hour delay in the activation of the Air Force network.

Government officials, uncertain of the facts, were reluctant to decide or to state whether there was or was not convincing evidence of extraterrestrial surveillance.

To clear up the potentially explosive atmosphere, the Office of Scientific Intelligence (OSI), under the Central Intelligence Agency, decided to consult outstanding civilian experts and invited certain eminent scientists to study and evaluate the evidence. For this purpose Air Force investigators assembled the complete data on the cases they considered most significant. They also prepared, on their own initiative, an unofficial report setting forth the evidence which, in the opinion of several investigators, proved conclusively that UFOs were interplanetary objects operating under intelligent control.

After a preliminary meeting late in November 1952, the panel met on January 12, 1953, to begin their study. The chairman was the late Dr. H. P. Robertson, mathematician and physicist, of the California Institute of Technology at Pasadena. The other members were Dr. Luis W. Alvarez, physicist, of the University of California at Berkeley; Dr. Lloyd V. Berkner, an expert on radio propagation; Dr. Samuel A. Goudsmit, physicist, of Brookhaven National Laboratory; and Dr. Thornton W. Page, astronomer, of Johns Hopkins University, Baltimore. Also present were several officers of the OSI. To avoid possible bias, Air Force officers who had actively worked on UFO cases and civilians who were closely identified with such studies were not asked to attend. The cases studied included all the "classics," such as the Tremonton and other movies, the Mantell and Gorman affairs, the radar sightings at Washington, D.C., as well as other less well-known reports.

One incident that particularly engaged the attention of the panel, and would probably have become a famous classic except that Air Force investigators had kept it a strict secret, was the sighting at Presque Isle Air Force Base in northern Maine. On October 10, 1952,

at about 10 P.M. E.S.T., a group of weather observers had noticed a bright-orange object hovering low on the eastern horizon and had set up a theodolite to measure its altitude and bearing. As the glowing unknown slowly rose higher above the horizon and seemed to come closer, it appeared through the telescope of the theodolite as a circular disk accompanied by four flickering green lights, two on each side. Alarmed by this spectacular phenomenon, the observers called the Air Force Base at Limestone, some twenty miles north and east, to ask whether the object was visible there. It was. Setting up a theodolite, the Limestone observers measured the height and bearing, and both groups of observers sent the recorded data to ATIC.

Here was the kind of situation the investigators had been hoping for: simultaneous observations of a single object, made from two different stations a known distance apart. Calculations based on the altitudes and bearings reported by the two stations yielded fantastic results. In a plot of the data (shown schematically in Figure 12a) the prolonged lines intersected, indicating a group of unknowns hovering 100 miles above the earth and more than 50 miles off the Maine coast, of tremendous size and moving at high speed. Concluding that the objects must have come from outer space, or

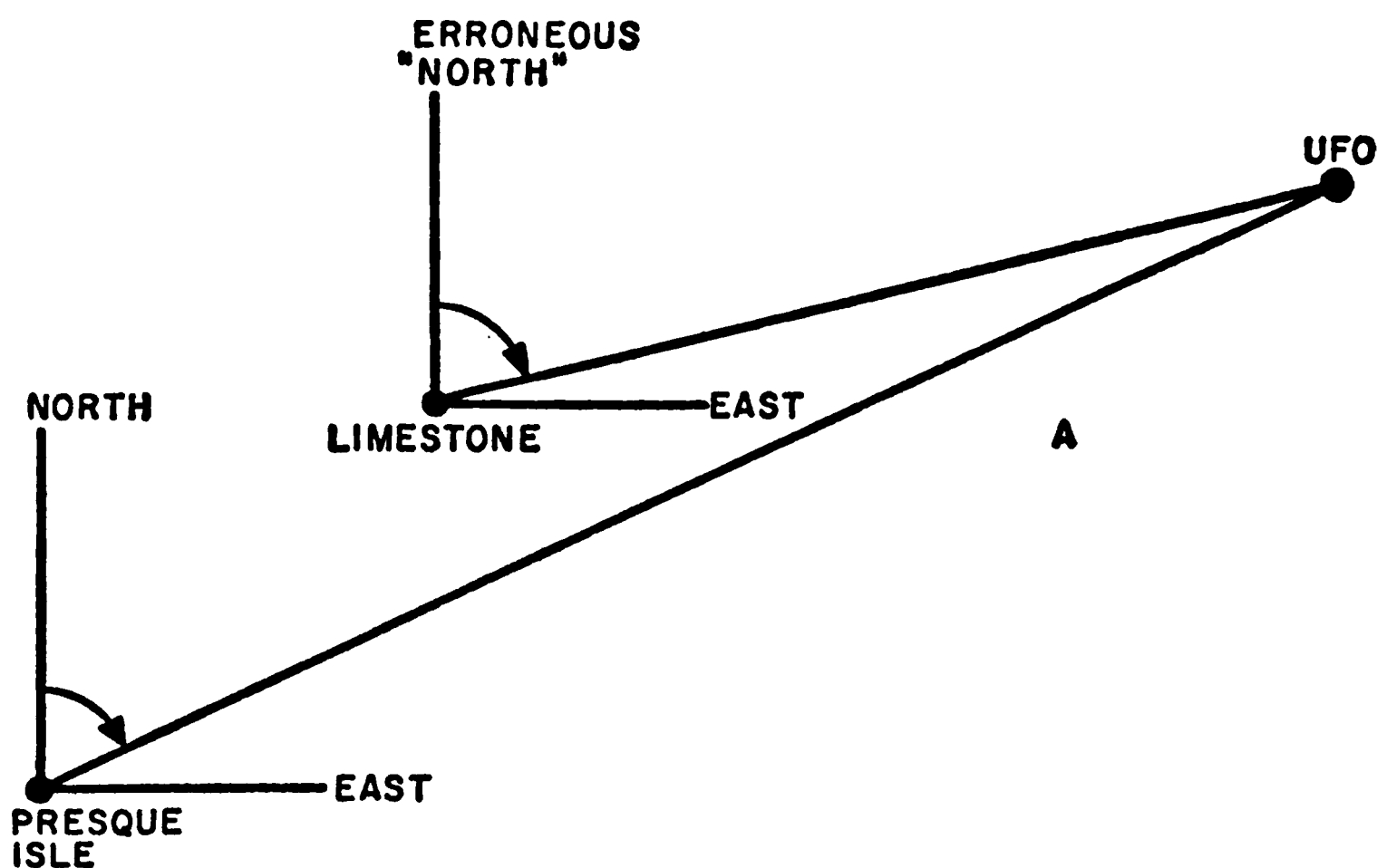


Figure 12a. The Presque Isle sighting from two stations; the erroneous determination of North at Limestone seems to indicate a nearby UFO.

were possibly a new type of orbiting vehicle of Russian origin, the Air Force had promptly clamped down the security lid. When ATIC's science consultant, Dr. J. Allen Hynek, looked at the data, he just as promptly disagreed with these ideas and clearly identified the unknown as the planet Jupiter, which had risen at 6:03 P.M. E.S.T. and at 10:00 was the brightest object in the eastern sky. The believers in the extraterrestrial theory were then in the majority at ATIC, however. They had refused to accept the identification, and submitted the Presque Isle sighting to the panel as a prize example of UFO surveillance.

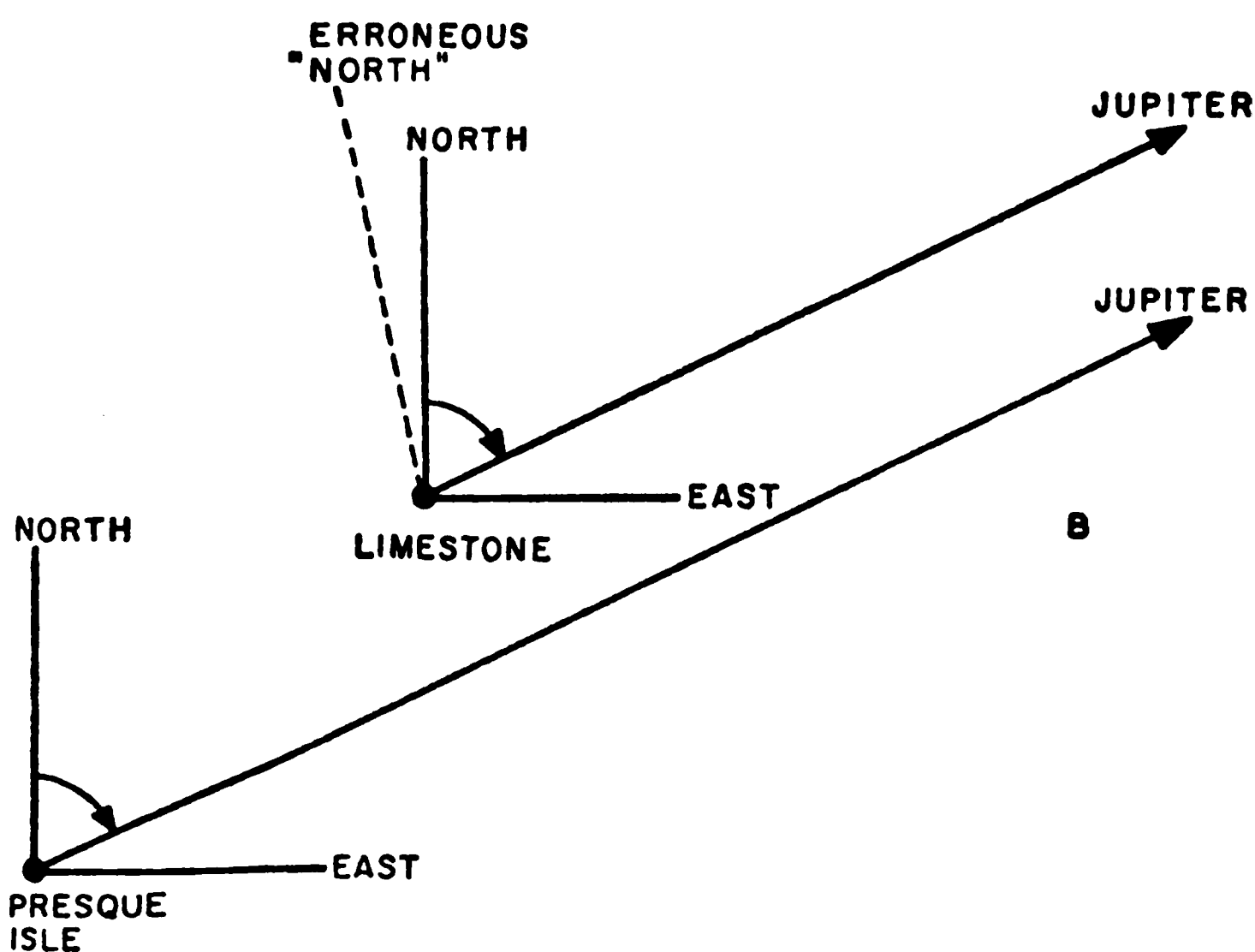


Figure 12b. The Presque Isle sighting from two stations; the corrected determination of North indicates Jupiter at infinity.

The panel members quickly disposed of the case. The measurements reported from Presque Isle obviously pointed directly to the planet Jupiter, not a mere 100 but millions of miles beyond the earth. If a constant correction was applied to the bearings from Limestone, they also agreed with Jupiter's position. Careless use of the theodolite had produced an error in the data. To measure the angle of an object above the horizon, the observer has only to make sure that the theodolite is level, but to measure the bearing

he must align it with true north, a direction that cannot be determined by guesswork. The Limestone observers had made a mistake in determining true north and had thus obtained a wrong bearing for the unknown. When the corrected data were plotted (shown schematically in Figure 12b) the prolonged lines were parallel, and both pointed squarely to the planet Jupiter at infinity.

The orange light was unquestionably Jupiter, and the accompanying green lights were its four bright satellites twinkling through the layers of the earth's atmosphere. Amazed that this uncomplicated case, already explained by Dr. Hynek, should have been offered as evidence for the extraterrestrial origin of UFOs, the panel extended its investigation to the original observers at Presque Isle. The witnesses there were bewildered by the inquiry; they had checked the object when it appeared again on the night of October 11, they said, and had then identified it as the planet Jupiter, but they had not thought it necessary to notify the Air Force! [4]

For five long days the panel worked, analyzing every available bit of evidence as it related to four alternative theories: 1) that UFOs were a supersecret device of some sort being developed by the United States; 2) that UFOs were a supersecret device being developed by some foreign power; 3) that UFOs were normal phenomena wrongly interpreted; and 4) that UFOs came from other planets. As the panel succeeded in explaining one after another of the fifty or so submitted cases, or was able to suggest a highly probable solution in terms of normal physical phenomena, the members reached their conclusion. Theory number one they rejected with complete certainty; they were 98 per cent certain that theory number two was wrong, and 99 per cent sure that number four was also incorrect (scientists are reluctant to accept any negative belief with absolute certainty). The document submitted unofficially by ATIC investigators they also rejected for lack of evidence. All the facts, they decided, supported theory number three, that the reported UFOs were merely natural phenomena, wrongly interpreted [6].

The panel delivered this evaluation to the Office of Scientific Intelligence, together with a recommendation that government agencies should immediately abandon the policy of secrecy regarding UFO reports and should make public all the facts in every case. Unfortunately this recommendation was not followed. The report

included some rather caustic comments on the general inadequacy of the investigative techniques that had been used. As one of the members remarked unofficially, trying to get to the bottom of some of the sightings was like cutting treacle. The panel report with its blunt criticisms was of course not intended for public release and, understandably, was kept classified.

Although the OSI had asked for an expert opinion, some Air Force and government officials were unwilling to accept the verdict when they got it, and flatly refused to believe that UFOs were normal phenomena [7]. When echoes of their disagreement escaped the security screen, civilian saucer enthusiasts concluded with some justification that Air Force officials were "covering up." They were. They were not hiding any proof that flying saucers came from outer space, however, as the saucer addicts charged, but were merely trying to conceal their own confusion and the panel's criticisms.

As one member of the panel later stated to a correspondent, the explanation of UFO beliefs "lies in a logical defect. It is this: UFOs form a class of all celestial observations that cannot be immediately explained. There is no other truly common feature; some manifestations are optical, others are detected by radar; some are points, others circular, others patterned; some are seen by night, others by day, etc. The implication that they are somehow related is a false one, as we know from the large proportion positively identified after the fact (what relation is there between Venus and a meteorological balloon?). Calling all unidentified objects in the sky 'flying saucers' or even UFOs (Venus doesn't 'fly' in any proper sense of the word) is like calling any word I cannot understand 'Greek.' The class of all words I cannot understand would scarcely form a single language. Therefore, the explanation of UFOs as a class is simply that they are not a uniform class but a hodge-podge of widely disparate, partly described phenomena that were seen in the sky." [8]

Not until April 9, 1958, did the Air Force make public the internal recommendation made by the panel some five years earlier. If the entire study had been released earlier, with a full statement of the facts and the analyses made by the panel, it might have ended the saucer scare at once. Instead the UFO hysteria continued, with periods of remission, and is still dying a slow and lingering death.

- [1] Ruppelt, E. J. *The Report on Unidentified Flying Objects*. Garden City, N.Y.: Doubleday & Co., 1956.
- [2] Olivier, C. P. "Tables of Hourly Rates Based upon American Meteor Society Data." Interim Report No. 28, Harvard University Radio Meteor Research Program (May 1958).
- [3] *Sky and Telescope*, Vol. XI (1952), p. 312.
- [4] Air Force Files.
- [5] Barker, G. *They Knew Too Much about Flying Saucers*. New York: University Books, Inc., 1956.
- [6] Robertson, H. P. Personal files.
- [7] Chop, A. M. Personal communication.
- [8] Page, T. W. Personal files.

Chapter VIII

PHANTOMS ON RADAR

The evidence of radar, according to the saucer enthusiasts, provides final proof that alien spaceships indeed patrol our skies. Because radar is an electronic device, it allegedly cannot be fooled by mirages, reflections, or peculiar weather conditions. If radar records an echo from an unidentified object and, at about the same time, a human witness reports a puzzling light in the sky, the believers proclaim that the unprejudiced testimony of science has confirmed the presence of a solid flying saucer. Sometimes a radarscope reports unidentified objects at a time when observers on the ground and in search planes cannot see anything unusual in the sky. The believers then conclude not that radar evidence can be misinterpreted, but that the operators of the flying saucers may somehow be able to make both themselves and their ships invisible! [1]

Radar as a Reporter

Any UFO investigator who presumes to evaluate electronic evidence should have much more than an amateur's knowledge of the nature and behavior of radar. Correct interpretation of the signals requires training, experience, skill, and an expert's acquaintance with the peculiarities of the set under varying conditions. But even the expert does not yet understand the causes of all the phenomena that can appear. He is limited by our still incomplete knowledge of dynamic meteorology—precise information about the composition of the atmosphere and how it interacts with microwaves. With proper instrumentation and first-rate operators, radar can correctly report the approximate direction, distance, altitude, and rate of mo-

tion of objects within its range. If the returns are misinterpreted, however, radar can seem to give false reports.

Radar is not a TV camera or a photographic lens. It does not, at least at present, produce a picture of the physical appearance, shape, size, or color of the thing it detects. The scope shows only tiny spots of light on the flat surface of a screen. A pointer something like a clock hand continually sweeps around the dial at a given speed. A complete rotation may take from two to fifteen seconds, depending on the type of the set. This sweep hand keeps pace with the rotation of the radar antenna as it scans the sky by sending out radio pulses. When they encounter a solid object, they bounce off and return to the set as echoes which show as "blips," or spots of light, on the radarscope. The operator must interpret these spots and try to identify them as planes, helicopters, balloons, ships, mountains, clouds, birds, storms, hurricanes, or phantom echoes of various kinds. Safe commercial flying depends on the accuracy of

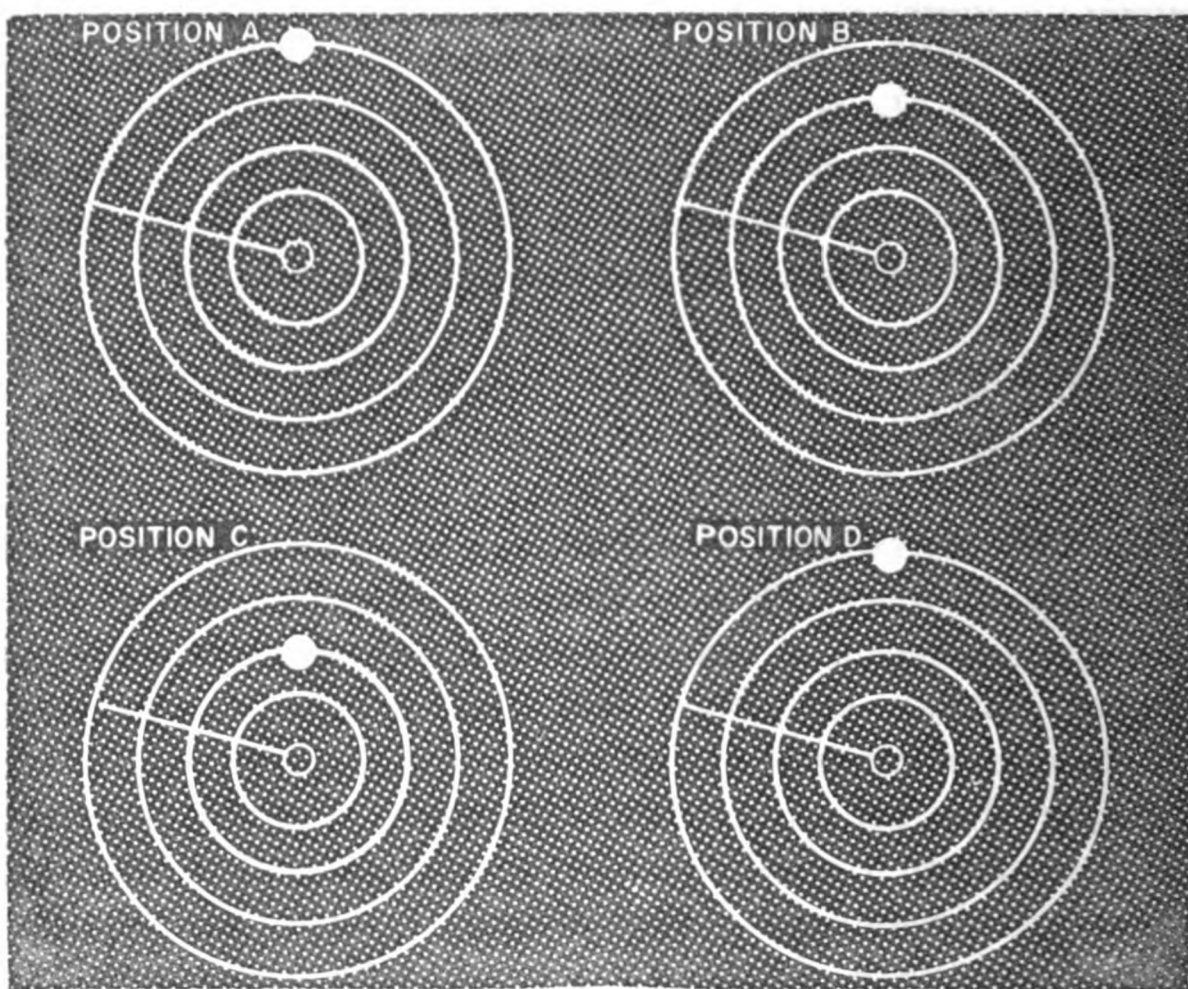


Figure 13. Schematic view of radar targets on successive sweeps of the antenna.

these identifications, as does the security of the country in periods of international tension.

Radar only reports. It does not interpret. If the sweep hand on successive rotations shows a spot of light apparently moving from position *A* to position *B*, to *C*, to *D*, the operator generally concludes that the blips represent a single object that is moving at a certain speed in a certain direction (see Figure 13). If successive sweeps show a spot of light that remains at position *A*, he usually concludes that it represents a stationary object. If the blip moves a very great distance in the interval between two sweeps or seems to jump erratically from one position to another, an amateur might interpret it as a spacecraft flying at incredible velocity—a flying saucer. But an expert would probably conclude, especially under certain weather conditions, that the scope was picking up echoes from two or more separate objects, one reflecting briefly at position *A*, another at position *B*, and so on.

The Principle of Radar

Radar is an electronic assembly far too complex for detailed description here, but its basic principle is simple. It is merely an echo machine that reflects radio waves instead of sound waves. To illustrate by a rough analogy, let us imagine that a man is standing in the middle of an open field on a very dark night. He wants to find out something of the contours of the surrounding country but his only tools are a compass, a watch with luminous dial and hands, and a large megaphone. He raises the megaphone to his lips, points it directly north, and gives a sharp and piercing call: "Hi!" He now cups his hand to his ear and listens for an echo. Hearing no reply, he deduces that in the north there are no hills, tall buildings, or other obstructions that might have produced an echo.

Changing his position, he turns to the east and tries the experiment again. After an interval his call returns as a faint echo: "Hi!" The time elapsed between call and echo, according to his watch, is ten seconds. His call has taken five seconds to reach the object and five seconds more to return. Since he knows that sound travels at the rate of about 1000 feet a second, he deduces that an obstruc-

tion lies in the east, about 5000 feet away. Slowly changing position, he repeats his call at various points around the compass. Some echoes take longer to return than others, indicating more distant objects. Other echoes come back in a fraction of a second, showing an object very close. Thus he gradually constructs a mental map of the surrounding terrain.

Radar detects and locates objects in a similar way, by reflecting sharp pulses of radio waves. But spurious echoes, which sometimes deceive the operator, can also appear on the scope. These "anomalous" or abnormal returns may have one of several causes, including the nature of the radar mechanism itself. To help explain this, let us go back to our analogy of the man in the open field. Let us suppose that the man has mechanized his device. To ease the strain on his vocal cords, he has built a megaphone with a record-playing device. The megaphone rotates automatically and sends out a recorded "Hi!" once every twenty seconds, as regular as clockwork. To increase the sensitivity of his hearing, he wears ear trumpets that point in the same direction as the megaphone. This procedure is more effective than cupping his ears and eliminates some of the extraneous noise that might come in from the rear and the sides.

With this improved equipment the man now repeats his experiment. As before, he gets no signal from the north. When he turns to the east he gets an echo after ten seconds, just as he did during his first experiment. As he continues to turn slowly, like a minute hand on a clock dial, he mentally maps the positions of the echoes as distances along the hand from the center of the dial, and compares this new map with the crude one he constructed earlier. Basically the two agree.

But wait! From the southwest he hears a new echo that did not occur in his earlier experiment. It returns after two seconds and thus apparently comes from an obstruction 1000 feet away. Puzzled, the man decides to walk toward the object and check his observation. After he has covered half the distance he stops, sends out a call, and listens for the echo. The indicated distance to the echo-producing object is now 500 feet, just as he calculated. And so he goes on, checking at intervals. When he has covered 990 feet he knows that he should reach the obstruction at any moment and to avoid colliding with it in the darkness he proceeds with extreme

caution—995, 996, 997, 998, 999 feet. He puts out his hand, expecting to touch a building or a stone wall, and warily takes the last step. But he finds no structure of any kind, merely level ground. And at the same moment he finds to his astonishment that he can no longer detect the echoes he had been following. What has happened? Has his equipment been malfunctioning? Or was the unknown structure perhaps a vehicle from outer space that waited until he was practically touching it and then rose silently in an enormous burst of speed and vanished?

The man checks and finds that his equipment is functioning perfectly, since he can still pick up echoes from the terrain he had mapped earlier. He then walks back ten feet and listens once more for an echo from the phantom structure. Again he gets a signal, apparently from an obstruction just ten feet ahead. Has the mysterious object suddenly returned? But how could it have done so without disturbing the atmosphere or making a noise? By this time our man is frightened as well as puzzled, but he boldly decides to make one more experiment. He walks again to the point where the obstruction should be. Signaling again to the southwest, he now gets a faint echo apparently from a distance of 10,000 feet. Tired as he is, he starts walking toward this new obstruction and eventually reaches his goal. He now finds the true source of the returns—a high hill that rises abruptly from the plain. The hill is 10,000 feet away from the position indicated by the original series of echoes, and 11,000 feet away from the place he stood when he first sent out the signals.

Finally the man figures out the explanation. When he made his first experiment, with primitive equipment, he had given one sharp shout and then waited for a long time for the signal to return; thus there was never any uncertainty about the source of the echo. The time that elapsed between shout and return had clearly indicated the distance of the echo-producing object. But the improved automatic equipment of the second experiment produced a train of signals going out continuously at regular intervals, twenty seconds apart. Therefore when the sound waves encountered a definite object, a train of echoes began coming back, twenty seconds apart. An object at a distance of 10,000 feet would return an echo in twenty seconds; another object at a distance of 11,000 feet would return an

echo in twenty-two seconds. But an echo from this second object would reach the listener at exactly the same time as an echo from an object only 1000 feet away. He now understands why he seemed to detect a structure at a distance of 1000 feet which disappeared as he approached and then reappeared 10,000 feet farther away. In fact, the object that returned the misinterpreted echo could have been 20,000 or 30,000 or 40,000 feet farther away—any multiple of 10,000 feet. Large numbers of signals were returning every twenty seconds. The man had no way of deciding for certain whether a particular echo came from the most recent signal and therefore indicated a relatively close object, or whether it came from an earlier signal and therefore from a more distant object.

Broadening his experiment, our man eventually learned other characteristics of these echoes. He found that on the average day he was rarely plagued by this uncertainty in identifying the returns. The second-round echoes were very weak, almost undetectable, and therefore caused no major problem. But on other days, under different weather conditions, sound tended to travel long distances without losing much in intensity. On such days the echoes were often confusing.

Weather and Radar Echoes

Radar is an echo machine that reflects radio waves instead of sound waves. Instead of traveling at the speed of sound, about 1000 feet a second, radio waves travel at the velocity of light, 186,000 miles a second. Successive pulses go out at very short intervals, perhaps one one-thousandth of a second apart, so that each pulse is followed by another just 186 miles behind it. If the operator gets a return from an object that is apparently at a distance of 25 miles, he must sometimes allow for the possibility that he is getting a secondary echo and that the actual distance may be different. The object that produces the echo may be at a distance of 25 plus 186 miles, or 25 plus twice 186 miles, or 25 plus any other whole-number multiple of 186 miles.

Under ordinary circumstances, the reflections from very distant targets rarely confuse the operator. The curvature of the earth tends to shield the radiation, and the distance factor alone reduces the

intensity to a negligible value. But weather can cause peculiar returns. A layer of warm air above cooler air at the earth's surface has much the same effect on radio waves that it has on light waves. A temperature inversion can produce radar "mirages"—commonly called "phantoms," "ghosts," or "angels." Relatively small amounts of warm air, even mere warm bubbles in a layer of colder air, will suffice. When the scope records a series of blips, the operator ordinarily assumes that all are returns from a single object. If inversions of temperature or humidity exist in the atmosphere, however, the series of returns may represent several different ground objects rather than a single object in the sky. Since these inversion layers do not remain fixed but move, change, and shimmer, on one sweep the radar may reflect one ground object and on the next sweep some fifteen seconds later may reflect a totally different ground object five or six miles away from the first. An inexperienced operator might conclude, wrongly, that both echoes came from a single object that had traveled five miles in a fraction of a minute (see Figure 14). Similar mistakes in identity have caused many reports of radar flying saucers.

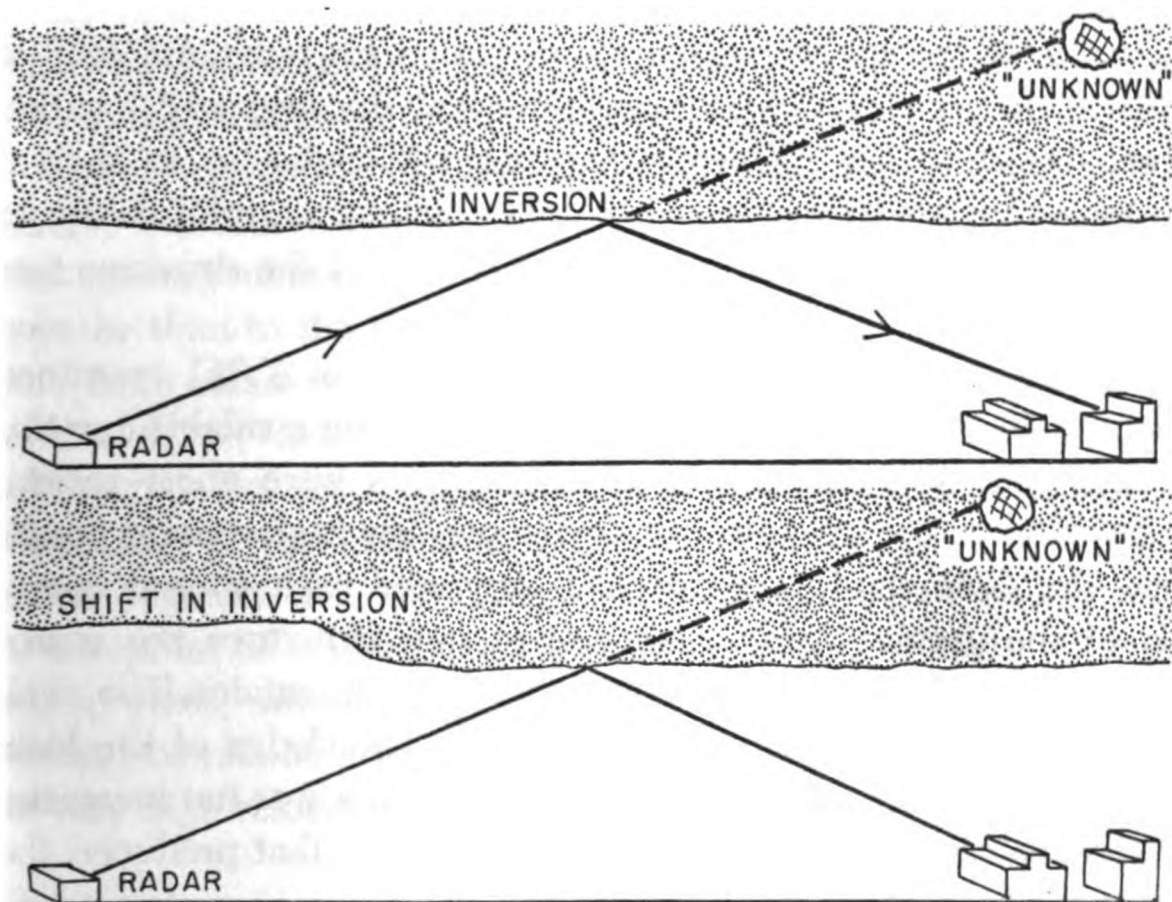


Figure 14. Deflection of radar beams by temperature inversion. Top, radar picks up ground target. Bottom, on next sweep, radar picks up different ground target, which seems to indicate a fast-moving UFO.

Such a radar incident occurred at one of our defense installations in Alaska early in the morning of January 22, 1952 [2]. Shortly after midnight a bright target appeared on the radarscope, moving down from the northeast, fairly high, and apparently traveling at about 1500 miles an hour. Unidentified targets require particularly prompt investigation in this sensitive area so close to Siberia. Within minutes an F-94 jet was moving in from a fighter base 100 miles to the south; two other jets were scrambled at intervals and vectored in toward the unknown target by ground radar. When radar switched to short range, however, it always lost both the target and the pursuit plane, even though both were close to the radar site. The first jet could find nothing in the air, and no echoes appeared on its radar. The second jet saw nothing in the air, but its radar recorded a brief, weak echo to the right at about 28,000 feet. The echo faded immediately, returned briefly, and then disappeared as the jet closed in. The third jet, after cruising the area for ten minutes without detecting anything visually or on radar, suddenly got a strong radar return from an apparently stationary target just as it passed over the ground radar site. The pilot made three direct runs on the unknown. Each time he broke off the intercept when he got within 200 yards of the target position as shown on his radar, for fear of collision. At no time did he see anything at the supposed location of the target. (This experience is somewhat analogous to that of our man who used echoing sound waves to locate a solid structure only to find, on reaching the indicated spot, that the structure was not there.)

Captain Roy James, chief of the radar section of ATIC, examined all the data and the scanty weather reports then available for this Alaskan area, and concluded that the targets were ghost returns probably from the ground, caused by peculiar atmospheric conditions—the same conditions that had interfered with normal operation of the ground radar. Although ground structures are scarce in that part of Alaska, they do exist, and so do mountains. The analysis was undoubtedly correct, even though knowledge of the location and movement of the temperature inversion was too imprecise for the analyst to plot and locate the true target that produced the reflections [3, p. 167].

Some of the nation's most brilliant physicists have carried out

fundamental research into the behavior of microwaves under varying conditions. The technical nature of these investigations makes them difficult to describe in ordinary language, but they provide vital information for the expert.

One such study has specifically attacked the problem of radar images that perform rapid and erratic maneuvers at close range and seem to overtake, fly parallel with, or almost collide with the pursuing aircraft. Such returns may be caused by the "non-isotropic secondary scattering of energy" (that is, the radio waves are not reflected in a uniform manner) from an airplane to a ground object, or from ground object to plane. Under appropriate weather conditions the plane itself causes the puzzling echoes, so that the velocity and movement of the radar "saucer" depend directly on those of the plane. When the aircraft is the first of the two scatterers, the radar saucer always appears at the same bearing as the plane, and is always farther away from the detecting radar than is the plane. Thus the path of the phantom always lies outside the path of the aircraft, and when the jet performs a 360-degree turn, the phantom also turns, on an outside path. However, if the jet happens to fly directly over the ground object that is reflecting the energy, then the observing radar will see the images of the jet and the phantom flying on what seems to be a collision course.

Conversely, when the ground object is the first of the two scatterers, the saucer phantom always occurs at the same bearing as the ground object, and the distance to the phantom is always greater than to the ground object. If the aircraft crosses the radial line from radar to ground object, at a range exceeding the range to the object, then the echoes from plane and saucer almost merge at the point of crossing, in a "near collision." But if the plane flies "this side" of the object, then the plane and saucer will never be closer together than the distance between plane and ground object at the point of crossing. A height-finding radar, trained on the pursuing plane, would show the phantom saucer apparently diving toward or climbing away from the plane, attacking and retreating at very high velocities [4].

The Kinross Case

Some such mechanism probably explains the radar returns reported in the Kinross case, which some saucer publications cite as a proved instance in which a flying saucer attacked a plane. On the night of November 23, 1953, an Air Force jet was scrambled from Kinross Air Force Base, Michigan, to intercept an unidentified plane observed on radar. The jet successfully accomplished its mission and identified the unknown as a Dakota, a Canadian C-47. On its return to the base, however, the Air Force jet crashed into Lake Michigan and, as often happens when a plane crashes into deep water and the exact place of the crash is not known, no wreckage was ever found. As the ground radar at Kinross had tracked the returning jet, the scope had picked up a phantom echo in the neighborhood of the jet; the two blips had seemed to merge just as both went off the scope.

Since the crash was not reported as a UFO incident and did not involve any question of unidentified flying objects, ATIC was not asked to investigate the problem. The office of the Deputy Inspector General for Safety carried out a thorough inquiry and concluded that the crash had been an aircraft accident, probably caused by the pilot's suffering an attack of vertigo. As for the two blips shown by radar, the night had been a stormy one and atmospheric conditions had been conducive to abnormal returns. The phantom echo had almost certainly been a secondary reflection produced by the jet itself, and it thus merged with the return from the jet and vanished with it when the plane hit the water.

Solely on the basis of this radar phantom, some civilian saucer groups have tried to transform the Kinross crash into a UFO mystery with Air Force investigators as the villains, and have suggested that the ghost blip represented an alien spacecraft that happened to be cruising over Lake Michigan that night and attacked the jet for one of two reasons: 1) The saucer might have tried to avoid close contact with the jet by employing a "reversed G-field beam" (see *Chapter ix*); colliding with this beam as with a stone wall, the jet crashed. 2) The saucer might have used the G-field to scoop the plane out of

the air and take it aboard the spacecraft; the captured pilot might have been needed to teach the English language to his alien captors.

The "Invasion" of Washington, D.C.

The most famous of the radar phantoms are those that "invaded" Washington, D.C., on the nights of July 19 and July 26, 1952, and terrified a large number of radar operators, pilots, and Air Force officials who in a more normal emotional climate would have recognized the "invisible" flying saucers for what they were—radar angels produced by weather conditions [2]. All during July the eastern seaboard had suffered an unprecedented drought and heat wave. Lack of cloud cover produced intensely hot days and rapid radiative cooling of the earth's surface at night. This situation, combined with the prevailing light winds, was ideal for the formation of low-level temperature inversions during the hours of darkness [5].

The hundreds of flying saucers reported during the summer (*Chapter VII*) had produced a state of near-panic which entered its acute phase on July 19, at 11:40 P.M. E.D.S.T., when a group of seven unidentified targets appeared on the radarscope of the Air Route Traffic Control (ARTC) at the Washington National Airport [3, p. 209 ff.]. Similar targets that moved erratically, appearing and disappearing, were observed on the radars of the control tower and of nearby Andrews Air Force Base. If the blips were to be accepted at face value, then a host of aerial objects had invaded Washington and were cruising over the White House and the Capitol. Traffic control notified the pilots of commercial flights in the area to keep alert for unidentified aircraft. Some pilots reported unusual echoes on their plane radars, some reported only normal returns, and two pilots reported unexplained lights in the neighborhood indicated by radar. Nobody saw any strange aircraft. After several requests from ARTC (which unaccountably did not notify officials in the Air Force Intelligence that an "invasion" was taking place), a jet interceptor finally arrived about dawn to search the area but found nothing. Meanwhile the targets had vanished from the radarscopes.

Next day the report flashed all over the world that a fleet of flying saucers had invaded Washington, and public tension became

almost tangible. Was the earth doomed? The terror reached its climax on July 26, just a week after the first incident, when at 10:30 P.M., E.D.S.T., the same radar operators who had observed the first "invasion" picked up another group of mysterious blips on their screens. The host of unknowns had apparently formed a ring around the city of Washington and the surrounding countryside. This time Air Force Intelligence officers were notified. They raced to the airport to see the radarscopes for themselves, and concluded that real saucers must be in the sky. All commercial air traffic was then diverted from Washington, reporters and photographers were barred from the radar room, and Air Force jets took to the air to defend the nation. But against what? The enemy, if there, was invisible. One pilot saw a bright light that vanished when he began to chase it; later, his radar showed a return that faded after a few seconds, but he could not find a visual target. In the hours between midnight and dawn, jet interceptors scoured the skies looking for mysterious objects that produced returns on ground radar but not on plane radar, and were invisible to the human eye. They found nothing.

One pilot who flew this mission, accompanied by a copilot who was also a radar officer, later described his experience:

"For a period of 1½ hours the B-25 was vectored at altitudes varying from 1,000 to 4,000 feet MSL to the objects observed on the [ground radar] screen. The airplane flew circles around stationary blips, flew through and along with their formations, paralleled their flight, and was observed in the radar screen to pass directly over, under, or through an angel. At all times the echo return of the aircraft caused a brighter return on the screen than the angel. The radar height finder was not operating during this mission, so exact altitudes of the blips could not be determined.

"No unidentified objects were observed by me or the crew during the flight. At 2300 E.D.S.T. all angels disappeared from the radar screen and screen detection returned to normal." [6]

By dawn this fantastic war of the angels had ended and the post-mortems had begun. One radar expert who kept his head in spite of the hysteria was Captain Roy James of ATIC, who immediately recognized the targets as caused by weather. A civilian expert on radio propagation, when consulted, correctly identified the phan-

toms and explained how they were produced [7, 7a]. General Samford, then in charge of the UFO investigation, concurred. But most newspapers and many government officials, influenced by the general excitement, ignored the conclusions of the experts. Saucer enthusiasts regarded the phenomena as a real invasion from space, and alleged that the Air Force was covering up the truth.

Weeks passed before the facts of the incidents could be separated from the fancies. Three ground radars had observed unusual targets on the nights of the "invasion." Only once, however, did all three observe what was apparently the same target, and that for a few seconds only. The unusual radar echoes had no visual counterpart—nobody had seen or heard a spaceship. A few pilots had reported unidentified lights, but the Washington area at night displays thousands of lights, and even an unexplained light is far from being a spaceship. One pilot who took part in this phantom war reported that, again and again, ground radar had vectored him in toward a target that proved to be a steamboat making a moonlight trip on the Potomac!

Radar Experiments in Washington

Immediately after the Washington crisis, the Technical Development and Evaluation Center of the Civil Aeronautics Authority was assigned the problem of finding out exactly what had produced the radar returns. Investigation showed that the phantoms were not a new or unusual phenomenon. They had appeared on the Washington radars on many nights before the first "invasion," appeared twice during the week between the two, and many times after the second. Abnormal returns are commonplace during the hot summer months when temperature inversions and inequalities in the moisture of the air are most frequent. On the nights of July 19 and 26 the Weather Bureau at Washington recorded small temperature inversions and an abnormal distribution of moisture in the atmosphere, conditions that regularly produce radar angels.

The experts also carried out a series of experiments in the Washington area on several nights in August when conditions of temperature and humidity closely resembled those on the "invasion" nights.

During these experiments unidentified targets appeared in profusion on the radar screens. The first observation period began on the evening of August 13, 1952. At about 9 P.M. E.D.S.T., suddenly "a group of seven strong stationary targets became visible in an area about fifteen miles north-northeast of the radar antenna. During the next two or three antenna revolutions, the area on the scope between Washington and Baltimore became heavily sprinkled with stationary targets in a belt about six miles wide. A group of additional targets became visible in an area approximately ten to fifteen miles south of the radar antenna. This was evidence of the beginning of a temperature inversion." [6] Two temperature inversions were involved, one just above the earth's surface, and one at about 8000 feet. The investigators concluded that the unidentified targets observed on Washington MEW (Microwave Early Warning) and other radar in the summer of 1952 were to be attributed to secondary reflections of the radar beam, caused primarily by temperature inversions [5].

Saucer enthusiasts protested (and still insist) that the inversions were not large enough to produce radar anomalies, revealing how superficial was their acquaintance with radar. Although pronounced temperature inversions are responsible for the superior and inferior mirages resulting from the bending of light rays, large inversions are not required to produce the mirages resulting from the refractive bending of radio waves. At radar frequencies, refraction is influenced by both temperature differences and the distribution of water vapor in the atmosphere. A pronounced drop in moisture content at higher altitudes can easily cause radar rays to bend earthward and pick up ground targets, even though temperature conditions in the lower atmosphere are entirely normal.

In December 1952, *True* magazine published a sensational article that attacked the Air Force findings, insisted that the radar echoes had been caused by strange machines and, in effect, accused the official investigators of releasing an explanation they knew to be at variance with the facts shown by radar [8].

Dr. Vernon G. Plank, now at the Aerophysics Laboratory of the Air Force Cambridge Research Center, was at that time Radar Meteorologist at Walpole, Massachusetts. A specialist in the science of radar, Dr. Plank had made a detailed study of the refractive

conditions prevailing over Washington for July 20 and 21, 1952. In a letter (which was never published) to the editor of *True*, he pointed out that the saucer theory of the Washington radar returns had no basis in fact. The material given in the letter merits quotation:

"The regular Washington radiosonde observations, when converted into refractive index terms, reveal that a very marked superrefractive condition (a condition favorable to earthward bending of radar rays) prevailed in the lower atmosphere during this period. The cause of this superrefractive condition was primarily the rapid decrease of water vapor with altitude.

"Although this superrefractive layer was not quite intense enough to cause the radar rays to be bent completely back to earth, the rays would be very markedly bent downward from their normal position. From past experience with other situations of this type it is to be expected that certain regions in this layer might be considerably more superrefractive than others, or that particular terrain features, such as rivers or small bodies of water, might create local, transitory conditions favorable to extreme superrefraction or even reflection. Another factor to consider is that whereas such local anomalies are usually due to moisture, localized temperature effects may also create or help create such intense superrefractive regions. Therefore, it would not be at all surprising that such local anomalies, when superimposed on the generally superrefractive layer already existing over Washington, could create a situation conducive to radar echoes of the type observed.

"Under such conditions the general ground clutter referred to in the Keyhoe article would not be present and the radarscope would only show echoes whenever and 'wherever' (qualified below) a favorable superrefractive region occurred. As the radar ray has to travel from the radar set to the particular region of refraction and thence onward to the ground, the scope echoes created by such disturbances would occur at an indicated range of roughly twice the disturbance range.

"Even slow air movements within a localized disturbance (one sufficiently intense to bend the ray into the ground) would be translated into enormous movements of the echo over the scope face. Both lateral and radial movements could be expected and

disappearance of echo between sweeps would not be surprising.

"Of course, the optical effects noted in conjunction with the radar echoes would depend upon temperature effects. However, the lack of a temperature inversion in the type of data referred to by Mr. Keyhoe does not preclude the possibility that extremely sharp and localized inversions existed over the area, perhaps in close association or in conjunction with the regions causing the radar echo. The Weather Bureau data cited are not sufficiently accurate nor do the instruments used in obtaining the data have a sufficiently rapid response to measure such small inversions. Also, such data are usually obtained at only two definite periods during each day.

"As the distance between Andrews AFB and the Washington National Airport is only some few miles, the refractive effects of a given disturbance might appear to be quite similar, and the position of the resulting ground echo on the two sets might coincide to a fair degree of approximation. However, as information about the degree of accuracy maintained in plotting echo position is not available to me, I cannot comment with any degree of intelligence. It does seem though, that with the observed echo speeds and radical direction changes, as well as the echo appearance and disappearance phenomena, that accurate scope coordination between the separate fields would be extremely difficult." [9]

"Simultaneous" Radar-Visual Reports

On the night of July 29, three days after the second Washington crisis, the radar installation of the Air Defense Command post near Port Huron, Michigan, had been tracking three F-94s as they made practice runs on a B-25 bomber. At 9:40 P.M. C.S.T., ground control picked up an unidentified target moving from north to south at a speed of about 625 miles an hour. The operators notified the pilot of one of the F-94s and vectored him in for an attempted intercept. The plane's radar did not show the reported target, but when the plane had climbed to a height of 21,000 feet, both the pilot and his radar man saw a brilliant multicolored light, many times larger than a star, close to the northern horizon. At the same time the plane's radar picked up an echo in the north; it disappeared after

thirty seconds, although the light was still visible dead ahead. As the pilot began the chase, the light changed color from bluish white to reddish and slowly diminished in size as though it were moving away. The pilot pursued the light for about half an hour without gaining on it, and eventually had to return to base. The ground radar, meanwhile, had been trying to keep track of events in the sky. When the chase began, the target appearing on ground radar had first made a 180-degree turn and reversed direction from south to north; it had then moved erratically, doubling its speed instantaneously, and then slowing down. It once seemed to reach a speed of about 1400 miles an hour, then slowed to about 300 mph, and disappeared from the scope shortly after the plane had returned to base [2].

To many persons this incident seemed a simultaneous visual and radar sighting of a single unknown object but the Air Force soon demolished this theory. A study of the facts revealed that the movement of the radar target and that of the mysterious light had not coincided. The radar target had traveled from north to south, had then reversed direction, had slowed down, speeded up, and moved erratically. The light, however, had remained steadily in the north, diminishing in size and brilliance but not vanishing. It behaved, in fact, like the image of a star or a planet seen through turbulent atmosphere (see *Chapter IV*).

For several nights before the sighting, many residents in this part of Michigan had noticed a similar light that appeared in the northern sky each evening at about the same time and place, displaying various changing colors. The investigators were able to identify the shining unknown as the star Capella. The position of the lights coincided with that of the star for that time, date, and latitude. Capella was at lower culmination—that is, at the lowest point of its swing around the pole star, just skirting the horizon where its spectacular blue, yellow, and red twinkling is familiar to astronomers of the region. The pilot's description, and the fact that he could get no closer to it even after a thirty-minute chase, confirmed this identification. Neither the brief blip that appeared on the plane's radar nor the erratic returns picked up by ground radar had any relation to the star; they were merely phantom returns caused by weather conditions [2].

Like this Michigan sighting, many UFO problems are difficult to solve because they result from more than one cause. The observations seem at first glance to refer to a single phenomenon, although actually two or more unrelated phenomena are involved. On August 1, 1952, two days after the Michigan incident, such a puzzle arose with an impressive radar-visual-photographic sighting near Bellefontaine, Ohio [2]. At 10:45 A.M. C.D.S.T., the radar operator at the Air Defense Command post picked up an unidentified target north of Dayton, moving southwest at a speed of about 525 miles an hour. Two jets from Wright-Patterson Air Force Base were scrambled for an intercept and were vectored in by ground control. Since the ground radar was not equipped with height-finding devices, however, the operator could not direct the pilots to a specific altitude; he could only tell them whether they were nearer to or farther from the target.

When the jets had reached 30,000 feet, ground radar informed them that they were almost on target, which was still moving southwest at the same speed. A few seconds later, the returns from the jets and the UFO blended on the radarscope and the operator advised the pilots that they would have to continue the search visually. At this moment, unfortunately, the ground radar suddenly failed. Soon after communication between ground and air had ended, the lead pilot observed a silver-colored sphere several thousand feet above him. Both jets went after it but although they climbed to their maximum altitude, 40,000 feet, neither could get close enough to identify the object, which was still some 30,000 feet above them. One pilot, however, managed to expose several feet of film with his gun camera. At the same moment the warning light on his gunsight radar blinked on to indicate it detected a solid object. At this point the jets broke off the intercept and started back to Wright-Patterson Field.

Both pilots then realized that, although they had been chasing an unknown for some ten minutes, they were still northwest of the base in almost the same area where they had started the intercept. This surprising fact seemed to indicate that the unknown had slowed down from its original speed of 525 miles an hour, to hover in the sky nearly motionless.

In flying saucer circles, this series of events was regarded as an

iron-clad case of a physically material UFO observed simultaneously by radar, the human eye, and the camera.

After sifting the evidence, ATIC investigators eventually found the more prosaic though complicated solution to the puzzle:

1) The object picked up on ground radar had actually been a jet plane, flying out of Cleveland. It had not been identified immediately because the Bellefontaine station had not received its flight plan. At 10:45 that morning the jet had been north of Dayton, flying at low altitude on a southwest heading, at a speed of around 525 miles an hour—the exact time, position, and speed of the radar unknown.

2) The pilots of the interceptors never saw this jet. What they saw, what their gun radar detected, and what their gun camera photographed was a twenty-foot radiosonde balloon that had been released from Wright-Patterson Air Force Base that morning shortly before the sighting. Ground radar, on the other hand, never picked up the balloon.

3) The chief reason for the confusion was that ground radar did not have a height-finding device. When the operator notified the pilots that his scope showed a blending of the returns produced by the pursuit jets and by the unknown, neither he nor the pilots had any way to tell whether the unknown was directly above or directly below the pursuing jets. At 30,000 feet the pilots were too high to see the Cleveland jet far below them. But they did see the balloon above them and naturally assumed that it was the object they were supposed to be chasing.

4) Since the ground radar stopped functioning at this point, the operator could no longer track the course of the unknown or of the interceptors. If the radar had been working, he would have seen that the target continued on to the southwest while the interceptors were searching in a different area to the north.

5) The photographs confirmed this reconstruction of a complicated series of events. The pictures obtained by the gun camera displayed a round, indistinct blur. Analysis showed that the size of the object was that of a twenty-foot sphere—a balloon—photographed from a distance of 30,000 feet.

"Ghosts" and "Angels" on Radar

Every experienced radar man has observed blips on his scope that he cannot account for [4], but he recognizes many characteristics of these "ghosts" or "angels." They often come from an apparently clear and normal sky. They are usually concentrated in the lower atmosphere, are weak in character, and last only a short time. Although they may occur at any time of the year, they appear most often on summer nights in calm weather [10]. Summer atmospheric conditions, in which the air is relatively quiet but varies in temperature and moisture content, have an adverse effect on radio and radar transmission and produce many of these ghost returns.

The uneven distribution of temperature and humidity in the atmosphere is only one of the many possible causes of the radar angels often labeled as saucers [11, 12]. These ghosts may be produced by peculiar atmospheric conditions, back and forward scatter of radio waves [13], smoke, wind-carried debris, moisture-laden clouds, ice crystals in clouds or air, lightning, meteors, the Aurora Borealis, birds, insects, bats, electronic reflections from the moon, flares on the sun, or by "chaff" or "window" (foil dropped from airplanes). A radar operator once picked up a group of phantom echoes that seemed to form the letters "GI" which, according to the scope, apparently stretched over a distance of about eighty miles. He tracked them for two hours, but gave up trying to interpret the message when he learned that it was produced by chaff dropped from an Air Force plane during an experiment.

An extremely unusual pattern of "angels" (see Plate IVc) appeared on the radarscope at Schilling Air Force Base at Salina, Kansas, on September 10, 1956, and was attributed to forward scatter from atmospheric eddies to ground targets and back [13].

Many radar angels are caused by insects and birds. Their detection on sensitive, high-resolution, Q-, K-, and X-band radars has been verified both observationally and theoretically. Since a radar set surveys a very large volume of the atmosphere and maps it on a relatively small dial, a surprisingly small concentration of insects

can cause appreciable clutter on the scope. On sets such as the 0.86-cm TPQ-6 (Cloud Base and Top Indicator), a single insect of detectable size in a volume of 100,000 cubic feet of air is enough to fill the scope with return [4]. Since the guilty insect would be invisible both to ground observers and to the crew of pursuing jets, a flying-saucer report inspired by the radar echoes would remain forever an "Unknown."

Birds can cause substantial echoes on many radars. Large birds at a distance of ten miles can give signals equivalent to those from a medium-sized aircraft at a distance of fifty miles; in fact, even the fading and fluctuation resemble those of aircraft echoes. On radar, a sea gull may cause a return equivalent to that of a quart of water flying around. The radar cross section of the blip may be several times larger than the geometric cross section of the bird, so that a single adult sea gull at a distance of twenty nautical miles gives a very large radar return. As few as eight birds per square mile can completely fill a PPI (Planned Position Indicator) scope with return [14]. If conditions were exactly right, the birds might be visible to an observer and the source of the angel would thus be explained. But if no one happened to see the birds, the "mysterious" returns could serve as a basis for still another report of invisible flying saucers.

Birds have also been responsible for some of the "ring" angels that have been interpreted as fleets of invisible spaceships. In September 1953 several radar sites in England picked up unidentified objects apparently encircling the city of London. They performed peculiar maneuvers including, according to one saucer publication, the formation of the letters Z and U of the English alphabet. How the correct orientation of this invisible sky writing was determined has never been explained. If the letters are turned top to bottom, back to front, or rotated 90 or 180 degrees, they take on new meanings. Scholars might well argue about whether the first giant symbol should be interpreted as a Roman Z, a Roman N, a Greek Z, or a Russian И; and whether the second symbol should be read as a Roman U, a Greek Ω, the mathematical symbol $\subset$ standing for "is contained in," or a Roman C lying on its side.

On the scope, ring angels produce outwardly expanding rings and arcs that sometimes move on and off the screen at incredible

speeds. Such echoes have been a fairly common phenomenon in England since 1940 and 1941 [15], and experimental research has shown that many of those occurring at dawn or at dusk are caused by flocks of starlings. At dawn thousands of starlings leave the roost in waves at intervals of about half a minute. The birds in each wave are often closely packed in a tight circle or semicircle as the wave ascends. All are flying outward, dispersing in all directions, so that the ring diffuses rapidly on the radar screen and disappears, but is followed almost at once by a new ring. At dusk the birds may return separately to the roost during the course of an hour. Sometimes, however, they assemble first in a field some distance from the roost; they finally take off at the same time as a group and head for the roost in a single giant wave, causing a tremendously impressive but quickly vanishing angel on the radarscope.

Ring echoes observed at Texarkana, Arkansas, have been traced to the movements of red-winged blackbirds. Thousands of birds flying out from a common roosting ground a few minutes before sunrise show up on the PPI scope as an expanding ring that grows broader and more diffuse with time until the composite echo breaks into individual ones and fades at a distance of twelve to thirty-five miles [16].

Other types of ring angels have been observed on radarscopes, but the causes are not yet fully understood [17, 18].

Recognizing the true character of these radar angels and spurious reflections has tremendous importance for the security of the United States. Our Early Warning System, designed to notify Air Defense of imminent attacks by intercontinental ballistic missiles, has already had troubles with such radar ghosts. On October 5, 1960, a signal from Thule, Greenland, to the North American Air Defense Command flashed the warning, "Massive ICBM attack is underway." The Canadian officer in charge had only seventeen minutes in which to decide whether to order several hundred bombers of the Strategic Air Command to retaliate against the USSR or to push the button that would cause our long-range missiles with atomic warheads to come roaring out of their underground sites. He immediately asked Washington: Where was Khrushchev? Khrushchev was in New York at the United Nations: the officer did not push the button that would have set the world at war.

Later, he learned that radar beams reflected from the moon had produced the terrifying angels. This incident is only one of the reasons why the Air Force continues to be interested in radar UFOs. Failure to identify them correctly could threaten the effectiveness of our patrol system.

The Rapid City Sighting

One of the most complex incidents in saucer history occurred early in August 1953 near Rapid City, South Dakota. Like the sightings the previous year at Bellefontaine, Ohio, and Port Huron, Michigan, the presence of a UFO seemed to be confirmed by several types of evidence. Trained civilian and military personnel on the ground and in the air observed an unknown visually and by radar. The blips on the ground radarscope were photographed and a plane's gun camera took a picture. If a similar incident were to occur today, Air Force investigators would probably find the answer without difficulty. In 1953, however, they were less experienced and finally classified the case as "one of the best" Unknowns.

It is clearly impossible to solve the mystery with absolute certainty after nearly ten years, because vital information is lacking. The original records are no longer on file. Few details are available except those in Ruppelt's sketchy summary [3, p. 303 ff.], and some of these are inaccurate: the town of Black Hawk, for example, is not west, but northwest, of Rapid City. Although many questions of fact must therefore remain unanswered—exact times, directions, sequence of events—we offer here a highly probable explanation.

The first report came at 8:05 P.M. M.S.T. when a spotter for the Ground Observer Corps in the town of Black Hawk telephoned the Air Defense Command post near Rapid City, approximately ten miles southeast of Black Hawk, to report an extremely bright light hovering low on the horizon to the northeast. The radar operators at Ellsworth Air Force Base had been working with a jet patrol flying west of the base. After receiving the phone call, they shifted the scope to scan the northeast quadrant of the sky and picked up an unidentified target moving slowly at about 16,000 feet. Although the controller wondered at first whether the target might have been

due to weather, he decided after a few minutes that it was well defined, solid, and bright.

Since the ground spotter had a visual target and the traffic controller had a radar target, he telephoned to compare notes on positions; as they were talking, the spotter interrupted the conversation to say that the light was beginning to move southwest toward Rapid City. Checking the radarscope and finding a fast-moving target, the controller sent two of his men running outside to look at the sky. After a few seconds they reported that they could see a large bluish-white light moving toward them from the northeast. It made "a wide sweep" around Rapid City and then returned to a stationary position in the northeast where it had first appeared. (Unfortunately the account does not state clearly whether the "wide sweep" was observed visually or on radar.)

By this time all the witnesses were greatly excited by the UFO. The master sergeant couldn't decide what to do next because he kept thinking, "They're bigger than all of us!" but the traffic controller notified the F-84 patrolling in the west and asked for an intercept. The pilot soon found the light, which was still stationary. He began the chase, but when he had approached to within an estimated three miles, the light rapidly began to retreat. He continued the chase directly north for 120 miles (during which both the jet and the UFO went off the ground scope) but he could not gain on the object. Running short of fuel, he turned back toward the base. The ground scope soon picked him up again and, a few seconds later, picked up an unknown target apparently trailing the jet by ten or fifteen miles.

A second jet then took to the air, located the light, and began the pursuit. Like the first pilot, he could not close the distance between him and the receding UFO. After performing various tests to convince himself that he wasn't chasing a reflection, he finally turned on his radar gun camera. After a few seconds the red light blinked on, indicating a solid object ahead. The pilot thereupon asked permission to break off the intercept and, having taken a photograph, returned to base. As before, the ground scope picked up the returning jet but this time the UFO did not reappear on the scope. The controller then called officials at the filter center at Fargo, North Dakota. They had not received any UFO reports; a few min-

utes later, however, they called back to say that spotter posts between the two cities, on a southwest-northeast line, had indeed seen a bluish-white light.

Investigators from ATIC arrived promptly but they were not able to explain the sighting. Even the photographs showed nothing useful. Conclusion: unknown.

The incident remained unexplained chiefly because the investigators, like the witnesses, apparently assumed that a single unidentified flying object accounted for all the phenomena observed that evening. Although the available evidence is somewhat confusing, a careful study shows that, on the contrary, the visual and the radar targets could not have been the same.

When the ground spotter first reported the UFO, she described it as a stationary light low on the horizon. The radarscope, however, showed a target that was moving slowly, at an altitude of about 16,000 feet. Some minutes later, when the visual target did begin to move, the radar target speeded up. This was the only instance in which the movements of the two seemed to be roughly parallel. But in the excitement that followed, all the witnesses assumed that the two targets were identical. The published account [3, p. 303 ff.] does not distinguish clearly between the actions of the light and the movements of the blips on the radarscope.

Let us begin by reviewing the facts about the visual target. According to the witnesses on the ground, it was a brilliant bluish-white light that appeared on the northeast horizon and remained stationary during most of the period it was observed. At one time it seemed to advance rapidly toward the witnesses, make a wide sweep around Rapid City, which was a few miles away from the observers, and then return to its original position. According to the witnesses in the air, the light did not remain stationary but retreated from the pursuing plane and followed the returning plane, duplicating the plane's speed and keeping the distance between them constant. The pilots based this interpretation, evidently, on the fact that the light did not vary in size or brilliance and thus seemed to pace the plane.

These descriptions all point to the same answer: that the light was a star or a planet. Since it was infinitely distant, the jets could not get any closer to it and at ground levels the image was distorted

by peculiar atmospheric conditions. Mars had been absent from the night sky for months, and Mercury, Venus, and Jupiter were then morning stars; therefore the unknown could not have been a planet. However, the bright star Capella was on the northeast horizon at a declination of plus 46 degrees and would have been visible from both Fargo and Rapid City. A check of the Weather Bureau records shows that the night was clear and dark. The sun had set about an hour before the sighting began, and at that time in the evening there was no moonlight because the moon was in its last quarter. Visibility was about thirty-five miles and the wind was from the northeast, about four meters per second. There was a marked temperature inversion—9 degrees—at ground levels. Such an inversion could easily account for the erratic motions reported for the light.

There can be little doubt that the visual target was the star Capella.

The radar targets also were clearly the result of weather, just as the air-traffic controller had suspected when he first looked at the scope. Conditions were ideal—a calm, clear, warm summer night—for phantom echoes. The first radar target, moving southwest, was probably a return from some ground object. When the jet took to the air, the scope showed a different kind of UFO target, one that echoed the movements of the plane itself—retreating from the pursuer, advancing when the pursuer turned back—and was always farther away from the ground station than the plane itself.

Although saucer enthusiasts interpret these maneuvers as proof that the phantom was under intelligent control, radar experts recognize the familiar pattern in which a ghost echo is actually a return from the plane itself. Because of the temperature inversions the radar pulses do not return directly from the plane to the ground receiver but are deflected from the plane to the ground, then back to the plane, and thence on to the ground scope. The phantom echo always occurs from the same direction as the aircraft and is always “on the other side” of the plane (see p. 153).

This explanation also accounts for the evidence of the jet's gun camera. The photographs taken showed nothing, although the radar warning light indicated a solid object ahead. After the pilot had switched on the set, however, there had been a brief delay before the red signal blinked on. During this interval the plane had not come any closer to the unknown light, but the radio waves had scat-

tered from plane to ground and back to plane so that the gun radar did indeed detect a solid object—the plane itself!

In short, the evidence supports our conclusion that an image of the star Capella, distorted by the atmospheric conditions produced by a strong temperature inversion, accounted for the visual sightings; and that radar echoes from the pursuing jets, deflected by the same temperature inversion, accounted for the phantom targets on the ground radarscope and the gun radar.

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Chapter IX

E-M AND G-FIELDS IN UFO-LAND

The phenomenon of magnetism has always fascinated both scientists and laymen. Paracelsus believed that he could use a magnet to draw disease out from a person, transfer it to the ground, and thus cure the patient. Later practitioners believed that a sick person could regain his health by sleeping with head and feet oriented north to south so as to be in line with the earth's magnetic poles. Laputa, the saucer-shaped floating island visited by Gulliver in his travels, was propelled by the attracting or repelling forces of a large magnet imbedded in the center of the island. In recent years magnetism has similarly been called on to account for some of the peculiar maneuvers allegedly performed by UFOs.

In the world of flying saucers an all-purpose electromagnetic (E-M) force, unknown to earth scientists, is supposed to be able to produce light and heat, disturb a compass, render an object radioactive, stop a wrist watch without damaging the man who wears it, interfere with the functioning of radio and TV sets, turn out the lights of automobiles, stop the action of gasoline engines, and aid in the creating of artificial gravitational fields (G-fields) around extraterrestrial spaceships.

UFOs equipped with E-M powers have occasionally been reported in France since 1954 [1], but they had rarely appeared in the United States until late in 1957 when freak weather in Texas, plus the birth of the space age, started a new wave of flying-saucer incidents. Few spectacular UFOs had appeared since the 1952 panic (*Chapter VII*) and the average citizen had almost forgotten about flying saucers. Then on October 4, 1957, when Sputnik I went into orbit and opened the door to outer space, people once more began to watch the heavens uneasily. Uneasiness became alarm a month

later when, with American satellites still sitting on the launching pad, Sputnik II roared into space. A ball of fire floating over a field in western Texas provided the small stimulus needed to turn alarm into hysteria, and for several weeks people tended to see spaceships in every cloud and every unfamiliar light in the sky. The reasoning seemed to be that if man with his limited powers could launch satellites to orbit the planet, why shouldn't interplanetary ships already be visiting the earth?

In the months of November and December the Air Force received more UFO reports than during the entire ten months preceding, and the reports had their highest frequency in the single week following November 2 [2]. For a period of about eight days, if all the stories were true, our skies were crowded with flying saucers.

Spaceships with electromagnetic powers roved from the Dominican Republic to Alaska; they stopped automobiles, turned off headlights, jammed radios and stopped clocks in cars, blurred TV sets in the home, dimmed the cabin lights in airplanes, and altered a speedometer to register a dangerously high speed instead of the legal sixty miles per hour. (Whether the driver in question offered this novel defense to a judge in traffic court is unknown.) Police in squad cars pursued UFOs in Elmwood Park, Illinois; Danville, Illinois; and Hammond, Indiana. In Brazil, an orange-colored, whistling UFO hovered near Fort Itaipu and first caused a temporary failure of the lights, then knocked out the generating plant for several moments. A driver in Santa Fe, New Mexico, saw a UFO that not only stalled his car but also stopped the dashboard clock and the driver's own wrist watch. A driver in western Texas saw a UFO that, not content with stopping the engine and radio of his car, also magnetized the right half of the bumper and a part of the fender. One driver reported that his car and those of several other motorists had stalled near Cortez, Colorado; he had not thought of looking at the sky, but any saucer enthusiast could have told him that a UFO must have been hovering there.

In addition to these special models equipped with Medusa-like powers, other spaceships allegedly landed briefly at the military installation at White Sands, New Mexico; harassed a United States Coast Guard ship in the Gulf of Mexico; landed in Ohio and raised

the radioactivity level of the ground; and stopped in Nebraska for repairs.

Stormy Weather in Texas

The new type of UFO with electromagnetic (E-M) powers first attracted notice in this country by allegedly appearing near Levelland, Texas, on the night of November 2, 1957, a few hours before Sputnik II went into orbit. A small town with a population of about 8000, Levelland lies on the plains of western Texas about sixty miles from Plainview, site of a famous meteor shower, and only twenty-five miles from Lubbock, which a few years earlier had gained national fame with its "Lubbock lights" (p. 123). The region is normally an arid one, but at the beginning of November it was experiencing unusual weather—electrical storms and rain (the month proved to be the wettest ever recorded in western Texas).

About 11:15 that Saturday night, a farmworker named Pedro Saucedo (or Saucido) with his friend Joe Palaz (also given in various printed accounts as Palav, Salav, Salaz, Salvaz) was driving home from Levelland. A few miles northwest of the town he had turned off Route 116 into a side road, when both men noticed a flash of light in a field at the right. Evidently unalarmed, he continued driving and talking until suddenly the engine died and the lights went out. While trying to restart the motor, Saucedo (the similarity between "Saucedo" and "saucer" presents a diverting coincidence) glimpsed over his left shoulder something that looked like a flaming ball or a fiery tornado drifting rapidly toward the truck. A veteran of combat in Korea, Saucedo reacted instantaneously to the blazing unknown. As he described the experience later that night, "I jumped out of the truck and hit the dirt because I was afraid. I called to Joe but he didn't get out. The thing passed directly over my truck with a great sound and a rush of wind. It sounded like thunder and my truck rocked from the flash. . . . I felt a lot of heat." Crawling out and seeing the object disappear in the direction of Levelland, he restarted the engine and drove back to Levelland to report the incident to the sheriff [2].

The sheriff was soon receiving reports from other persons who

had been driving in the same area at about the same time. They said that they, too, had seen a blazing object which they described as a "flying egg" or "egg-shaped fireball." Their cars, like Saucedo's, had stalled and then restarted when the object disappeared. A number of townspeople telephoned the authorities to report bright flashes in the sky, and the police comment that "everyone who called was very excited" [3] was probably an understatement.

Under headlines such as "Mystery Object Stalls Autos in West Texas," these stories hit newspapers all over the nation. The news spread fast. All day Sunday dozens of persons in Texas and New Mexico were relating that they, too, had seen fiery objects and flashes of light in the sky the night before. An amazingly large number of citizens seem to have been out late that stormy Saturday night, but apparently none of them noticed any ordinary lightning—only phantom "somethings" variously described as a burning mass, a big light, an egg-shaped object 200 feet long lighted up as though it were on fire, something like neon lights, objects that were red, glowing, brilliant, fiery, bluish-green, or pulsating green.

Not surprisingly, with all this publicity, the original incident quickly began to take on new dimensions. Saucedo amplified his first statements and recalled that the object had been "torpedo-shaped," "like a rocket, but much larger," and that lights on the object had seemed to be winking on and off [4].

For days the Russian satellites had to share the spotlight with the American flying eggs, while both amateur and professional investigators tried to solve the mystery. The proponents of UFOs deduced the presence of a flying saucer with E-M powers. Various astronomers, when urged by newsmen, reluctantly advanced off-the-cuff theories based on the meager printed accounts. Dr. La Paz, of the Institute of Meteoritics in New Mexico, suggested that the things seen at Levelland might have been fireballs. A reporter assigned to the Harvard-Smithsonian Observatories to cover Moonwatch observations of the new Sputnik gave a sketchy summary of the incident to Dr. Menzel, who also concluded that Saucedo might have seen an unusually bright meteor and, startled by its brilliance, might accidentally have killed the engine. Lacking news of Sputnik II, the reporter sent in a facetious story asserting that, according to the director of the Harvard College Observatory, the flying eggs

were mirages that so frightened the drivers that they reacted by pressing a "nervous foot" on the accelerator and killing the engine. When the weather conditions at Levelland became known, of course, the meteor theory was immediately discarded. Dr. Nininger, of the American Meteorite Museum in Arizona, made the best guess of all: Saucedo had observed an example of that rare phenomenon, ball lightning [5].

Within a few days an Air Force investigator visited Levelland to study the incident. Members of civilian saucer groups complained later that, since he spent only seven hours in the area, he had obviously not taken the problem seriously and could not have found the correct solution. Even seventy hours of labor, however, could not have produced a clearer picture. Saucedo had unquestionably had a frightening experience, very much as he originally described it. But as in many UFO sightings, most of the other reports had been stimulated chiefly by the general excitement. Three persons, not "dozens," had seen the phenomenon near the ground. From ten to fifteen others (including the sheriff) had not observed it at close quarters but had merely seen brilliant flashes of light in the sky.

After studying the weather reports and the descriptions given by the various witnesses, the Air Force issued an explanation, unfortunately ambiguous because it omitted the necessary word "either," stating that the phenomenon observed at Levelland had been "ball lightning or St. Elmo's fire." Supporters of the saucer theory seized on this ambiguity to protest, correctly, that ball lightning and St. Elmo's fire are two different phenomena. They went on to conclude by some process of peculiar logic that neither ball lightning nor St. Elmo's fire was involved and that the phenomenon had actually been a flying saucer.

Saucer publications have printed thousands of words to support this argument. The evidence, however, leads to an overwhelming probability: the fiery unknown at Levelland *was* ball lightning.

The Phenomenon of Ball Lightning

Most of us know very little about lightning. On the average, it causes some 180 deaths each year. Many persons when caught out-

doors by a thunderstorm run to shelter under a tree, not realizing that the tree itself offers the most attractive target to the electrically charged clouds overhead. Even the scientists who make a special study of the phenomenon still have much to learn about the conditions that produce lightning and its various manifestations [6].

The most familiar type is the lightning we see in stormy weather; it flashes in brilliant zigzags from zenith to horizon, darts from cloud to cloud, or strikes like a javelin toward earth. At night, particularly in the country where no city lights mask its brilliance, lightning can be a frightening elemental force. A form popularly called "heat" or "sheet" lightning is a familiar, almost playful phenomenon in the midwest and southwest, although comparatively rare on the east coast. In hot, humid weather it flares intermittently near the horizon, noiseless because the luminous "sheets" are merely reflections of an ordinary zigzag flash that is too far away to be heard. "Bead lightning" has also been reported, appearing as a chain of spheroids that gradually fade away as they discharge. A spectacular display of "pinched lightning," an even rarer phenomenon (see Plate Va), was photographed in late August 1961 at Los Alamos, New Mexico, during a severe thunderstorm [7]. Ball lightning, which seems to be commoner in Europe than in North America (just as tornadoes are commoner in North America than in Europe) is so little understood that some scientists have doubted its reality. In recent years, laboratory research has added much to our knowledge of ball lightning and Soviet scientists in particular have studied it as a possible weapon against enemy planes [8].

Ball lightning is usually described as a luminous ball whose diameter ranges from a few inches to several feet; the color may be red to orange or blue to white. These lightning balls appear most frequently toward the end of an electrical storm when the air is highly ionized, often just after a nearby lightning flash. They look and act like solid objects. They can hang motionless or drift in the air, glide along telephone wires or fences, roll down chimneys and across the floor to radio or TV sets, float a few inches above the ground or high in the sky. The ball persists as an entity for a time ranging from several seconds to many minutes; it may then evaporate noiselessly, or may disappear with an explosive noise and a force that can damage nearby objects [8a]. One of the few existing

photographs of ball lightning was taken at Lincoln, Nebraska, on August 30, 1930 (see Plate Vb).

American, European, and Soviet scientists have suggested various theories, none of them entirely satisfactory, to explain the formation of ball lightning [9, 10, 11]. These evanescent fiery globes probably represent some sort of continuous electric current perhaps held together by its own magnetic field, like the fabled hoop snake that could roll along the ground by holding its tail in its mouth.

In 1938 the pilot of a BOAC plane en route to Iraq, flying in dense cloud and rain at 8500 feet, reported that a ball of fire had entered the rear cabin and burst with a loud explosion. One or two minutes later it (or another lightning ball) entered the cockpit through the window which was open for visibility, singed the hair and eyebrows of the pilot, then bounced on through the forward passenger cabin and into the rear cabin, where it again exploded [12].

Similar incidents have been reported by Soviet pilots. In the summer of 1956, a Soviet transport plane flying at about 10,000 feet was struck by ball lightning during a very rough flight through a stormy cold front. A fiery red-orange ball ten to fifteen inches in diameter appeared in front of the aircraft, swerved to the left, struck the left propeller and exploded with a loud detonation and a blinding white flash. The intense electrical discharge destroyed radio communication between the plane and the ground and disabled the radio compass. In attempting to disconnect the antenna, the radio operator received an electric shock. When the plane landed and was examined, one of the blades of the left propeller was found to be slightly damaged and a small fused area and a deposit of soot were found on the edge of the airfoil a few inches from its end [13].

A similar case occurred in December 1956, when a Soviet jet had entered a storm cloud and was climbing through it. As the plane reached the top of the cloud, at an altitude of 12,000 to 15,000 feet, ball lightning suddenly appeared a short distance ahead and to the right of the plane, and exploded with a dull but piercing noise and a blinding flash; the ball then broke into a series of beads. Although one of the engines close to the ball died at the instant of the explosion, the crew were able to start it again and the flight continued normally. After landing and finding no mechanical damage, they concluded that the engine had failed temporarily because

the explosion had formed a region of intense rarefied air that deprived the engine of oxygen [13].

Ball lightning has often been reported near the ground, as in the Levelland case. In the summer of 1934 Mr. Durward, a British meteorologist, while driving along the bank of a lake observed the phenomenon: "It began to rain heavily, with slight or moderate thunder and lightning. His son, a boy of twelve, was opening the iron gates, spaced at intervals on this road, and found one difficult to open. Mr. Durward, while walking the short distance from the motor-car to the gate to assist his son, saw among the pine trees on his left what looked like a ball of fire about 12 in. in diameter moving towards them. It struck the iron gatepost farthest from the latch. There was no noise, but the boy, who had his hand on the latch, gave a yell; for the next few hours he was unable to lower his arm." [12]

In Levelland the night of November 2 conditions were ideal for the formation of ball lightning. For several days the area had been experiencing freak weather, and on the night in question had been visited by rain, thunderstorms, and lightning. Shortly before the glowing sphere approached the truck, the two men had noticed a lightning flash in a nearby field. The original description of the phenomenon—a "flaming ball" or a "fiery tornado" that floated toward and over the truck and detonated with light and heat—fits the classic picture of ball lightning. The truck's engine may have died for one of several reasons. The rain during the evening could have seeped under the hood and soaked the ignition or dampened the spark plugs. The feed line may have been clogged. Or the region of highly rarefied air created by the ball lightning may temporarily have deprived the engine of oxygen.

Of the other drivers near Levelland that night who reported having trouble with balky motors and seeing a blazing object like an egg-shaped fireball, three probably saw ball lightning. Others, after hearing Saucedo's frightening story, perhaps unconsciously dramatized their own experiences and magnified ordinary lightning flashes into attacking fiery objects. It is significant that although the night was stormy, only Saucedo reported seeing the ordinary lightning that normally accompanies a thunderstorm.

Since ball lightning is short-lived and cannot be preserved as

tangible evidence, its appearance in Levelland on the night of November 2 can never be absolutely proved, even though this explanation fits all the facts—facts that in themselves do not warrant so lengthy a study. Only the saucer proponents could have converted so trivial a series of events—a few stalled automobiles, balls of flame in the sky at the end of a thunderstorm—into a national mystery. Ball lightning doubtless accounts for other UFO reports, such as the phenomenon observed at Lock Raven Dam on October 26, 1958, when two men returning late at night from a fishing trip saw a flaming ball hovering above the superstructure of a bridge; the ball exploded with a loud noise and a brilliant white flash and disappeared.

E-M and Non-E-M Saucers

The next UFOs reported in this series belonged to the old-fashioned, non-E-M variety. From White Sands Proving Grounds near Alamogordo, New Mexico, came a report that military police, while patrolling the up-range in a jeep about 2:30 Sunday morning (a few hours after the Saucedo incident), had seen a brilliant reddish-orange light, shaped like an egg, hovering in the sky. From its apparent distance (two to three miles away) and apparent size (as large as a grapefruit held at arm's length), the men deduced that it was a huge object, 75 to 100 yards in diameter [2]. After remaining motionless for about three minutes, it descended toward the ground and disappeared. (According to some versions, it later rose into the sky and then disappeared.) Members of another jeep patrol soon matched this tale with the report that on Sunday night about eight o'clock they had seen a bright, glowing object hovering in the sky but, instead of landing, it suddenly climbed until it got so far up it looked like a star. Both jeeps, it should be noted, continued to function normally.

Officials at White Sands soon dampened the excitement. The description of the light that appeared at 2:30 A.M. included certain doubtful factors. The night had been overcast and so dark that the stars were not visible, although the cloud cover was broken at intervals. Since the sighting had not included any object of known distance or known size for comparison, the estimates of the UFO's

distance and size were of no value. The light might have been small and close; it might equally well have been huge and far away. Under the circumstances, the most probable explanation was that the men had glimpsed the moon (then roughly half full) through broken clouds, and that the apparent movement was an illusion produced by the moving clouds. The Sunday evening UFO was unquestionably the planet Venus. Then nearly at maximum brilliance, it was a conspicuous object in the western sky after sunset and inspired many saucer reports during this week of anxiety.

The White Sands incidents had reached the papers, however, and contributed to the general hysteria. By Monday afternoon, flying eggs were allegedly stopping automobiles as far north as Canada, but the Southwest continued to hold the center of the UFO stage against all competition.

On Monday night, November 4, the Alamogordo, New Mexico, radio station broadcast a dramatic interview with an engineer from Holloman Air Force Base, New Mexico, describing his sighting of an E-M-radiating UFO at least 500 feet long. About one o'clock on Monday afternoon, Mr. X stated, he was returning to base after a weekend in El Paso [4]. While driving along a desert stretch of U. S. Highway 54 near the town of Orogrande, he noticed a group of cars stopped ahead of him, their passengers standing in the road, pointing at the sky. Looking up, he saw an iridescent egg-shaped object at least 500 feet long—more than twice the size of the UFOs reported in the preceding two days. As it approached, the flying egg exerted a force that killed the engine of his car, generated a wave of heat that gave him a bad burn, and demonstrated a startling new characteristic: it silenced the radio in his car. (During the next few days, reports of similar encounters usually included a jammed radio.) When the UFO took off toward the mountains and disappeared, Mr. X started his car again and drove on into Alamogordo to the home of a friend, Mrs. Coral Lorenzen.

One of the most zealous amateur investigators of UFO reports, Mrs. Lorenzen had founded the Aerial Phenomena Research Organization (APRO) (see *Chapter XIII*) in January 1952, and from 1954 to 1956 had been employed at Holloman Air Force Base. After listening to Mr. X's story and examining the notes he had scribbled during the sighting (unfortunately they proved to be illegible, but

for some reason no one has ever suggested that the pen or pencil was also hexed by the UFO), she hurried him down to the local radio station where he made the taped interview that was broadcast later that evening.

A daylight visit by an E-M flying egg 500 feet in length would supposedly have attracted the attention of many witnesses. Air Force investigators could find only one: Mr. X. According to his testimony, the passengers of several automobiles (his estimate of the number of cars varied from time to time but he eventually settled on ten) had stood in the road watching the unknown object. A persistent search by Air Force officials failed to locate any one of these persons. The witness showed no sign of the burns he allegedly suffered. In short, the only evidence to support his story was Mr. X's own and the authorities sensibly concluded that the incident was either a hoax or a hallucination, inspired by newspaper publicity about Levelland's flying eggs.

Tuesday morning's chief contribution to the UFO epidemic was not to be laughed off so easily, for it was made by trained military personnel. At 5:10 A.M. on November 5, the Coast Guard cutter *Sebago*, traveling north in the Gulf of Mexico, detected an erratically maneuvering UFO on the radarscope. The swiftly moving object would race across and off the scope, only to reappear almost immediately from another direction and position and again move off the scope at incredible speed. After ten minutes the radar target vanished, but watchers on the deck glimpsed a glowing object, brilliant as a planet; it streaked across the sky just above the northwest horizon and vanished. The unknown radar targets then returned and continued to fill the scope with their incredible movements until 5:37, when they finally disappeared and did not return.

This mystery, too, yielded to orderly investigation. Air Force radar experts made a detailed analysis of the data and positively identified the mysterious returns. They had not come from the complex air traffic overhead, as had first been suggested, nor from a fantastically maneuverable spaceship. They were merely false targets produced by the weather conditions (see *Chapter VIII*). The brilliant light that flashed across the sky was not reported by the radarscope and had no relation to the radar returns. In view for a few seconds at most, brilliant in the morning twilight (the sun

rose some fifty minutes later), the flash of light was probably a distant meteor—November is rich in meteor displays.

The Saturnian Visitors

Tuesday evening while the nation was still wondering about the flying eggs in New Mexico and the invisible UFOs that buzzed the *Sebago*, welcome comic relief appeared. A man named Schmidt, a grain buyer, announced that during the afternoon he had visited with the crew of a flying saucer that had landed to make repairs. While driving in the country near Kearney, Nebraska, he said, he had noticed a bright flash about a quarter of a mile away. Going closer to investigate, he perceived a huge silvery ship a hundred feet long, thirty feet wide, and fourteen feet high, which had landed in a dry river bed. The motor of his car then died. He got out and was walking toward the ship when a light shot out and paralyzed him. The ship opened and two men emerged. After searching him for concealed weapons, they released him from paralysis and invited him into the ship, where he spent half an hour chatting with these strangers and their female companions, mostly in High German and English. (He knew that they came from outer space but not until some weeks later, when they paid him a second visit, did he discover that they were natives of the planet Saturn.) [14] After he left the ship it rose straight up into the sky and disappeared, while he hurried back to town to report to the sheriff, to broadcast an account of his experience over the local radio, and to give his story to the newspapers.

It is perhaps a measure of the panic level that week that local officials actually examined the ground at the "landing" site, looking for evidence. They found none. The four "hydraulic rams" that allegedly supported the huge machine had left no imprint on the sand of the dry river bed. Traces of oil found on the ground were tested chemically and proved to be the same brand that the witness carried in the trunk of his car.

Gaining national notoriety from this incident, Schmidt soon became a popular lecturer at flying-saucer clubs, thrilling the audience with tales of later visits from the Saturnians and his journeys in

their spaceship to the Arctic Circle, through the waters under the North Pole, and even into outer space. A year or so later his extraterrestrial friends allegedly tipped him off to the location of certain valuable minerals on earth, including veins of quartz that had the desirable property of curing cancer. To mine this quartz and thus make it available to humanity, he enlisted the sympathy and financial aid of a number of lonely, wealthy widows. Some of these ladies eventually came to believe that they had been the victims of fraud and, in 1961, a California jury agreed with them. The Saturnians apparently have not yet reappeared to help their friend out of his difficulties.

Surveillance by Flying Eggs

Wednesday November 6 was relatively calm on the UFO front, although automobile engines died, radios malfunctioned, and TV screens blurred at about the time that lights were reported in the sky in Texas, New Mexico, Illinois, and Canada. Accounts received later by saucer organizations stated that on Tuesday (or Wednesday) night an orange-colored, whistling, E-M type of UFO had hovered near Fort Itaipu in Brazil, caused a temporary failure of the electric lights, and then knocked out the generating plant for several moments. Since the alleged visitation occurred in a foreign country it was not, of course, open to study by the United States Air Force. In any case investigation would have been difficult, since the report failed to include such facts as the exact time of appearance, position, and direction of movement of the UFO. The witnesses, whose names were not given, apparently related the incident under pledge of secrecy to other persons who insisted on remaining anonymous, who passed the story on to still others who refused to be named, who in turn gave the news to reporters, who signed only their initials [15]. So insubstantial a tale obviously does not merit serious investigation. The dimming of electric lights and the capricious behavior of a generating system are not extraordinary phenomena and no UFO is required to account for them.

The next incident to gain publicity in this amazing week occurred on Thursday (or Wednesday) evening when a UFO allegedly

landed in Ohio and then vanished. Driving home in the early evening along a country road, a Mr. Olden Moore saw a glowing UFO in the sky. At first it looked small, like a star, but it rapidly increased in size and split apart in the air as it descended and apparently landed in a nearby field. Moore stopped his car, intending to investigate, but for some reason he changed his mind and instead drove on home to get his wife. When they returned and searched the field they found nothing. Nevertheless, they reported the incident to the authorities and next day a Civilian Defense official, arriving to check the ground where the UFO supposedly had landed, reported the level of radioactivity "far above normal."

A woman living half a mile away from the field in question reported that, although she herself had not seen a UFO, her TV set had blurred at about the time of the sighting, and on the following day she found that her car, parked near the house, was pock-marked. Applying his Geiger counter to the car, the Civilian Defense official pronounced it radioactive [16]. This UFO apparently possessed highly selective E-M powers: it did not stop the engine of Mr. Moore's car but did interfere with the operation of a TV set half a mile away!

Air Force investigators patiently collected and sifted the facts. The supposed landing site showed nothing abnormal—the grass was not burned, the earth was not disturbed, no foreign material could be found. The normal radioactivity of the ground in the area measured .18 milliroentgens; at the supposed landing site the measure had been .20 milliroentgens. This difference of .02 is not "far above normal" but well within the probable error in the calibration of the instruments.

Interviews with other Ohioans who had also seen the glowing unknown provided the answer: the UFO was a large meteor, conspicuous in the dusk of early evening. Traveling directly toward the witness, it had looked like a glowing sphere suspended in the air and rapidly increasing in brightness. Near the end of its flight it split into two or more pieces and fell silently to the earth, not "in the next field" but perhaps many miles away. The blurring of the TV set may have been mere coincidence or, if the meteor had actually passed close by, may have resulted from the ionized trail of the meteor (see *Chapter v*).

Saucerdom's Miraculous Electromagnetic Force

Most of us remember the nursery tale of Chicken-Little, who started a panic in the barnyard kingdom with her eyewitness report that the sky was falling: "I saw it with my eyes, I heard it with my ears, and a piece of it fell on my tail." Calm was restored in the kingdom, after a time, when the prosaic truth came to light: a falling acorn, not a piece of the sky, had grazed the credulous chick.

In somewhat similar fashion, the hysteria caused by the car-stalling flying eggs subsided. As the Russian satellites gliding across the night sky proved more interesting to the public than hypothetical spaceships, flying-saucer stories occupied less and less space in the daily papers and the number of UFO reports dwindled. Air Force investigators worked hard at the job of separating facts from fantasy and by Saturday November 9, 1957, the end of a wild week, the panic was over. During the two years following, 1958 and 1959, fewer than a dozen E-M-equipped UFOs were reported over the entire American continent.

The civilian flying-saucer groups, however, rejected the normal explanations of the November reports except that of the Schmidt-Saturnian meeting, which all but the cultists indignantly denounced as a hoax publicized to embarrass sincere students of UFOs. Dissatisfied with the solutions found by the Air Force, the National Investigations Committee on Aerial Phenomena (NICAP) carried out an independent study (see *Chapter XIII*) of the November sightings, and in June 1960 issued a booklet entitled "Electromagnetic Effects Associated With Unidentified Flying Objects (UFO's)." After examining many reports of E-M phenomena and rejecting an unspecified number as unreliable, members of the investigating committee studied the evidence in a series of eighty-one incidents occurring over a period of fifteen years, roughly a third of which were reported during the week of the Levelland panic [17].

The cases include instances in which, allegedly, electrical appliances failed to function, at the same time and the same place in which a witness observed a UFO. In some cases a witness observed

electromagnetic effects but did not see a UFO, at the same time that a neighboring witness saw a UFO but did not observe electromagnetic effects. The effects in question include the stopping, missing, sputtering, and near-quitting of automobile motors; the dimming or flickering of automobile headlights; static, roar, or fading of car radios; the dimming and brightening of house lights; the dimming and brightening of cabin lights in airplanes; the blurring of TV screens; the temporary loss of picture and/or sound in a TV set; the stopping of watches and clocks; and odd noises over a telephone wire.

This list may astonish the average citizen who has often endured similar annoyances and never thought of blaming UFOs for his troubles. Most householders know that watches run down, that houselights dim and brighten with the changing demands made on the city electrical system, and that a plane flying over a house can blur the image on a TV screen. There can be few readers of this book who have not at some time experienced such brief frustrations with automobiles, radios, TV sets, and timepieces—the ordinary troubles that keep our repairmen in business without assistance from UFOs.

To the heterogeneous data provided by these eighty-one cases, the committee attempted to apply the precise tools of logic and mathematics in order to establish a correlation between UFOs and electromagnetic effects, and concluded that a cause-and-effect relationship probably did exist.

With suitable material, statistical methods can suggest a correlation between any two sets of facts and can estimate the probability that the correlation is significant and not due to chance. No competent statistician, however, would try to apply the methods to such amorphous and uncertain data as those used by the committee. More than a third of the incidents cited come from newspaper accounts or the private files of saucer organizations in foreign countries. All leave many unanswered questions. At least two involve fully identified objects: the great fireball of September 18, 1954 (p. 92), and the three fireballs of April 6, 1955, may well have caused some radio interference but they were not UFOs. Even with the well-reported cases, a conscientious historian would find it nearly

impossible to determine precisely what the witnesses saw, what they heard, what they did, and what they said.

The various printed accounts of the Levelland incidents, for example, vary in many details. The events took place in an atmosphere of excitement and the stories inevitably changed slightly with each retelling. The reports of Air Force investigators, records in the files of civilian saucer organizations, statements in newspapers, magazines, and books—no two give exactly the same version of any given incident. Although the points of disagreement are often trivial, they are sometimes vital to finding the correct explanation.

Even if, for the sake of argument, a statistician were willing to accept the evidence of the eighty-one cases at face value, he would still not attempt to establish a correlation between UFOs and E-M effects. The probability that a (postulated) UFO will appear at a given time or place is unknown; the probability that an electrical appliance will fail to work at a given time or place is equally unknown. Hence the probability that the two phenomena will occur together at a given time and place is a concept that has no meaning.

Effects and Causes

Asked to explain what caused the failures of engines, radios, watches, etc. reported during the week of the Levelland sightings, any high school physics student who answered, "Some new kind of electromagnetic force" would properly receive a grade of zero. Admittedly there are physical phenomena that the scientist does not yet understand, but he does know that electrical and magnetic forces do not and can not perform all the feats attributed to them by saucer enthusiasts.

The electrical failures ascribed to E-M forces undoubtedly had a variety of causes. Automobile engines can stall for many reasons. Rain seeping under the hood of a car can soak the ignition and temporarily interfere with smooth operation. Sand or dust or a vapor lock in the fuel line can do the same. The body of an automobile is metal and completely encloses the ignition system and the motor. The engine stops if it is deprived of gasoline or oxygen, but it does

not stop if lightning strikes the car. The metal body acts as a shield that electrical forces cannot penetrate.

Every driver knows that the reception on a car radio normally varies from poor to fair; it rarely remains constant. While moving beneath a power line, a car may receive no radio signals at all. A high-tension line can be surrounded by an electrical field that makes a radio set hum or buzz raucously and completely jams the reception. Static or a powerful interfering signal can easily jam a car's radio, but no electrical field, static or oscillating, can kill a car's motor or shut off its lights or stop the dashboard clock; it could not stop the driver's wrist watch, and it could not stop a man's watch without seriously injuring the wearer, even if he were standing in an open field.

Radio and TV sets may function badly for one of many reasons. They may simply need a good repairman! A passing plane, a more powerful transmitting station on the air, auroral activity, stormy weather, ultraviolet radiation, or clouds of ejected atoms from the sun—any of these can disrupt radio or TV communication, but they do not interfere with the operation of gasoline engines.

All meteors bright enough to be seen can cause some radio and TV interference—and in the first week of November the Taurid shower is approaching its maximum. Although meteors do not, by themselves, emit any appreciable amount of radio energy, the friction between the swiftly moving meteoric body and the atmosphere produces a train of hot gases that can momentarily reflect radio waves. The brightest meteors leave behind them a persistent cloud of luminous, electrified gas that can absorb radio waves and thus blanket incoming signals for several minutes after the meteor has passed. A spectacular fireball observed about 8:30 P.M. M.S.T. on April 18, 1962, momentarily turned off the street lights in the town of Eureka, Utah; it was so bright that it triggered the photoelectric control, just as daybreak does [17a].

No imaginable single force—electric, magnetic, or gravitational—could possibly have caused *all* the effects attributed to saucerdom's miraculous electromagnetic force. An E-M field with the postulated powers is as improbable as a force that would lift fallen apples from the ground and draw them up to reunite with the branches of their parent tree.

Let us suppose for a moment, however, that the incidents in the Levelland epidemic might have occurred just as they are described by the NICAP committee. If UFOs had been visiting the earth that week, projecting a force field that performed as claimed, certain other events should also have occurred.

Thousands of automobiles should have been, but were not, temporarily disabled in the neighborhood of every car-stopping UFO. Fantastic traffic jams have sometimes been caused by torrid weather and consequent vapor locks in the fuel lines of automobile engines. In June 1961, for example, a sudden heat wave in Boston caused a vapor-lock epidemic that tied up traffic on the main highways for three hours. On some stretches of road so many cars were immobilized that, with their hoods up to cool off, they looked "like a convention of pelicans." No such traffic jams were reported in connection with the 1957 UFOs. In South Springfield, Ohio, a car and a taxicab stalled but the vehicles around them experienced no trouble. One car stalled in Houston and another in Santa Fe, but the traffic around them proceeded as usual.

Hundreds of TV sets should have blurred, but did not, in the neighborhood of every TV-blurring UFO.

Equally surprising, no one complained of UFO interference with hi-fi sets, vacuum cleaners, refrigerators, washing machines, irons, freezers, or electric razors. No airplane, helicopter, motorcycle, or ocean liner reported engine trouble.

At least two landings were reported, in New Mexico and Ohio. No physical evidence of landing could be found—shrubs were not crushed, grass was not scorched, ground was not disturbed.

Except for the *Sebago*, no radar reported the presence of a UFO.

Moonwatch teams, trained specifically to detect, observe, and plot the exact path of moving objects in the sky, were on the alert that week all over the United States and Canada. They did not see even one unidentified flying object.

"G-Fields" and UFO Propulsion

Even more fantastic than the E-M force that stops cars and silences radios is the artificial gravitational field or "G-field," which

saucer enthusiasts call on to account for all UFOs whose reported behavior clearly contradicts the laws of physics. Employing electromagnetic forces, the UFOs supposedly can create a variety of G-fields as needed, to be used as a defense weapon, a means to invisibility, or a method of propulsion [18, 19].

Writers of science fiction have regularly utilized similar handy expedients such as "gravity shields," "force fields," "inertia drives," and "space warps" to move their heroes quickly from earth to remote parts of the galaxy. Physicists, too, dream of revealing new aspects of nature that would allow man to nullify the effects of gravity and make short cuts through space, but they realize that such devices, even if theoretically not impossible, must await unimaginable discoveries about nature and are at least far in the future.

Unlike the amateur investigator of UFOs, both the storyteller and the physicist know that if and when such advances are made, they will enlarge our understanding of the cosmos, as did the creative insights of Galileo, Newton, and Einstein, but new discoveries cannot invalidate what we have already learned about how the universe works. Many of the properties ascribed to UFOs imply a complete breakdown of physical law. They belong to the realm of magic, not science. Traveling at speeds approaching the velocity of light, reversing direction instantaneously, achieving maximum acceleration or deceleration in a fraction of a second, becoming invisible at will—such feats are impossible for a solid body moving either in an atmosphere or in space. Most of the serious proponents of the saucer hypothesis acknowledge that such actions are impossible, according to our present knowledge, but they argue that alien races more advanced than earthmen have undoubtedly found new sources of power and developed new methods of propulsion. Elaborate theories have been constructed, phrased in nearly incomprehensible scientific jargon, to show that UFOs do not flout the laws of physics but merely operate under laws that are still unknown to human beings.

To UFO investigators whose professional training lies chiefly in fields other than physics—business, the arts, entertainment, military science, government, the law, medicine, or religion—such theories might well seem plausible. But to the physicist they seem so irrational that they do not even deserve discussion, and he dismisses

them as nonsense. Saucer believers thereupon denounce the physicist as a bigot, complain of his "closed mind," and piously invoke the ghost of Galileo. They forget, apparently, that the persecutors of Galileo were specialists in theology and had only a nodding acquaintance with astronomy.

One of the earliest theories of UFO propulsion suggested that saucers got their motive power by tapping the lines of force in the earth's magnetic field. One author wrote:

"The earth being simply a huge magnet, a dynamo wound with magnetic lines of force as its coils, tenescopically [the meaning of this impressive word is unknown to the present authors] counted to be 1,257 to the square centimeter in one direction and 1,850 to the square centimeter in the other direction (eddy currents), indicates that natural law has placed these lines as close together as the hairs on one's head. And yet they never touch or cross each other if let alone. If done so by accident the catastrophe would spread like a searchlight and destroy everything in its path." [20, p. 139]

The same author asserts that such a "catastrophe" is the true explanation of Mantell's death (p. 33). Supposedly objecting to his close approach, the occupants of the saucer he was chasing manipulated some of the lines of force until they crossed in front of Mantell; the resulting surge of power knocked the plane out of the air. Under some conditions, he adds, the crossing of the lines can produce desirable effects, such as the Aurora Borealis, when "we have magnetic lines of force that are crossing one another at or near the geographic and the magnetic poles and as a result we see those beautiful colored lights." [20, p. 141]

To the physicist, these statements are an unsavory verbal hash. Lines of force cannot provide a source of power and they cannot cause explosions—they are not even real. Created merely to describe the behavior of magnetic fields, they have no more objective existence than a train of thought. By using the convenient fiction that lines of force emerge from the north magnetic pole, spread apart as they flow around the earth, and then crowd close together again as they enter the south magnetic pole, the physicist is able to map observed variations in the earth's magnetic field. In a similar

way the geographer uses contour lines to map high and low areas on the earth's surface.

A spacecraft could not propel itself by hitching to magnetic lines of force any more than a man could travel from Philadelphia to Peru by sliding down the 75th line of longitude.

The more sophisticated students of UFO behavior do not propose magnetic lines of force as a source of power. In fact they skip lightly over the awkward question of how the saucers are propelled and vaguely assert that extraterrestrial vehicles obtain energy (apparently without doing equivalent work) by somehow plugging in to the cosmic rays and magnetic fields that exist in space. Thus having access to unlimited power, a saucer supposedly draws on E-M forces to create and enclose itself in a kind of cocoon of artificial gravity. This G-field cuts off the attraction of the earth and other heavenly bodies, enables the saucer to attract or repel any approaching object, and allows it to travel almost as fast as light without suffering an increase in mass or a transformation into energy [18].

The G-Field Myth

To explain the alleged properties and behavior of flying saucers, a variety of speculations have been published on the nature and operation of the G-field [18, 19, 21]. In the physicist's view, most of these ideas belong more to the realm of magic than of science but we shall summarize them briefly, with a few parenthetical comments.

A UFO supposedly can travel at speeds of thousands of miles an hour and shatter the sound barrier without making any noise because the G-field would create a kind of protective envelope around the saucer. But if the G-field breaks down for any reason, so that the protective envelope is opened, then the ionized moving air hits ordinary static air and creates the thunderous detonation produced by some UFOs. (Even with an intact G-field, a boundary or gradient would always exist somewhere between the air that was dragged along by the saucer and the air that was not. A thunderous impact would certainly occur at this barrier.)

The "invisible" UFOs supposedly become so by using the G-field

to bend or deflect rays of light. (It is true that starlight passing near the sun's gravitational field suffers a deflection that makes the star appear slightly displaced from its actual position on the celestial sphere, but a shift in apparent location does not dim a star and does not make it invisible. Furthermore the amount of deflection is only 1.75 *seconds* of arc, less than half of a thousandth of a degree! To produce even this small deflection, a covey of saucers would have to be able to increase its mass to equal that of the sun: 1.97 times 10^{33} grams! What this increase in mass would do to the rest of the solar system doesn't bear thinking of.)

Angel hair (see *Chapter XI*) is supposed to be a waste product from the operation of the G-field. The ionization of the air inside the G-field allegedly would create heavy atoms that reacted chemically with the atoms in ordinary air to produce a kind of precipitate that falls to the ground and disappears as the ionization decreases. (In the physics laboratory, ionization means taking an electron away from an electrically neutral atom. The resulting atom would not be heavier. The contact between ordinary air and that in the ionized trail of a meteor has never yet produced "angel hair." No laboratory has ever reported that isotopes of oxygen, hydrogen, nitrogen, and other elements in the atmosphere can react with their normal analogues to produce precipitates. A change in ionization cannot make a chemical compound disappear.)

The envelope of air enclosed by the G-field is supposed to allow a UFO to accelerate or change direction instantaneously, even when flying at enormous speeds, because the UFO would not encounter atmospheric friction. (Vehicles moving in the earth's gravitational field are also surrounded by a cushion of air, but they still must overcome friction.)

At this point the whole G-field myth falls apart. One of the fundamental laws established by Newton, to which no exception has ever been found in the laboratory, states that a moving object will continue to move in a straight line unless it encounters an applied force. Let us suppose, for the moment, that a gravity shield could suddenly be interposed between a spacecraft and the earth, and thus make the craft reverse its direction of flight. The occupants would still be subject to the law of inertia. They would be hurled against the wall of the craft with a violence far greater than that

experienced by a plane crashing to earth from an altitude of 30,000 feet. There could be no cushioning of the blow.

Such dreams demonstrate an almost contemptuous disregard for reality. Physicists admittedly do not yet understand the basic nature of gravity, but they do know a great deal about how it acts. Gravity is the force that holds the universe together. It exerts a pull on all objects in the physical world—the earth, the moon, the planets, our sun, the distant stars, and even the stars in other galaxies. All these bodies without exception move according to the law of universal gravitation as formulated by Newton and refined by Einstein: Every particle in the universe attracts every other particle with a force that is proportional to the product of their masses, and inversely proportional to the square of the distance between them. The magnitude of the force depends only on the masses of the bodies and on their distances from each other. It does not depend at all on the nature of the medium that separates them. It operates unchanged through stone, metal, water, air, or empty space. With a metal shield we can reduce electrical forces to zero; with a soft-iron shield we can weaken magnetic forces; but no substance existing in nature can act as a shield to shut out the force of gravitation.

Electricity, Magnetism, and Gravity

No responsible scientist would assert that man has found out all there is to know about the universe, and few would insist that some kind of a shield for gravity is an absolute impossibility. As yet, however, no laboratory has detected any phenomenon that might be a clue to “negative gravity.” In recent years nuclear physicists have occasionally caught fleeting glimpses of what has been called “anti-matter,” electrons with positive charges and protons with negative charges—the reverse of their charges in the normal world. Some investigators have speculated on the gravitational properties of anti-matter, and have wondered whether it might exert a force that would repel instead of attract.

So far no one has been able to think of an experiment to test the idea. Even if someone could find a way to collect a thimbleful of anti-matter, when he brought it into contact with normal matter,

it, he, and his surroundings would instantly detonate like a super-colossal neutron bomb. Many physicists believe that, since electrical forces operate independently of gravitational forces, interchanging the charges on protons and electrons would probably have no effect on the gravitational field. Theoretical study and computations may someday yield an answer.

For years scientists have been searching for a "unified field theory," a single equation that would describe the interrelationship among electrical, magnetic, and gravitational forces. Such a mathematical statement would reveal the mysterious bond that holds together the atomic nucleus, imparts to atoms their unique structure, and keeps the stars in their courses. But this unifying equation, when it is found, will not make our present knowledge invalid. Enthusiasts are deluding themselves when they base their belief in flying saucers on the hope of overthrowing the laws of gravity and inertia. Gravity, magnetism, and electricity are actual physical forces, as real as light, air, houses, trees, or persons. They can act only according to the laws of nature which, unlike the laws passed by legislatures, are not subject to repeal. No juggling of words, no argument, no wish can change these laws any more than they can stop the rising of the sun or the waning of the moon.

If man is ever to learn to control the force of gravity, he will succeed not by denying the reality of the laws but only by finding out what they are and by trying to understand them.

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Chapter x

CONTACT!

All fields of human activity have their practical jokers. Elaborate hoaxes have been perpetrated in music, art, literature, history, religion, science—and in the world of flying saucers. Although the motives for such swindles are not always obvious, the trickster is usually trying to promote a cause, to gain fame and/or prestige, to make money, to satirize a folly, or just to have some fun at the public's expense. Some hoaxes, such as Mark Twain's petrified man, produce only harmless amusement. Others, planned as serious deceptions, can cause long-lasting damage. The celebrated Piltdown man was fraudulently created from an ape's jawbone, a stray tooth, and a few chemical staining agents; it gained fame for the scientists involved but threw the study of human evolution into a confusion that lasted more than twenty years, until the forgery was revealed in every detail [1].

A few hoaxes live on and on even after they are exposed, apparently because people enjoy believing in them. The Jersey devil, described as a fire-breathing monster with huge wings and a long tail, was first mentioned in the columns of a small-town newspaper in New Jersey in 1906. Within a few days inhabitants of rural areas all over the east coast were reporting glimpses of the frightening demon and on one particular night it allegedly terrified citizens in New Jersey, Pennsylvania, Delaware, and Maryland. The panic finally reached such heights that some towns closed their factories and theaters. This fantastic monster was quickly found to be a hoax, the brain child of the publicity manager for a Philadelphia museum of freaks; his sole purpose had been to drum up customers for the museum. Nevertheless many persons rejected this explanation and continued to believe that the creature really existed. It was re-

ported again in 1926, in 1930, in 1932, and may reappear again at any time. Obviously the Jersey devil, though admittedly the product of a hoax, has become a permanent part of the local fauna [2].

Flying-saucer hoaxes are rarely submitted to the Air Force as bona fide sightings. Of 1500 UFO reports, only forty-two proved to be deliberate frauds or the delusions of unstable persons. The hoaxer may give his tale to the newspapers, to a lecture audience, or even publish it in a book, but he carefully avoids Air Force scrutiny. His story will not hold up under close investigation, and he knows it.

Earthlings and Extraterrestrials

The fantasies of the obviously deluded are a problem for the clinician and will not be discussed in this book. Typical is the case of "Dr. X" who writes to strangers, inviting them to accompany him on his next visit to the "Brothers" in space and to "join the side of righteousness." Although Dr. X has several times set a date for the excursion, he has always had to postpone it for some reason. He himself, he says, has made more than sixty journeys on flying saucers and mother ships, and has often taken his automobile along—just why he needed it he does not explain.

Peculiarly hard to classify are the "contact" reports, in which a witness affirms that he has had one or more personal encounters with a spacecraft and that he has communicated with its occupants, who range in type from ordinary specimens of *Homo sapiens* to hairy dwarfs and elephant-faced little men in space suits. He gives a more or less detailed account of the incident and sometimes offers "proof" in the form of alleged photographs or fragments of the vehicle. Ostensibly inspired by religious or humanitarian motives, these "contactees" wholeheartedly support the theory that flying saucers originate in worlds beyond the earth.

In general the contactees tell essentially the same story, with minor variations: Earthling (the witness) sees a flying saucer; saucer lands. Extraterrestrial occupant emerges, extends friendly greetings, confides his wish to help the human race solve its problems, takes Earthling for a cruise to another planet, brings Earthling

back. After promising to maintain a sort of guardianship over the earth, the visitor says farewell and flies back to his home planet.

Although these stories are told in the first person, purportedly as fact, they perhaps should not be called hoaxes, for they can deceive only the credulous who want to believe that supermen from other worlds are hovering near to save our troubled planet. With no suspense, little characterization, and ludicrously bad science, these naïve accounts are fiction of such poor quality that they would be rejected by even the most hard-pressed editor of fantastic tales. Whether from Venus, Mars, Saturn, or the planets of other solar systems, these gods from the machine all look just like human beings and either speak the colloquial language of the contactee or communicate by thought transference. Their physical appearance, clothing, tastes in food, habits of thought, and ethical values usually seem indistinguishable from those of the citizens (whether American, French, or Brazilian) who report the visitors.

The "Contactees"

One man who supposedly was privileged to make contact with visitors from space was Daniel Fry who, while strolling in the New Mexico desert on the evening of July 4, 1950, noticed a flying saucer that had apparently just landed. When he approached and started to touch the ship, he suddenly heard a voice speaking in friendly caution: "Better not touch the hull, pal, it's still hot." The voice, he discovered, belonged to an extraterrestrial being in a mother ship that was hovering some 900 miles above the earth. The craft on the ground needed no crew, for it was a "remote-controlled cargo carrier," sent down to collect samples of the earth's atmosphere. Communicating by mental telepathy, the spaceman revealed that, although he came from a remote planet, his ancestors had been earthmen who had migrated from the island of Lemuria in ancient times (see *Chapter II*). Strangely enough, although the visitor's first remark had shown a remarkable command of contemporary English, he did not know what a roller coaster was! He took such a fancy to Fry that he invited him to enter the cargo craft and treated him

to a quick flight to New York and back, a round trip of 4000 miles completed in half an hour! [3]

A contactee whose experience offered variations on the basic theme was Truman Bethurum, a construction worker. According to his story, he happened to be looking for sea shells in the Nevada desert sometime before dawn one morning in July 1952 when he encountered a flying saucer and its friendly crew. The captain was a female, a "queen among women," whose attractive costume included a bright-red skirt, a black-velvet short-sleeved blouse, and a black beret with red trim [4]. Though the grandmother of two, she was so beautiful that at their first meeting Bethurum was speechless. Obviously trying to put him at his ease, she smiled and said encouragingly, "Speak up, my friend, you're not hexed." During the following months, he says, they had several meetings and eventually, at her invitation, he accompanied her on an enjoyable visit to the saucer's home base, the planet "Clarion." Being placed directly behind the moon and apparently moving in a parallel orbit, this heavenly body has entirely escaped the notice of earthly astronomers [5].

George W. Van Tassel, operator of a commercial airport, resort, and guest ranch in California (for some reason most of the better-known contactees seem to be Californians), allegedly made contact with space beings of a more ethereal type. Their saucers traveled on power produced by the "transmutation of hard light particles into soft light particles," and a typical vehicle was 1500 feet in diameter, 300 feet thick, and carried a crew of 7200. Why they needed so much room—more than 70,000 cubic feet per spaceman—remains a mystery, for both the ship and its occupants were made of pure light. The mother ships remained thousands of miles above the earth at substations from which they sent out their "ventlos," or flying saucers, to patrol the earth and try to improve conditions here. Speaking through Van Tassel, the visitors sent many messages such as that of June 28, 1952:

"Salutations. My identity is Qel, 72nd projection, 15th wave, realms of Schare [a saucer station in space]. We are passing over your cone of receptivity, 172 thousand miles above you. Our center requests that I inform you. You will see more of us if you watch the skies."

Several times the spacemen threatened, if opposed, to launch thousands of saucers per second against the earth. In January 1953 they warned that they had three substations in space ready to release 500,000 saucers each; two months later, in March, they informed Van Tassel that they now had 3½ million saucers in operation around the earth. Somehow or other, this armada of UFOs seems to have remained invisible to both the United States Air Force and the public [6].

Whether such tales are delusions, fantasies, or hoaxes may be impossible to determine. Some contact cases, however, undoubtedly contain elements of fraud. At worst, the witness may be deliberately inventing the whole story from start to finish; at best, he may feel so certain of the reality of his experience that he feels justified in manufacturing evidence to convince possible skeptics. No matter what his motives, when he tries to add verisimilitude to his narrative by fabricating proofs, he joins the company of hoaxers [7].

In the Maury Island case (see *Chapter II*), the witnesses offered alleged fragments of a disabled spaceship, which turned out to be chunks of slag. The scoutmaster in Florida exhibited singed hair on his arm and a scorched cap to prove that he had suffered from the heat rays of a landed flying saucer (see *Chapter VII*), and the grain salesman in Nebraska bolstered his tale of the Saturnian ship by pointing to shallow cracks in a dry river bed and oil smudges on the grass (see *Chapter IX*).

A contactee who provided "proof" of his story was Howard Menger, who specialized in describing visits to the moon. In the moon cities, he said, he met many earth scientists who enjoyed a delightful, relaxed existence. The lunar natives use no money, are born without appendixes, and for entertainment play a game very much like baseball. In science they are way ahead of us: using saucers equipped with "self-contained gravity" and propelled by "processed free energy," they transported him from earth to moon in only two hours [8]. As a trophy of his visit, Menger brought back a lunar potato. This remarkable vegetable was supposed to have five times the protein content of an ordinary American potato, but unfortunately it was not available for analysis. As soon as he returned, he said, he had turned it over to the United States Government, and the government was keeping it top secret [9].

Adamski's Travels

Perhaps the best known of the contactees is George Adamski, who on the night of November 20, 1952, in the desert of Southern California, supposedly met and talked with the pilot of a vehicle that had just arrived from Venus. Conversation was no problem; both men simply used telepathy and sign language when words failed [10]. In the years since then Adamski has reported many other pleasant chats with visitors from Mars and Saturn as well as Venus, and has allegedly made several journeys in their spacecraft, including an aerial tour of the moon. On this trip he observed with surprise that the moon's hidden side contained fertile country abounding in lakes, rivers, vegetation, and prosperous cities with people strolling along the sidewalks [11]. He was not at all disconcerted when the Russian photographs of the moon's far side showed no trace of these delightful features. Obviously, said Adamski, the Russians had simply retouched the pictures before releasing them to the world, in order to deceive the United States and to conceal the vegetation, trees, and buildings of the space people who had their bases there [12].

Clearly aware of possible skepticism, Adamski did not ask the public to accept his experiences on his unsupported word; as evidence, he offered various photographs showing cigar-shaped objects, a rocky hillside with a white blob on the horizon, and the drawing of a person apparently clad in coveralls—without the book's explanation no one would ever suspect that he came from the planet Venus. One of the best-known pictures he published showed a bell-shaped "spaceship" with circular openings near the top and three large balls on the bottom for landing gear. By an interesting coincidence, this craft closely resembles a well-known type of chicken brooder, whose three infrared bulbs at the base look very much like the "landing gear" of the alleged spacecraft (see Figure 15). When skeptics doubted Adamski's claim that he had traveled from Kansas City, Missouri, to Davenport, Iowa, by flying saucer, he displayed one of the most unusual items ever called upon

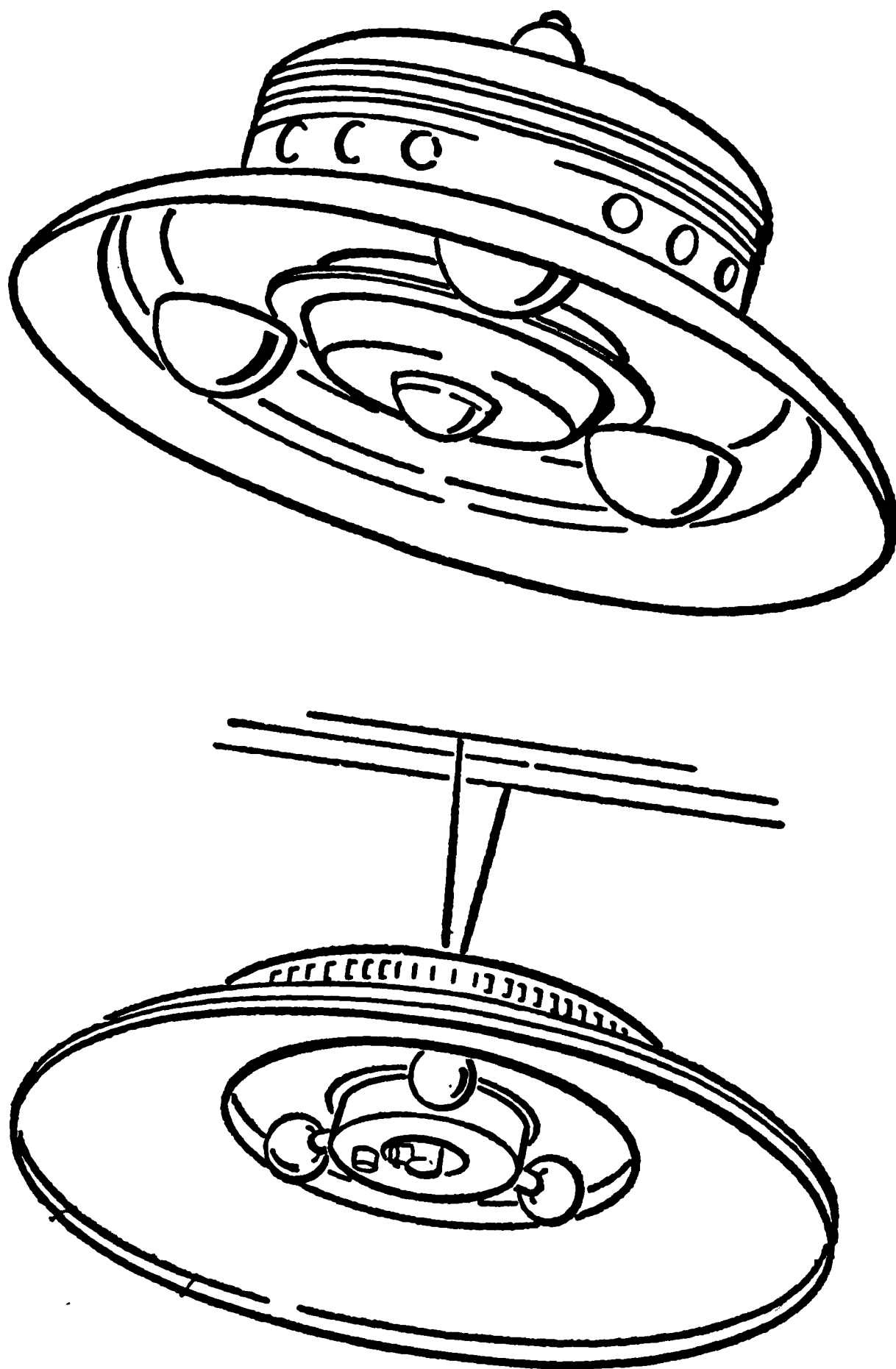


Figure 15. Top, schematic drawing of Adamski's Venusian saucer. Bottom, schematic drawing of chicken brooder.

to prove the existence of spaceships: his uncanceled railway ticket, for which he requested a refund! [13]

Photography and the UFO

Those who believe in flying saucers have long hoped to obtain a good clear photograph that would establish their existence once and for all. Many "UFO" pictures show vague specks and blurs whose interpretation is limited only by the imagination of the viewer. Of the many pictures taken in good faith and offered in evidence, none shows an indubitable spaceship. Most of them are genuine photographs showing indistinct images of jet planes, birds, balloons, and other objects normally in the sky. They are puzzling only until they are compared with similar photographs of known jet planes, birds, balloons, and other normal objects; then their identity becomes obvious.

Trick photography has often been called upon to prove the reality of the incredible—fairies, ectoplasm, ghosts—and it has also played a part in the history of flying saucers. While the most detailed contact stories have usually come from the United States, for some peculiar reason the best of the faked pictures have come from Europe and South America. A widely publicized photograph supposedly taken at Taormina, Sicily, in 1954 shows four men standing on a bridge and apparently gazing at two UFOs soaring overhead [14]. The deep shadows cast by the men and the bridge railing show that the sun was shining brilliantly, but the objects in the sky, which look like the inverted covers of teapots or sugar bowls, show only faintly shadowed areas. Stranger yet, the shady side of one UFO is on the left, that of the other UFO on the right. The men on the bridge have their heads tilted at such an angle that they could not possibly have seen the objects pictured, but are obviously looking at the hill in the background instead of at the sky. Even a casual inspection exposes this picture as a crude fake (see Plate VIa).

An even cruder fake was offered as evidence to Dr. Menzel in South Africa in the summer of 1962. The optimistic photographer insisted that he had snapped a genuine saucer on the wing, even though the circular object shown in the print was an unmistakable hubcap, the Chevrolet trade-mark clearly legible.

The Isle of Lovers Hoax

Some photographic hoaxes are more cleverly executed. In May 1952, a few weeks after *Life* magazine had alarmed the world with its article "Have We Visitors from Outer Space?" [15], the Brazilian weekly picture magazine *O Cruzeiro* published startlingly clear photographs of an alleged flying saucer [16]. According to the accompanying story, a reporter and a photographer on the staff of the magazine on May 7 had visited Ilha dos Amores, an island not far from Rio de Janeiro, to do a feature assignment. Late in the afternoon, at a moment when the photographer just happened to have his camera pointed at the sky, the reporter suddenly called his attention to a passing UFO. During the minute or so the object was in view he obtained five pictures which, along with the reporter's eyewitness story, were released to the public on May 17. If the editors actually believed in the reality of the saucer, the ten-day delay before informing the world of its visit is remarkable. The magazine has never admitted that the photographs were a hoax, but they inspired doubt even in sympathetic investigators [17].

The UFO appears in a dull sky above a mountain peak. In the first picture the object looks like a jet plane surrounded by an exhaust haze and, with a little imagination, might be called a Saturn-like object. In succeeding pictures it resembles the lid of a teapot, or the bottom view of a rubber stopper for a sink. A study of the shadows quickly reveals the fraudulent nature of these photographs: the dome on top of the "saucer" casts its shadow to the right, while the trees and mountains in the foreground cast their shadows to the left. The picture could be authentic only in a peculiar world in which the sun shone from the west on objects on the ground, but shone from the east on objects flying in the sky!

The Trindade Island Saucer

The most famous of all purported photographs of a UFO, the Trindade Island saucer, also came from Brazil. First published in

Brazilian newspapers on February 21, 1958, the pictures showed dark mountain crags looming against an overcast sky. Above one peak appeared a startling image (much like the *O Cruzeiro* saucer of 1952) resembling the planet Saturn—a flattened sphere banded round the middle by a dark line that extended like a platform beyond the curved sides. According to the accompanying news stories, the UFO had flown over the island of Trindade and had been observed by the officers and crew of a ship of the Brazilian Navy. The pictures, taken by a photographer on board, had been examined and supposedly pronounced genuine by Navy experts before being released to the press. Since a responsible military organization and a major world government thus seemed to accept the photographs as proof that flying saucers actually existed, the incident raised a storm of official inquiry both in Brazil and abroad. Then, within a few weeks, the storm abruptly subsided. Although no explanation was given, the object in the pictures was obviously considered no threat to our planet's security (see Plate VIb).

Although saucer enthusiasts regard these pictures as genuine evidence for the reality of UFOs, careful study of the facts strongly suggests that this case, which rocked the Brazilian Government and created a short-lived but world-wide saucer scare, was merely an unusually skillful hoax [18].

At first glance, the circumstances of the sighting seemed to be entirely clear and straightforward [19]. Trindade is a barren, mountainous island of about six square miles, about 600 miles from the coast of Brazil. Abandoned after the end of the Second World War, the island remained deserted except by sea gulls until October 1957, when the Brazilian Navy established an oceanographic post and a meteorological station there to carry out its research for the International Geophysical Year (IGY). To facilitate the oceanographic studies, the Navy also converted a training ship, the *Almirante Saldanha*, into a floating laboratory equipped with scientific apparatus and photographic darkroom. With a crew of about 300, the ship routinely traveled between Rio de Janeiro and Trindade Island on its duties for the IGY.

A major function of the meteorological station was the launching and tracking of weather balloons; they were painted red, inflated with hydrogen, and carried radio transmitters. Launched each morn-

ing, they were tracked by radio and optical devices to show the movements of the winds in the upper atmosphere. At a certain point (when the balloon burst, or at a prearranged signal) the balloon released a bag of scientific instruments which, attached to a parachute, floated to the ground to be retrieved.

The Trindade station began operation in November 1957. Almost immediately, UFOs were reported over the island. (Brazil had not been immune to the flying-saucer epidemic that had begun in Texas early that month [see *Chapter ix*], and sentries at Itaipu Fort, near Santos, on November 4 had reported a UFO that knocked out the lights and electric plant.) With weather balloons going up daily, parachutes floating down at odd times, and sea gulls cruising over the island, the advent of other "saucers" was inevitable. During November and December several UFOs were reported by workmen, none of whom were trained observers. Although neither Captain Bacellar, the commanding officer at the station, nor his officers saw any unidentified objects, he radioed Rio to report the incidents and investigated each story. Some he found to be false, some were based on mistaken identification of gulls and balloons, and in others the evidence was inconclusive.

Early in January 1958, when the *Almirante Saldanha* arrived on schedule at Trindade, it had on board several civilian guests who were to collaborate in various aspects of the research. Among them was Almiro Barauna, a professional photographer. After several days at the island, the ship prepared to leave for the return trip to Rio on January 16. Shortly after noon Barauna was on deck with his camera, waiting to film the departure. The sky was thinly overcast, the sea was rough, and waves dashing against the ship and the rocky shore created a noisy background.

According to the news accounts printed several weeks later, Captain Viegas, of the Brazilian Air Force, suddenly shouted "*Olha o disco!* [Flying saucer!]" Hearing the shout, Barauna peered at the sky and saw a luminous oval object moving swiftly toward the island. Officers and crewmen on deck also observed the UFO, he said, and interfered with his aim as they ran about excitedly. Nevertheless he managed to take six shots of the UFO as it approached the island, disappeared behind a mountain peak, reversed direction and reappeared at a lower altitude, retraced its course, and van-

ished with incredible speed against the horizon. The unknown had arrived and departed in a period of about twenty seconds.

According to the news stories, the photographer had retired to the ship's darkroom under the supervision of an officer to develop the negative, and found that four of the six exposures showed the mysterious object. He was not able to make prints, he said, because the darkroom supplies unfortunately did not include any photographic paper. However, he did exhibit the negative, and the officers and crewmen who examined it allegedly agreed that it showed the same Saturn-like UFO that had flown over the island. After the return to Rio he made prints and enlargements and turned them over, together with the negative, to the Brazilian Navy.

The question of authenticity arose immediately. Called down to Intelligence headquarters for an interview, Barauna underwent a four-hour interrogation concerning the pictures. During the questioning he was asked, "If you were going to make a flying saucer appear on a negative, how would you proceed?" He replied, as he later told a reporter, "*Comandante*, I am an able photographer, specialized in trick photography, but I could not produce one that would withstand close and accurate examination." [18]

In spite of this modest disclaimer, some of the photographic evidence clearly suggested fraud, and a strong difference of opinion developed among government officials. Some accepted the pictures as a genuine record of a flying saucer; others pronounced them fakes. For several weeks the incident was kept secret, but when eventually someone took the prints to the President of Brazil, further concealment became impossible. Yielding to the persuasion of certain military advisers and newsmen, and against the advice of the Naval Ministry, he released the pictures to the press.

The Brazilian Naval Ministry

The photographs were published on February 21, five weeks after they were taken. Since the President had apparently accepted them at face value, the Naval Ministry was obviously in a difficult position; through an unofficial spokesman it issued a statement notable for its lack of enthusiasm:

"On the morning of January 16, 1958, over the island of Trindade, the crew of the school ship *Almirante Saldanha* sighted an unidentified aerial object for a few seconds. A civilian who was aboard the ship took some pictures of the object. The Navy has no connection with the case, and its only connection with the occurrence was the fact that the photographer was aboard the school ship, and came back with the ship to Rio." [20]

On the same day another Navy spokesman released a similar unofficial statement to *O Globo*:

"The news about a flying saucer sighted over the Island of Trindade was received here with utmost reserve. There will be an investigation to verify the authenticity of the sightings and photos. No officer or sailor from the N.E. *Almiranté Saldanha* witnessed the event." [20]

Immediately an international furor broke out. Were these pictures indeed proof of extraterrestrial spaceships, or were they a hoax, with the Brazilian President and the Brazilian Navy as victims? Who were the witnesses, and exactly what did they report? In the United States, high officials asked for copies of the pictures. An editor of *Look* magazine asked Dr. Menzel to fly to Brazil to evaluate the evidence, but later canceled the plan when the Rio office advised that the photographs were generally considered fraudulent. Public excitement in Brazil became so great that on February 23 the Naval Ministry released an official statement, distinguished by its air of caution, which concluded:

"Clearly this Ministry will not be able to make any pronouncement concerning the reality of the object seen because the photographs do not constitute sufficient proof for this purpose." [18]

The day after the pictures were published the *Almirante Saldanha*, which had been lying outside the harbor at Rio, received orders to sail. Not until February 24, when the ship docked at Santos, did newsmen have a chance to interview the officers and crewmen who allegedly had observed the Trindade saucer and could support Barauna's story. None of them, it turned out, had actually seen the object.

The Assistant Naval Attaché of the United States, who was then in Santos in connection with the visit of the U. S. Coast Guard cutter *Westwind*, visited the Brazilian ship to collect information

about the Trindade saucer, but with little success. The commanding officer stated that he had not seen the alleged UFO; he had seen the pictures but refused to express an opinion on their authenticity; he stated that his secretary might have seen the UFO but the secretary, when questioned, preferred not to discuss the matter. The executive officer said that he had not been on deck at the time of the sighting, but that other persons might have seen the object.

During the next week arguments for and against the authenticity of the photographs filled the Brazilian papers, and *O Globo* published deliberately faked views of a "flying saucer"—a china plate tossed into the air. A federal deputy in an official note to the Naval Ministry deplored their amazing failure to procure sworn statements from the officers and crewmen who were reported to have witnessed the UFO.

In spite of the widespread and increasing skepticism, the weekly magazine *O Cruzeiro* used the Trindade pictures for its lead story in the issue of March 8. "Once bitten, twice shy" apparently did not apply to its editors, who seemed instead to adopt the principle, "In for a penny, in for a pound." The photographs, they remarked editorially, not only proved the existence of flying saucers, they also established the authenticity of the Ilha dos Amores pictures published several years earlier. As though to emphasize this point, the magazine assigned the Trindade story and the interviews with witnesses to the same staff reporter who had described the Ilha dos Amores saucer in 1952. The Naval Ministry refrained from further comment and, since the military authorities showed no alarm about the possibility of extraterrestrial patrols, public interest in the pictures quickly died.

The report sent home by the U. S. Naval Attaché included the comment:

"There appear to be only two explanations for this peculiar incident, and the peculiar handling of it by the Brazilian Government: (a) Some overwhelming power has told the Brazilian Navy not to verify this incident officially (which they should easily be able to do, if it actually occurred) or to deny it (which they should easily be able to do if it is a fake). I personally do not believe that anyone has told the Brazilian Navy to keep quiet about it because there has been no hint of such suppression in either Brazilian or

United States circles. I also doubt that their control of the individual officers and men would be good enough to hold the line in any event. (b) The whole thing is a fake publicity stunt. . . . This seems more likely. . . .” [18]

The Icarai Submarine Hunting Club

The accounts originally printed in the Brazilian papers and in *O Cruzeiro* contain a number of significant details that have been glossed over or ignored by UFO enthusiasts, both in Brazil [19] and in the United States [21], who apparently accept the Trindade saucer at face value. A study of the available news stories, facts gathered by Intelligence officers, and of the photographs themselves leads inescapably to the conclusion that the Trindade Island photographs were almost certainly a hoax.

Almiro Barauna was a free-lance photographer. A professional of unusual skill, he had long been interested in flying saucers and, some time before the Trindade incident, he had published a purposely humorous magazine article entitled “A Flying Saucer Hunted Me at Home” and illustrated by admittedly faked photographs. He had also published trick photographs of “treasure chests” lying on the ocean bottom. In addition, Barauna specialized in underwater photography and was a member of the Icarai Submarine Hunting Club, a group interested in skin diving and the study of life on the ocean floor.

When the *Almirante Saldanha* left Rio for its historic January visit to Trindade Island, the ship had on board, as guests of the Navy, five members of the Icarai Club. Among the five, in addition to Barauna, were Amilar Vieira Filho, captain of the group, and José Teobaldo Viegas, a retired captain in the Brazilian Air Force [22]. On January 16 when the ship was getting ready to leave Trindade, these three friends were on deck, Barauna with his loaded Rolleiflex camera, the other two standing some distance away. Suddenly Vieira remarked on a big sea gull in the sky. Looking up, Viegas immediately shouted, “Flying saucer!” and Barauna snapped his pictures.

No other eyewitnesses have been found, even though the deck

was crowded with sailors. The ship's dentist has been listed as a witness (in one document he appears as two persons, under two different versions of his name) but no newspaper yet examined mentions his story. Captain Bacellar, returning from his post as commander of the Trindade station, has also been listed as a witness but, according to his statement, he was not on deck when the incident occurred.

Vieira, the first man to sight the object, had called it "a big sea gull." When interviewed five weeks later, in the midst of the saucer excitement, he had changed his mind about its being a sea gull, but he was no longer certain just what he had seen. He stated that the unknown had been in view for twenty seconds at most, and had disappeared too quickly for him to note any details; it was simply an oval gray object that seemed to flash briefly before it vanished. He did not mention the Saturn-like bands around the middle that are a conspicuous feature of the photograph.

The Trindade Photographs

Accounts of the Trindade affair often remark that the photographs must be genuine because no opportunity for fraud occurred. On the contrary, there were ample and repeated opportunities. Since Barauna was not under observation when he loaded his camera, he could easily have inserted a prepared film, with no one the wiser. With the type of camera used, the operation would have been simple. He was again free from observation when he developed the negatives. Captain Bacellar escorted him to the door of the dark-room but remained outside, on guard at the door. The only person to accompany Barauna inside (to help by holding a flashlight) was his friend Viegas—the same man who had cried "Flying saucer!"

When Barauna emerged with the dripping film, Bacellar examined it but what he expected to find is a question, since he had not observed the UFO. The witnesses allegedly agreed, however, that the negatives showed the object they had seen in the sky—an amazing feat when we remember that the Rolleiflex film frame is small, only about 2.25 inches square.

In the print of Frame 3 shown in *O Cruzeiro* [22], the UFO is

slightly more than $\frac{1}{4}$ inch long and less than $\frac{1}{8}$ inch thick. Assuming an enlargement factor of a little more than three, we find that the UFO on the negative would have appeared merely as a pale blur about $\frac{1}{16}$ of an inch in length and no thicker than a pencil line. Miraculous eyesight would have been required to distinguish a "Saturn-like" or any other shape.

The Navy's officers on board showed astonishingly little interest in the film and did nothing to prevent the possibility of fraud. All during the homeward trip the photographer had both the camera and the negative in his own possession. When the ship stopped at Santos, he and his fellow club members were allowed to debark (with camera and negative), and they completed the journey to Rio by bus. The ship had been anchored at Rio for two days before Captain Bacellar, of the Trindade station, finally called on Barauna and asked to see the prints so that he could show them to the Navy. Thus the photographer had been free of supervision for days. In that time he could have produced pictures of little men from Mars, if he had wanted to.

The pictures themselves raise many questions. The three witnesses had emphasized the brilliance of the UFO, yet the prints show merely a gray shape with no suggestion of luminosity. Barauna had used a Rolleiflex camera, 2.8 Model E, f/8 lens, set at 125. Finding that he had overexposed the film, he said, he had treated the negative with silver salts after development in order to increase the contrast. (During this procedure he was, again, without official supervision.)

The prints used in *O Cruzeiro* have obviously been cropped since, unlike the film frames, they are not square. Frame 1 shows the UFO above the sea, some distance from the island; Frame 2 shows the UFO above rocky crags, at the right of a peak. Frame 3 shows it at the right of the peak but at lower altitude. Frames 4 and 5, not reproduced, did not show the object, and in Frame 6 the UFO is a mere speck low on the horizon.

Frame 3, the only one showing the Saturn-like shape, deserves special attention. In the published print the mountains in the foreground are quite clear, while the UFO is little more than a dark line with an indistinct beginning and end, with a faint suggestion of rounding at top and bottom; without the dark line the curves would scarcely be visible, so completely does the object merge into

the background of overcast sky. The picture widely distributed by news agencies is a further enlargement of the section containing the UFO. In the enlarged section, the foreground rocks are a mere black blur, but the UFO has gained greatly in clarity. The central band is darker, particularly at the left, and the outlines of the object are no longer vague.

The Navy's study of the negatives revealed several dubious features. The details of the land in the foreground were very sharp but the UFO disk was hazy, showed little contrast, and was essentially without shadows. The object in Frame 2 seemed to have been inverted, as compared with Frames 1 and 3. From the reported high velocity of the saucer and the fast shutter speed, some lateral haziness might have been expected, but no such blurring appeared.

Exactly when and how the fraudulent images were produced—if they were fraudulent—cannot be known. Experienced photographers can easily think of a dozen possible devices. The probability that they were faked is overwhelming and, but for the embarrassing fact that the Brazilian President had seemed to sponsor them publicly, the Naval Ministry would undoubtedly have exposed the entire hoax.

In summary, the facts are these: The man who made the Trindade pictures had no connection with the Brazilian Navy; he was a professional photographer noted particularly as an expert at trick photography. No officer or crewman of the Brazilian Navy reported seeing the UFO; in addition to the photographer, only two persons are on record as actual eyewitnesses; both of them were personal friends of the photographer; neither of them had any connection with the Brazilian Navy. The photographer had ample time and many opportunities to fake the pictures. A Rolleiflex camera can easily be used for double exposures. A series of pictures of a model saucer against a dark background could be rerolled and exposed a second time to provide the background, an old and well-known photographic trick. The pictures themselves show internal inconsistencies. The Brazilian Naval Ministry never accepted the pictures as authentic records of a flying saucer.*

* During a visit to Rio de Janeiro in February 1963, Dr. Menzel discussed this case with some of Brazil's leading astronomers; they concurred in the view that the Trindade saucer was a hoax.

The final paragraph from a United States Intelligence report provides perhaps the most appropriate comment on the affair:

"It is the reporting officer's private opinion that a flying saucer sighting would be unlikely at the very barren island of Trindade, since everyone knows that Martians are extremely comfort-loving creatures."

Project Ozma

Astronomers have found no evidence suggesting that intelligent life exists on any of earth's sister planets. Most scientists would agree, however, that life of some kind probably does exist in other parts of our galaxy and in other galaxies. Even if this probability were certainty and space travel were possible over the vast distances we measure in light years, the chance that earthman and alien will ever establish physical contact remains infinitesimally small. An explorer (whether from earth or from a planet of another sun) would have to begin by locating, among the millions of stars in the heavens, a particular star that had a family of life-bearing planets. If he were able to identify one of these needles in the cosmic haystack, he would next have to find out which of the planets supported living, intelligent organisms. If he could find the planet and set down his spaceship, the explorer would then have to try to identify and to communicate with creatures that might be unimaginably strange—so strange that he would not recognize them as either living or intelligent.

At present, only light waves and radio waves can bridge the immensities of space. Physical travel to other star systems is not now and may never be possible. Nevertheless, men are making attempts to find out whether other intelligent beings do exist outside the solar system and, if so, where. The earliest effort, known as Project Ozma, started a few years ago at the National Radio Astronomy Observatory at Green Bank, West Virginia. As the first step in a systematic search, the astronomers began to listen for possible radio signals from the neighborhood of certain stars. Tau Ceti, Epsilon Eridani, and 61 Cygni were chosen as the first targets because they lie within range of our radio telescopes—ten to eleven light years

distant—and because they resemble our own sun in age and type and therefore might have planetary systems not unlike our own. So far, the radio telescopes have detected no phenomena that might be interpreted as artificial signals.

The problems involved are incredibly difficult. A background of radio noise—"swishes," "whistles," "tweeks"—comes in constantly from the universe at large. Deliberate signals, if they occurred, would be hard to distinguish from the random noise. Even if signals came in and were detected, they might still be indecipherable just as the written records of some early civilizations on our own planet remain a mystery. Egyptian hieroglyphs were meaningless pictures for millennia until the Rosetta stone provided the key, less than 200 years ago. The many pages of text and pictures left by the Mayan Indians cannot yet be read, except for some dates and a few astronomical symbols. Hundreds of inscriptions exist in the Etruscan language, written in an alphabet that resembles the familiar Greek, but scholars have deciphered only a few words.

If we are not able to interpret the records devised and set down by human beings like ourselves, we will not easily understand signals that might possibly be broadcast by aliens from the planets of other suns.

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Chapter XI

ANGEL HAIR, PANCAKES, ETC.

If thousands of aircraft from other planets have indeed been patrolling the earth for many years (according to some authors, for centuries), they have achieved an incredibly perfect safety record. Disabled or wrecked flying saucers have occasionally been reported, but the debris and bodies to be expected from such incidents have never been located.

A "mummified man," sometimes referred to as proof of such a catastrophe, may be seen at Caspar, Wyoming. Found in the Rocky Mountains in the autumn of 1932, this little creature measures 6½ inches high in a sitting position and weighs three-quarters of a pound. Paleontologists recognize it as *Hesperopithecus*, an anthropoid denizen of earth during the Pliocene period. The mummified body of another such creature, supposedly found in Arizona, has also been called the remains of "a little green man." [1] In 1952 four spaceships were supposed to have crashed in the deserts of New Mexico and Arizona, carrying the bodies of thirty-four "little men" [2], but the only evidence offered for this disaster was a chunk of "unknown metal" that proved to be ordinary aluminum, and the entire drama was shown to be the work of a known hoaxer [3]. Although a few flying-saucer organizations regard such "humanoid" evidence with some doubt, others, such as the Aerial Phenomena Research Organization (APRO) are less skeptical of the reality of "little men." [4]

UFO publications have reported the finding of various substances alleged to have been produced by UFOs. The offices of Air Force investigators at Dayton house a small museum of such "pieces of saucers"—old batteries, meteorites, parts of primitive radios, rocks, corroded lead pipe, tangles of wire, strips of tin foil. Although a

few of these specimens have been sent in by optimistic hoaxers, most of them have been submitted by genuinely puzzled citizens. When analysis shows the normal origin of such an object, the finder usually accepts the verdict calmly, whether he is disappointed or relieved, but occasionally he rejects the identification and indignantly accuses the Air Force of theft, substitution, or plain lying to suppress the "truth." Nevertheless, not a single fragment studied so far—animal, vegetable, or mineral—shows any evidence that it grew or was constructed on an alien world.

Angel Hair and Spiders

Some centuries ago the primitive inhabitants of the Hawaiian Islands, observing the feathery, hairlike threads of volcanic glass left on the ground from ancient eruptions, accounted for the substance by the legend that the goddess Pelee had once stopped somewhere in the neighborhood to comb her hair. "Angel hair," a term in UFO parlance used to describe any unfamiliar fibers, strands, threads, liquids, granules, and powders found on the earth and supposedly deposited from flying saucers, offers an interesting analogy.

Fils de la Vierge—the hair of the Virgin Mary—is the usual French phrase for gossamer or cobwebs, whose origin was long a mystery. Similarly the English "gossamer" commonly means cobwebs. According to one source, the word may be derived from *gaze à Marie*—the gauze of Mary. According to legend, cobwebs were formed from threads that fell from the shroud of the Virgin Mary on her Assumption. UFO enthusiasts in France began to use *fils de la Vierge* in 1952, to describe the cobwebby material that allegedly fell from flying saucers. Translators of the French UFO publications, instead of using the English equivalent "gossamer" or "cobwebs," chose to create the new term "angel hair" which, unlike the French, implies an entirely strange substance, one that has no apparent connection with such ordinary earthly phenomena as spiders.

Two remarkable falls of angel hair were reported in France on October 17 and 27, 1952. In both incidents, witnesses observed in the sky a strangely shaped, cottony cloud at a height of several thousand feet. Above it was a long, narrow, cylindrical object trailed by

a white plume, moving slowly across the sky and accompanied by twenty or thirty smaller objects that looked like puffs of smoke. Following a broken path, they made rapid zigzag motions, and left a broad ribbon of white substance that slowly drifted to the ground and clung to trees, telephone wires, and roofs of houses. These masses of white threads were described as like wool, nylon, or Fiberglas. When rolled into a ball they became gelatinous and disappeared within a few hours; set on fire, they burned like cellophane.

One witness was able to disentangle a single strand more than ten yards long. None of the material, unfortunately, was preserved for study.

Students of UFOs pondered the unusual phenomenon: "If the observers really did see what they described, and if all these objects were machines guided by a single intelligence, then what mysterious experiment were they performing? What purpose was served by the strange ballet of paired saucers? What was the meaning of the whitish streak appearing between two saucers on separation? What, finally, was the 'angel's hair' that sublimed so readily in the air?" [5, p. 150] UFO enthusiasts have suggested various theories of the nature and origin of the mysterious substance. According to one hypothesis [5, p. 149], angel hair might be produced in the wake of a spacecraft moving in a force field; ionization of the atmosphere would produce ultraheavy particles which would react with ordinary air to form a kind of precipitate—angel hair—which would disintegrate as ionization decreased (see *Chapter ix*). Another theory suggests that angel hair might be a chain polymer of cellulose containing radioactive carbon 14 (the carbon 14 being produced by the action of cosmic rays on atoms of nitrogen in the atmosphere), hydrogen, and oxygen from moisture in the air, the three elements combining under the action of ultraheavy particles produced by ionization [6]. This theory overlooks the fact that cellulose is not formed from a combination of carbon dioxide, oxygen, and hydrogen in air. Rather, it is made by living organisms in a series of complicated enzymic reactions. Even if cellulose could be made by the hypothetical reaction suggested, it would contain no more carbon 14 than does the ordinary carbon dioxide in the air.

To French entomologists, the angel hair seen in October 1952, was no mystery at all. The objects dancing the strange ballet were

not spaceships, but spiders. Far from performing a mysterious experiment, they were merely carrying out the well-established routine of migration.

Each year the young spiders of most species leave the nests of their infancy and prepare to establish their own homes. Crawling by the hundreds or the thousands to the tops of fence posts, walls, or trees, they spin long silken webs which, inflated by the air, carry the tiny emigrants up from the ground. These gossamer parachutes drift up and along on rising air currents, sometimes to great heights; they may soar for a few yards or for many miles over hills and valleys. These migrating balloonists have been observed as high as 14,000 feet, and at sea 200 miles from any land. Eventually drifting back to earth, the spiders detach the now useless parachutes and move off to build new nests for the coming year, while the abandoned gossamer may pile up in great masses on trees, fences, telephone wires, and ground, to decay and vanish in a matter of hours. These gossamer showers sometimes include so many outworn webs that the filmy blankets of fine silk may be several inches deep and may cover an entire landscape like snow.

These migrations occur in spring or, more frequently, in autumn—but only when the weather is exactly right. Spiders may sit patiently for days, waiting for a calm, clear, windless day. On such days the steady upward currents of air from the sun-warmed ground carry the spiders gently aloft [7]. The association of angel hair with UFO sightings is completely natural. The drifting patches of gossamer reflect the sun brilliantly. A whole armada of saucers can appear overhead and then vanish as the gossamer cascades to earth.

The description of the material and the date of the fall both indicate that the angel hair observed in France in October 1952 was of arachnid origin. Even the weather was exactly right—"superb, with a sky of cloudless blue"—for the migration of a smother of spiders.

A similar fall of angel hair occurred in the United States on October 22, 1954, near a school in Marysville, Ohio. At afternoon recess the pupils of the Jerome Elementary School noticed a dazzlingly bright object in the sky. It disappeared, and for the next forty-five minutes both children and teachers watched white, cottonlike tufts

floating slowly down to the ground. The material was in long strands, very fine and soft, could be stretched and rolled into a tiny ball, but quickly vanished to nothing and left a green stain on the hands. The stuff clung to grass and cars, draped the telephone wires for a distance of three miles, and was like a misty canopy over the road [6].

Unfortunately none of the material was preserved and no analysis was possible. Marysville is near Columbus, Ohio, an industrial center, and the stuff might have been waste products from one of the many factories. Since similar falls were reported in Indiana during the same period, the substance more probably was gossamer. As in the French incidents, the time was late October and the weather was perfect, a warm autumn day with a sunny, cloudless sky. Both the time and the weather were ideal for migrating spiders to take to the air, float down to earth on their fluffy parachutes, and then discard the no longer necessary *filis de la Vierge*.

Many falls of angel hair that occur in the warm days of Indian summer are probably abandoned gossamer. It is significant that of fourteen such incidents reported in Europe and the United States, all but three took place in October and November, the season of spider migration [6]. In one of the three incidents reported in other months (Horseheads, New York, February 21, 1955) the angel hair was identified as waste products from the local milk plant.

One of the most recent reports of angel hair came from Sebree, Kentucky, on September 11, 1962, when state police and the local Civil Defense director were called in to investigate a strange substance that looked like spun glass, which had been floating down near the residence of Mr. Y in great quantities for more than an hour. The Air Force, when called for advice, suggested three possibilities: the material might be chemicals used in cloud seeding, might be refuse from a defective filter in a chemical or industrial plant, or might be gossamer formed by migrating spiders. The first two possibilities were quickly ruled out. The witnesses, when re-questioned, remembered that they had indeed noticed spiders clinging to several bits of the material they had picked up. The troopers' report concluded, "It is the belief of this unit the substance observed was gossamer formed by huge quantities of migrating spiders moving, which is normal for this season."

The yearly migration of spiders and sloughing of gossamer is an established fact. As an explanation of angel hair it is far less fantastic than a still-hypothetical cruising spaceship.

Other Varieties of Angel Hair

Several types of angel hair not of arachnid origin have been reported in industrial areas, particularly in and near cities that have textile factories. When the filtering system of such a factory fails to work properly, lint and waste residues may be thrown into the air to be carried away by the wind and eventually deposited on the ground. Drifting fibers of nylon, rayon, and other fabrics can mystify an observer, especially if the residues break and disappear when touched. Some cities, such as Cincinnati, maintain an Air Pollution Center to deal with the problems resulting from air contamination by industrial wastes. Scientists at this and other centers often collaborate with ATIC in identifying unknown substances reported in connection with UFOs.

Late in the afternoon of September 25, 1956, a housewife in Cincinnati noticed a strange substance floating down into her yard, a white, fibrous material that curled when she touched it. Wondering if she had found some angel hair, she described the incident to the editors of *Orbit*, a saucer publication; in addition, she collected some of the material in a jar and sent it to the Air Force for analysis [8]. Working in collaboration with the Air Pollution Center at Cincinnati, ATIC investigators subjected the material to chemical and microscopic tests and identified it as waste products from fibers of cuprammonium (Bemberg) rayon, from a local industrial plant [9].

The possible varieties of angel hair increase with the development of new technologies. During March and April 1959, the Air Force received many reports that flying saucers were cruising over the mountains near Coburn, Virginia, regularly used a landing strip on an inaccessible peak of Sheep Rock Mountain, and frequently dropped angel hair on the nearby countryside. The investigating officer collected some of the material and identified it as a type of "window," the rolls or long strips of aluminum foil used by the

military in World War II to produce spurious radar echoes and confuse enemy anti-aircraft fire. The Coburn angel hair was identical with the foil used by Air Force planes carrying out experiments in the area. "Window" falls very slowly; dropped from a height of 40,000 feet, it may easily be visible for some time to ground observers, as well as interfere with local radar reception [10].

A similar angel-hair incident was reported on November 23, 1960, when many residents in southern Michigan and the Midwest reported a mysterious, glowing white object in the eastern sky that was dropping strange material to the earth. Witnesses described the object variously as a comet, a satellite with a tail, or a saucer-shaped UFO. The angel hair was quickly identified as foil dropped by planes that were conducting a test of radar reception [11].

Reports of angel hair still come in occasionally to ATIC and, if the explanation is not immediately obvious, are investigated. On the afternoon of October 12, 1959, officials at Robins Air Force Base, Georgia, received a telephone call stating that unidentified substances were falling from unknown objects in the sky near the town of Washington. Two Air Force investigators arrived in the town before evening to interview the witnesses and examine the material.

The first sighting had occurred shortly before noon, when a farm woman noticed an object in the sky, traveling not particularly fast from southeast to west. A stream of peculiar-looking substance, broad as the vapor trail of a jet plane, was trailing behind and floating toward the earth. The object itself was "as large as a football," brown or black in color, and maintained a perfectly straight, even course. A few hours later in a town a few miles northeast, a man mowing his lawn noticed on the grass two whitish-gray streaks about ten feet long and eight inches wide, extending from east to west. Deciding that the peculiar streaks were a fungus or a mold, he mowed across them; at once a gray dust rose about twenty inches into the air and then settled back to earth.

The Air Force investigators took samples of the dusty earth and grass for analysis. Chemical tests showed the presence of silver iodide. Finding silver in such an unlikely place posed a problem, but it also pointed the way to a solution. Silver iodide and other silver halides are used in cloud seeding to produce rain; long "plumes"

of this material, ejected from planes, have been successfully tracked in mountainous country for distances of thirty-five miles downwind. A few questions in the right places produced the answer: research teams from the University of Georgia at Athens and from the Lockheed plant at Marietta had been in the air that day, carrying out experiments in cloud seeding. The angel hair was the silver iodide used in the experiment [10].

Angel hair of less mysterious origin has now found its way into the culinary world. The restaurant of the Hotel Bristol in Córdoba, Argentina, offers "Angel-hair soup," very fine threadlike spaghetti in chicken broth.

The Wisconsin Pancakes

Of the many substances offered the public as proof of extraterrestrial visitors, probably few have evoked more publicity than the Wisconsin pancakes. According to a plumber named Joe Simonton, of Eagle River, Wisconsin, a flying saucer with three peculiarly dressed occupants appeared in his yard on April 18, 1961, and hovered a few feet above the ground. When one of the saucermen indicated by sign language that he was thirsty and held out a two-handled jug, Simonton obligingly filled it with well water and handed it back. Looking through the open hatchway, he saw another spaceman cooking something on a kind of grill. When the spaceman noticed the terrestrial's interest, he presented him with three "pancakes" from the grill—thin, oblong, greasy, rubbery pastries perforated by small round holes and smelling strongly of goose grease. The saucer then departed. Although Simonton's curiosity apparently stopped short of tasting these gifts, he took them to a friend of his in Eagle River, a county judge and a member in good standing of the National Investigations Committee on Aerial Phenomena (NICAP) [12].

Eager to learn whether the flapjacks came from this world or another, the judge promptly mailed one of them to NICAP headquarters in Washington, D.C., explained its history and requested an analysis. At the same time he gave the story, as far as it went, to the newspapers. After two weeks of anxious waiting, on May 7

he again wrote to NICAP, protesting their failure to acknowledge his parcel and demanding either an analysis or the pancake. This time he received a prompt reply: NICAP deplored the publicity involving the organization with such a fantastic-sounding claim, but agreed to send the stuff to a chemist.

Meanwhile time was passing and pancakes, at least terrestrial ones, don't last forever. Without waiting for the report from the chemist, the judge submitted one of the remaining pancakes to Air Force investigators of UFOs. On May 25—the cakes were now more than a month old—he wrote a third letter, excoriating NICAP for its lack of enthusiasm over the evidence, and sent a carbon copy to Ray Palmer, editor of *Flying Saucers*, who in the early days of UFOs had been their staunch proponent (see *Chapter II*). The magazine promptly published the letter, with comments, as well as an editorial that solemnly reproached NICAP for its attitude toward contactee stories in general [13].

If the magazine and the judge had planned the entire episode deliberately to embarrass NICAP, they could not have timed it better. Busy trying to promote a Congressional hearing on flying saucers, NICAP apparently had no time, facilities, or inclination to investigate flapjacks of such dubious origin. Interrupted by phone calls, besieged by reporters, and generally harassed, NICAP mailed the cake to an Ohio physics professor, a member of the organization, in the hope that he could induce his colleague in the chemistry department to analyze the cake. Since the chemistry professor was ill, the physics professor returned the specimen to headquarters in Washington. Old and tired as it must have been by this time, the cake then was dispatched to New York to another NICAP member, a chemist, who began some preliminary tests.

Sometime during these weeks the Air Force announced the results of its analysis. The pancakes consisted of starch, fat, buckwheat hulls, soybean hulls, wheat bran, and other common substances; bacteriological and radiation readings were normal [14]. Obviously the specimen had been an ordinary pancake fried on earth—or else the spacemen's home planet produced grains that are indistinguishable from those flourishing on earth.

NICAP, however, had the last word. Preliminary tests by their chemist had shown that the cakes contained a common type of

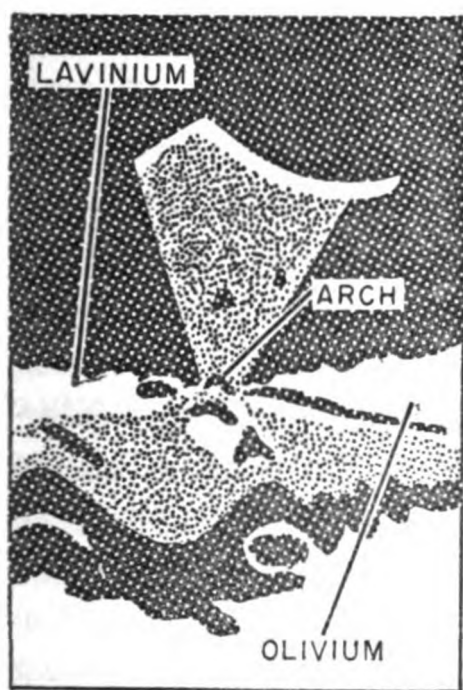
hydrogenated oil shortening that melted at body temperature. Further tests were temporarily delayed because of the expense. However, NICAP assured the judge, the tests would be completed sometime, and any fragments left over would be saved and returned! [15]

The Moon Bridge

On the evening of July 29, 1953, Mr. J. J. O'Neill, a science reporter for the New York *Herald Tribune*, was looking at the moon through his small telescope when he saw what he believed to be a shaft of light shining from the mountainous ridge above the Mare Crisium crater and fanning out into the shadowed area of the crater wall. According to his interpretation, the light was coming from underneath a new structure, a gigantic natural bridge twelve to twenty miles long that arched over a gap in the mountainous rim. This region of the moon had been thoroughly studied and mapped during the previous century and no such feature had ever been noticed. The sudden appearance of so spectacular an object, if true, would indeed require explanation. Alerted by news reports of the moon bridge, a British amateur astronomer, H. P. Wilkins, reported a few weeks later that he, too, could see the mysterious arch through his telescope (see Figure 16).

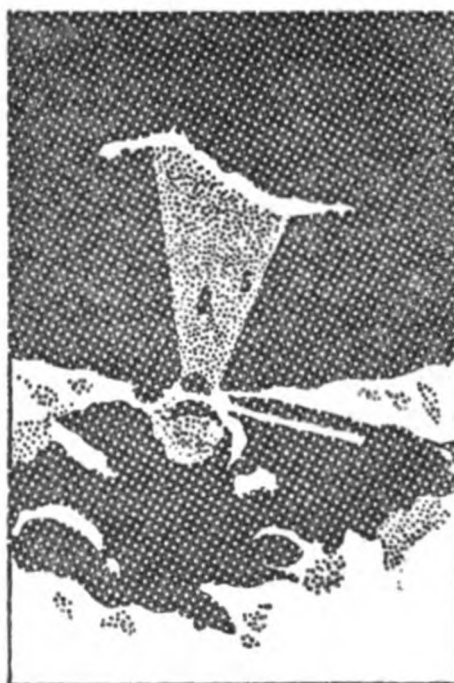
To saucer enthusiasts these reports constituted proof that the moon was inhabited. Since Nature alone could not have formed such an arch in so short a time, they argued, the bridge must be artificial. The structure might have been built by creatures living on the moon, perhaps in enormous underground cities. These beings might be native Selenites, or they might be colonists from Mars or from planets belonging to another solar system who were using the moon as a base for their spaceships [16].

Professional astronomers, queried about the mysterious bridge, pointed out that sunlight could not have produced the phenomenon in the way described. When a bright lamp shines through an open doorway into a darkened room, the light spreads out like a fan into the shadowed area because the light source is very near. But the supposed light source in this case was the far-distant sun. If a shaft



A

SUNSET



B

SUNSET



C

SUNSET

Figure 16. The "Moon Bridge." A, Just before sunset light fans out from beneath "arch"; B, the fan narrows as sun sinks lower; C, fan begins to disappear as sun sets below horizon. (Based on sketches by the late H. P. Wilkins.)

of sunlight were shining under a huge lunar arch, as claimed, the opposite boundaries of the illuminated area would be essentially parallel, not divergent like the fan-shaped region described. Examining the Mare Crisium wall through the fifteen-inch Harvard telescope, Dr. Menzel (who was therefore labeled "one of the Army stooges" [16a]) concluded that the bright area observed by the amateurs must have been a high plateau that was still illuminated by the setting sun while the rest of the crater wall was already in darkness. The roughly curved boundary of the illuminated plateau, seen against the shadowed mountains, had been mistakenly interpreted as a bridge. Dr. G. P. Kuiper, one of the world's leading authorities on the moon, also studied the area with the eighty-two-inch reflecting telescope at the McDonald Observatory, and reached the same conclusion.

One writer offered further proof (derived from an unnamed source) for the reality of the new bridge. Astronomers at Mount Palomar Observatory, he asserted, had made a secret study that confirmed the presence of the structure; furthermore a spectrographic analysis was supposed to have proved that the bridge was made of metal [16].

Sensible comment on these statements is not easy. A "secret" study would be impossible since the moon's face is obviously open to all viewers, and the purported chemical analysis is sheer nonsense. The spectroscope can tell the physicist what luminous gases are present in the atmosphere around a heavenly body, but it cannot reveal the composition of a solid object on the surface of the body, unless the object is first heated until it vaporizes and is transformed into gas. Before a physicist could make a spectrographic analysis of the alleged lunar structure, he would have to land on the moon and chip off a piece of the "bridge" itself.

"Pieces of Saucers"

In UFO publications, any oddly shaped chunk of rock or metal is likely to be described as a fragment of an interplanetary craft. A six-inch meteorite that fell at Sylacauga, Alabama, (*Chapter v*) has been classified in one saucer book as an "unidentified crashed ob-

ject.” [16] By peculiar reverse logic, sometimes the *absence* of a solid fragment is adduced as equally valid evidence of flying saucers. The green fireballs of New Mexico (*Chapter v*) were identified as spacecraft partly because they did not leave material traces on the ground. Similarly, when a small object apparently struck and went through a metal signboard in New Haven, Connecticut, on August 19, 1953, the object itself could not be found. Nevertheless, from a study of the size and shape of the hole and the material around the hole, saucer investigators, with more than Sherlockian skill, concluded that the object must have been a missile from outer space.

To identify “pieces of saucers,” a new pseudoscience has now developed which we may call “xenochemistry,” the interpretation of substances allegedly from other planets. In xenochemistry, a full qualitative and quantitative analysis is usually not performed and exact results are not made public. From an identification and sometimes a quantitative estimate of one or two of the elements present in the specimen, the investigator infers the nature of the rest and treats the inference as proved fact. On the basis of this “analysis” he concludes that the object, before it entered our atmosphere, must have had a certain chemical composition that is unknown or impossible on earth and that the object therefore came from another planet.

Silver Rain in Brazil

One of the most publicized substances to be analyzed in this way was the “silver rain” that allegedly fell from an unidentified flying object in Brazil. The incident occurred on December 13, 1954, in the city of Campinas and the witness was a housewife but, as in many UFO sightings, exactly what happened is not easy to find out [17]. UFO publications in England, New Zealand, and the United States reported that the sighting had occurred at night but, in spite of the darkness, the witness had observed the objects in detail. She described three gray-colored, circular flying saucers; each was made up of two sections or plates, one placed on top of the other; the top plate rotated continuously and sent out a strong light. Moving

soundlessly and in close formation, the three saucers had performed fantastic acrobatics over the city, apparently unnoticed by the other residents. Suddenly one of them had peeled off and dived low over the roof of the woman's house, lighting up the whole neighborhood with the brilliant glare of its rotating section; then, going into a high-speed climb, it dropped at her feet a liquid substance that fell "like silver rain."

According to the more generally accepted and more probable version, the incident occurred in the morning in full daylight. The housewife was feeding her poultry when she heard a noise on the ground near her feet. Stooping down, she observed a pool of shiny liquid, like silver rain, which solidified within a few seconds. Looking up, she saw three large objects moving rapidly high in the sky and they looked to her like flying saucers.

A reporter on the *Campinas Correio Popular*, hearing rumors that a flying saucer had dropped strange material "something like lead," interviewed the woman, collected some fragments that a neighbor had picked up, and took them to a local chemist for analysis. The newspaper then reported that the stuff was absolutely pure tin—that is, it was about 90 per cent pure tin and the rest was either oxidation or metal alloys that were unknown on earth [17, 18, 19].

Understandably interested in this report, members of the Brazilian Air Force also interviewed the witness and collected some of the fragments she showed them, as well as other fragments that had fallen about the same time in other parts of the city. Laboratory analysis showed the material to be merely solder. Several large airports not far from Campinas might well have had large planes in the air; they could have dropped the solder. The Air Force obviously saw no need to invoke the presence of extraterrestrial vehicles to account for the incident and considered the problem solved, but Brazilian saucer enthusiasts refused to accept this explanation. In their opinion the Air Force had either gotten hold of the wrong material or was covering up the true facts.

Two years later, in the autumn of 1956, the reporter who had ordered the original analysis received another collection of fragments and turned them over to a group of civilian investigators of UFO phenomena. Although he did not know the full history of

the new fragments (unfortunately he had forgotten the names of the persons who gave them to him), he himself was convinced that they were part of the original shower of silver rain. Accepting this theory, the civilians sent the fragments to the United States for analysis: one part to a sympathetic scientist at an Ohio college, who asked a chemist colleague to test the material, and another to a commercial chemist in New York. When the New York chemist, like the Brazilian Air Force in 1954, reported that the material was an ordinary tin solder, the UFO group concluded that the fragment sent him must have been spurious, and refused to accept his findings. The Ohio chemist reported that his specimen contained tin, did not contain antimony, and had a density of 10.3. Since the density of tin is 7.3, the sample obviously contained other elements in addition to tin.

With the reports in hand, the editor of the Brazilian *UFO Critical Bulletin* published the xenochemical conclusion under the headline, "Stuff Analyzed by American and Brazilian Scientists Proves the UFOs Are Non-Terrestrial Flying Machines." [18]

The full facts on which this conclusion rests should presumably be available for study, but they have never been published. The origin of the 1956 fragments is unknown; they may or may not have been part of the 1954 fall. But the 1954 incident at least offered an apparently ideal chance to establish beyond doubt the exact composition of a substance that fell from some object in the sky, and to determine whether it came from earth or from beyond. The material did not deliquesce or disappear, as gossamer and industrial waste may do, but remained available for analysis. Incredibly, this ideal chance was lost. Of the several chemists involved, none made a complete qualitative, quantitative, and spectroscopic analysis, and none published his complete data. The Ohio chemist, busy with ordinary duties, had time to make only a preliminary analysis of the 1956 fragment. He did not determine the amount of tin present and did not determine what elements other than tin were in the sample. The density of the 1954 sample is not known and the results of the complete qualitative, quantitative, and spectrographic tests, if performed, are not available.

When a businessman sends a specimen to a commercial chemist for analysis, he expects to receive a specific list of exactly what

elements it contains and in what percentages. If he received, instead, results such as those of the silver-rain analysis, plus the chemist's opinion that the specimen used to consist of something else in different proportions, the businessman would very properly refuse to pay.

No competent chemist would use the meager data available to assert that the 1954 and 1956 fragments had an identical origin, or that they were originally composed only of pure tin. A quantitative analysis theoretically could show that a given sample is composed entirely of a certain element such as tin, but if the sample contains only 90 per cent tin, 10 per cent obviously consists of other elements, and the specimen is not 100 per cent pure tin.

With so few facts available, the actual identity of the silver rain can only be guessed at, but overwhelming evidence indicates that it was made right here on earth.

The *Handbook of Chemistry and Physics* lists a large number of possibilities. At least 5 alloys of tin and lead, without antimony, have densities between 9.43 and 10.33, like the 1956 fragments. Ordinary "plumber's solder" is 67 per cent lead, 33 per cent tin, and has a density of 9.4. "Tinman's solder" is 67 per cent tin and 33 per cent lead. Many aluminum solders have neither antimony nor lead, but contain tin in percentages ranging from 50 to 97 per cent, combined with varying proportions of zinc, aluminum, copper, cadmium, or phosphorus.

One judicial-minded investigator of flying saucers gently pointed out to the editor of the *UFO Critical Bulletin* that the use of the word "proved" for the extraterrestrial origin of the silver rain was premature, and suggested the need for obtaining and publishing a complete analysis before drawing any conclusions. The editor responded with the peculiar logic of the xenochemist:

"What more is necessary to convince so severe and thickheaded person as Dr. —? Would be necessary a statement in conjunction with some highly worldly considered scientist? . . . Would be necessary a statement in conjunction from Eisenhower, Khrushchev and the Pope?— This he'll never get of course. Would be necessary a UFO landing on his private garden?" [17]

Another type of colored substance is the "blue rain" that sprinkled a thirty-mile stretch of countryside near London on September 9,

1962. Falling without warning from clear skies, it left a blue stain that wouldn't wash off. Investigation showed that the substance came from jet planes taking part in Britain's annual giant air show at Farnborough. The jets were using the blue dye to color their vapor trails and make a more spectacular display.

Other Mysterious Fragments

In the spring of 1960 Mrs. Coral Lorenzen, director of the Aerial Phenomena Research Organization, publicly challenged the truth of the Air Force statement that "no physical or material evidence, not even a minute fragment of so-called 'flying saucer' has ever been found." [20] Mrs. Lorenzen announced that she had in her possession two fragments of an extraterrestrial vehicle that had met with disaster in the earth's atmosphere. Without specifying the date and location of the event, the identity of the witnesses, or any corroborative details of the alleged disaster, she merely said that several persons had witnessed the catastrophe. She went on to assert, somewhat astonishingly, that "the gratifying aspect of this case, however, is that we do not have to depend on the testimony of witnesses to establish the reality of the incident for the most advanced laboratory tests indicate that the residual material could not have been produced through the application of any known terrestrial techniques." [21]

Sending a letter and two photographs of the fragments to Colonel Lawrence J. Tacker, then in the Office of Information, United States Air Force, she simultaneously released to the press copies of both letter and photographs, and suggested that the Air Force could "vindicate" itself by analyzing the material. The newspaper photographs showed one fragment about four inches long and two inches wide resembling petrified wood in appearance, and a smaller piece shaped roughly like a flattened cupcake, whose surface showed pits and whorls like those on the trailing end of a meteorite.

Two days later, without waiting for a reply from Washington, Mrs. Lorenzen through the newspaper amplified her challenge. If the Air Force wanted to examine the mysterious fragments, she said, they would first have to agree to certain conditions [22]:

"(1) APRO officers, together with duly appointed Air Force liaison personnel, would establish a board of experts representing both military and civilian UFO researchers.

"(2) This board of experts would decide what meaningful tests need to be performed on the material in question.

"(3) The board then would select a qualified testing agency to perform these tests under its cognizance."

In all its history, the United States Air Force can surely have received no more extraordinary proposition. Whatever he may have felt, Colonel Tacker merely suggested that Mrs. Lorenzen could submit the material to ATIC for analysis.

The fragments were never forwarded to the Air Force.

Eventually APRO published some information about the "disaster." Early in September 1957 a group of fishermen on a beach near Ubatuba, Brazil, had supposedly sighted a disk-shaped object flashing down toward the sea. The UFO had suddenly veered upward and exploded, showering down fragments and sparks like fireworks. Several pieces had been obtained by a Brazilian representative of APRO, who submitted them to a chemist for complete tests including spectrographic and X-ray diffraction analyses.

The analyses have apparently never been published. Although they evidently showed the presence of at least three elements common on earth—magnesium, hydrogen, and oxygen—APRO somehow deduced that the fragments in their original state had consisted of pure magnesium and that the hydroxide must have formed when they came in contact with the water. The final conclusion stated that the object consisted, at least in part, of 100% magnesium. Similarly, perhaps, a cook might assert that since chocolate fudge consists, at least in part, of 100 per cent sucrose, fudge must originally have been composed entirely of pure sugar, except for a little chocolate and milk it picked up in passing through the kitchen.

From the few facts available a positive identification of the fragments is impossible. The description of the object seen by the fishermen fits that of a meteor that broke into pieces near the end of its flight. In the photographs the fragments look like ordinary meteorites, which often contain a fair amount of magnesium (see *Chapter v*). There is no evidence to suggest that the fishermen's "wrecked spaceship" was anything but an exploding meteor.

In the last fifteen years the Air Force has patiently analyzed dozens of odd substances ranging from angel hair to pancakes. The statement made in 1960 by General Thomas D. White, Chief of Staff, United States Air Force, still holds true:

"By an act of Congress the United States Air Force is charged with the Air Defense of the United States. Rapid identification of anything that flies is an important part of air defense. Thus the Air Force initiated and continues the unidentified flying object program. Under this program all unidentified flying object sightings are investigated in meticulous detail by Air Force personnel and qualified scientific consultants. So far, not a single bit of material evidence of the existence of spaceships has been found." [23]

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- [16a] "There's Intelligent Life on the Moon!" *Flying Saucers* (May 1959), p. 73.
- [17] *UFO Critical Bulletin* (January-February 1958).
- [18] *UFO Critical Bulletin* (July-August 1957).
- [19] *UFO Critical Bulletin* (March-April 1958).
- [20] News Release No. 98-60, Department of Defense, January 29, 1960.
- [21] Alamogordo (N. Mex.) *Daily News*, March 13, 1960.
- [22] Alamogordo (N. Mex.) *Daily News*, March 15, 1960.
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Chapter XII

SPECIAL EFFECTS

Some flying-saucer reports, at first glance, do not seem to belong in any of the ordinary categories of sightings such as mistaken identification of air-borne objects or astronomical phenomena. Each of these atypical UFOs forms a class of its own and, when explained, proves to be the "special effect" of a unique situation. Many are misidentified lights or reflections, but since each one derives from a peculiar combination of circumstances that may not have occurred before and is not likely to occur again, accounting for them often requires a certain amount of luck as well as patient detective work.

Let us suppose, for example, that an Iowa farmer telephones the county sheriff one Tuesday afternoon to report that he has just seen a tiger running through his cornfield. When the sheriff arrives an hour later and can find no trace of a tiger, he is baffled; he knows the farmer is neither demented nor a hoaxter, and must have seen something remarkable—but what? The mystery remains unsolved until the sheriff learns from a feature story in Sunday's paper that on the preceding Tuesday afternoon a trailer truck, carrying a shipment of animals for the Des Moines zoo, had a flat tire while traveling on Highway X near the junction with Route Y. During the stop to repair the tire, a giant eland had escaped from its cage in the trailer; it had been recaptured and the truck had then continued its journey and delivered its cargo intact.

The sheriff can now reconstruct the peculiar combination of events that produced the "tiger" theory. He knows that the section of Highway X where the truck stopped runs parallel to the far side of the farmer's cornfield. The newspaper account tells him that a giant eland is a large antelope with short, twisted horns

and a tawny-colored coat with dark stripes. He concludes that the farmer, having only a few seconds' glimpse of a strange animal among the corn, had observed the eland's stripes but had failed to notice its horns, and had therefore mistaken it for a tiger.

The Role of Unusual Coincidence

Analogous unlikely coincidences account for many flying-saucer reports. The factors that encourage the misinterpretation may be the particular time or place at which the phenomenon appears, the kind of weather, the experience, physical state, or mood of the observer, his unawareness of a certain fact, or any combination of these and other relevant circumstances.

A fairly simple case of this type was the reported landing of a spacecraft near an Army barracks (often referred to in saucer publications as the "Nike site") in a rural area of Maryland, shortly before dawn on the morning of September 29, 1958. The sergeant on duty that morning left the orderly room at 4:25 A.M. and started to the barracks to waken the troops. The sky was clear, with bright moonlight. Hearing a whirring sound like a pitched baseball with a loose cover, he looked up toward the west to see a brilliant round white object soaring through the sky from north to south, and breaking up into smaller pieces as it traveled. It disappeared behind the roof of the mess hall, directly to the west, after being in view about two seconds. Hurrying around the south side of the mess hall to search the western horizon, he observed a very bright white, pulsating light at ground level, apparently in a wooded area some four or five miles west of the battery site, as though the glowing object had landed there. He reported the incident to an officer, who measured the azimuth position of the unknown. The glow remained in one place but diminished with increasing daylight until it was no longer visible.

Air Force investigators arrived that afternoon. They had already received many reports that a brilliant fireball had flashed through the sky at 4:25 A.M., the time in question, and had been observed by many witnesses in the area between Washington, D.C., and Pittsburgh, Pennsylvania, but no fireball could account for the

ground light. The next morning at 5:15 A.M. an intensely white, fluctuating light was observed at the same place and was studied through binoculars until daylight made it invisible; it could be seen only from the west side of the mess hall, and one step to the right or left would hide it from the observer. Traveling toward the position of the unknown, investigators found a dairy barn three miles away, and on a direct line of sight from the place the UFO had been observed. On one end of the barn was a 200-watt floodlight with a white reflector, still burning. On questioning the farmer, they learned that until recently the light had been burned out and had not been in use. The early hour of sunrise during the summer had provided all the light he needed to milk his cows. With the shorter days of autumn, however, he had needed the light and had replaced the bulb only a few days before. On the morning of the sighting, he had turned on the light a few minutes before the sergeant had noticed it [1].

Thus several unrelated factors had combined to produce the illusion of a landed space vehicle: 1) only a week earlier, newspapers had publicized the alleged landing of a flying saucer in Sheffield Lake, Ohio (see *Chapter XIII*); 2) a brilliant fireball had appeared; 3) a farmer had turned on a floodlight, previously out of use for several months; 4) the meteor had disappeared and the floodlight had appeared in roughly the same position as viewed by the observer.

The Problem of Unknown Lights

At night, when an observer notices a light appearing out of the darkness, he usually cannot see the object that produces or carries the light. Under familiar conditions on the ground or in the air he usually interprets the light correctly, by a kind of informed guesswork, as that of an automobile, an advertising sign, an airport beacon, a plane, a star, etc. But if it appears under unfamiliar conditions or in unexpected circumstances, he has to make an uninformed guess based on largely unconscious estimates of its size, distance, height, color, and rate of movement. To the driver of a car on a dark country road, a single light suddenly appearing ahead may

indicate a plane or a star low in the sky or something on the road itself—a motorcycle, a car with only one headlight working, a workman's lantern, a pedestrian carrying a flashlight, or something else. A double light may mean another automobile, two motorcycles traveling parallel, an animal whose eyes shine in the approaching headlight, or something else. The driver cannot be sure he interprets the light correctly until he passes it and can see the object itself or until he can identify it in some other way.

Michigan's Flying Bird Cage

A UFO sighting based on mistaken identification of strange lights occurred in the early morning hours of March 22, 1959, near Ann Arbor, Michigan. The night was clear, the moon was nearly full, and visibility was unusually good. At about 1:30 A.M. a man and his wife driving on a country road suddenly noticed a strange object hovering in the sky south of the road. According to their report to the Air Force, the UFO was an elongated oval with a dome on top, something like a bird cage, and brilliantly illuminated by two shafts of intense pale-yellow light that sprang from the bottom and converged over the top. Frightened at this apparition, the witnesses could provide only uncertain estimates of distance and size. The object seemed to be twenty to thirty feet in diameter, was at an altitude of about 200 feet when first seen, and was hovering about two miles away. As they drove on, the object seemed to move and travel parallel with the car for about a mile. Then the yellow lights dimmed and a circle of eight or ten red lights suddenly appeared on the underside, the UFO rose vertically, very rapidly, and vanished in a few seconds. It had been in view for a period of five to ten minutes.

Checking the most probable explanations first, ATIC officials found that the nearby Willow Run Airport had had no aircraft in the vicinity at the time and that no star or planet seemed to be involved. Further investigation showed that the flying bird cage was actually the radio telescope of the University of Michigan. The telescope was installed on the top of Peach Mountain and was clearly visible from the road on which the witnesses were traveling.

On the underside of the eighty-five-foot "dish" was a wire-mesh structure that suggested the bird cage. At the time of the sighting the dish was facing in the direction of the witnesses and was illuminated by a floodlight as well as by the bright moonlight. It had seemed to be following the car only because the car itself was moving. The astronomers operating the telescope were rotating the dish from the horizon to the zenith, and the yellow lights dimmed because the witnesses were seeing less and less of the surface. The "circle" of red lights was the red aircraft-warning lights on the WUOM radio tower, which lay in a direct line between the telescope and the witnesses. When the dish reached the zenith and was pointed to the sky overhead, the operating crew turned off the floodlights. The dish was no longer visible to the witnesses, who interpreted the sudden disappearance as a sudden vertical ascent into the sky [1].

UFOs from Reflections

Reflections from the bright sun have produced many elusive UFOs. All pilots are familiar with the luminous objects that sometimes appear in the air below a plane on a sunny day, particularly when the plane is flying over wooded terrain that is partly obscured by atmospheric haze. The sun has been reflected momentarily from a broad shiny surface, such as the metal roof of a farm building; because of the contrast between the bright surface and the dark forest surrounding it, the image appears to be a UFO floating high in the air.

Sometimes the sun shines on a bright metallic surface, such as the chrome trim of an automobile, and by chance is reflected directly into the eyes of a passer-by. If he then glances at the sky he may see a whole fleet of UFOs; the bright flash has produced a temporary chemical change in the retina so that for a moment or two the eye sees a series of saucer-shaped images of the sun. A photographer's flashbulb or a bright flash of lightning can produce similar after-images.

Some startling UFOs have been produced by reflections from an object that the witness was not able to see or did not recognize.

One night in the spring of 1961 an amateur astronomer reported that a huge cigar-shaped flying saucer was hovering in the sky several thousand feet above the Harvard College Observatory. Investigation showed that the "UFO" was a reflection from a small oblong insulator on an electric wire strung between two buildings. Faintly illuminated from below by the lights from the unshaded windows, it seemed to be an immense and brilliantly glowing object high in the sky. The witness at first refused to believe that he could so mistake the evidence of his own eyes. Next morning, however, he returned to the scene and was able to see that what had appeared the night before to be a giant spaceship was only a small insulator a few feet above his head.

The bright sun reflected at a particular time from an object invisible to the observer often produces a puzzling phenomenon, such as the flying saucer reported from Danby, California, early in October 1958.

About 4:00 in the afternoon on October 2, three prospectors standing near a tungsten mill at Railroad Danby noticed a sudden bright glow in the northwest sky which remained visible for about 2½ hours and then disappeared. When a glow appeared again the following day at the same time and place, the observers tried to identify it by using a small telescope and saw a bright, oblong object hovering above the horizon; it was the color of aluminum, approximately fifteen feet long, five feet high, and about four miles away. Getting into a car, the men drove in the direction of the object and searched the supposed location on foot for several hours, but could find no trace of the UFO.

Several days later, realizing that the object reappeared every day at about the same time and place, two of the men decided to investigate further. Studying the object through a pair of powerful binoculars, they could see guy wires coming from it and rods radiating from the guy wires. Remembering that two tall radio antennas used by the highway patrol stood in approximately the same location, the witnesses found the explanation, which Air Force investigators confirmed. The antennas, placed some twenty feet apart, extended about twenty feet above the trees. The cigar-shaped hovering object was a special effect depending on a particular combination of circumstances: only during the first part of October,

and only late in the afternoon, did the sun's rays strike the antenna in such a way that the reflection was visible to an observer at Railroad Danby [1].

Sundogs in Utah and France

Sundogs are another special effect resulting from a peculiar combination of circumstances, and they continue to supply their quota of good UFO reports. Tiny ice crystals floating in a layer of quiet air and reflecting a bright sun are responsible for producing sundogs. A thin layer of such crystals may be invisible to the observer; a thick layer appears as the familiar cirrus clouds. Sunlight filtering through such an ice fog is reflected in each crystal so that a pattern of bright spots of light forms in the sky, an image of the sun that sometimes rivals the sun itself in brilliance. These images are called mock suns, sundogs, or parhelia when they accompany the sun (and mock moons, moondogs, or paraselenae when they accompany the moon). They appear in the sky at a position a given distance from the sun and usually have a trace of red on the edge nearest the sun.

Occasionally a sundog makes a complete circle of light surrounding the sun with four bright patches, one above, one below, and one on either side. Sometimes two circles will appear, one within the other, surmounted by an inverted arc and traversed by a cross, like the spokes of a wheel whose center is the sun. The complicated structure of a fully developed mock sun—which is extremely rare—can suggest to the imaginative an enormous chariot in the sky and can terrify the superstitious. There is little doubt that this phenomenon inspired the two visions of Ezekiel described in the Bible.

Mock suns have been the cause of many UFO sightings. Even after several publications [see 1a] explained how the sun reflected from ice crystals could account for some of the reported flying saucers, this idea was largely ignored by early investigators who had a limited training in the physical sciences.

Sundogs are relatively uncommon. Few airmen, even those with long experience, have learned to recognize them. In a poll of both

commercial and military pilots, Dr. Menzel found that only one in five knew what a sundog was and how it might look in the sky. Two of three generals in the Air Force, similarly, were unfamiliar with the phenomenon. Like balloons, sundogs have a silvery metallic sheen. When observed from the ground, they seem to hover or move very sluggishly; to a witness in the air they seem to move rapidly, to pace the plane, or to take evasive action as though under intelligent control. When enough data are available, and the time of day and the position of the unknown relative to the sun are appropriate, a mock sun should be considered as a possible explanation of the UFO.

A sundog seen from a plane can suggest a spectacular and fantastic structure, like the one reported over Rheims, France, at 2:30 P.M. local time on March 31, 1960. The pilot and crew of a C-47 plane described the unknown as like a gigantic spool of thread some twelve feet tall. The neck of the spool, about six feet in diameter, seemed to be capped at top and bottom by disks eight or ten feet in diameter. The upper disk was reddish, the lower, blue-green. The plane was flying at 6000 feet and had just passed from a storm area into a region of calm with unlimited visibility. The UFO remained in view for about sixty seconds, then suddenly vanished. From an analysis of the data, the position of the unknown relative to the sun and the observers, and the weather situation, Air Force investigators positively identified the object as a mock sun [1].

One of the most recent sightings of this type occurred on October 2, 1961, a few minutes after noon [1]. A civilian pilot who was just taking off from the Utah Central Airport at Salt Lake City noticed a bright silvery disk in the air ahead of his plane. He supposed it to be another aircraft crossing his course. When he was air-borne, he was surprised to find that the object, now an elongated pencil shape, still appeared in the same position where he had first seen it and hence could not be a plane. Puzzled, he radioed the control tower and reported the UFO. Looking south as directed by the pilot, the tower operator easily found the object, a bright spot in the sky directly below the sun and apparently hovering over the town of Provo, forty miles to the south.

Deciding to investigate, the pilot left the traffic pattern and started directly south after the UFO. It seemed to be standing prac-

tically still in the sky, with a little rocking motion, at an altitude of 6500 to 7000 feet. He seemed to have approached within three to five miles when the UFO suddenly shot up "like an elevator" and retreated rapidly south, as though taking evasive action. The acceleration was tremendous, almost as though the UFO had been fired from a rocket, but there was no vapor trail and no sound. It then disappeared, gradually. "It just faded out. I kept my eyes glued right on it because I could see it was moving away at a great speed. I wanted to see how long it would take and it was just a second or two until it had faded completely. And it was getting smaller all the time, you could see it was moving away." The speed of departure, the pilot estimated, must have been thousands of miles an hour.

Alerted by the pilot's message to the control tower, several persons on the ground at the Salt Lake City airport, most of them with experience as pilots, had also been watching the UFO. Ground observers at the Provo airport, also alerted, were not able to locate the unknown, even though they had been told it was almost directly overhead.

Investigators from a nearby Air Force Base interviewed the witnesses, who were obviously competent and reliable. All agreed that the unknown had been a bright, silvery, metallic-looking object that seemed to glisten or flicker in the sun; that it was roughly oval or indeterminate in shape; that it was solid and tangible, but not a conventional aircraft or balloon; that it made no sound, showed no exhaust or vapor trail; that it was in view roughly fifteen minutes, and disappeared gradually by "blotting out" or fading. All but one of the witnesses agreed that the skies had been absolutely clear and cloudless; one stated that, although the day was clear, a very slight haze existed over the mountainous region where the UFO appeared.

In spite of this general agreement, certain significant discrepancies became evident. The pursuing pilot stated that the object had moved up and away from him at incredible speed, as though it were controlled. The ground observers, however, did not see any movement by the UFO. Most of them reported that it remained stationary as though it were suspended in the air; a few said that it vanished at intervals, only to reappear a few seconds later in

another place. Most of the time, they agreed, it just hung in the sky until it faded from view.

By analysis of these clues, ATIC was able to solve the mystery. According to the local weather bureau, the sky had been clear with visibility unlimited, but there had been very thin cirrus clouds, a layer of minute ice crystals suitable for producing a mock sun. A sundog would also account for the contradictory statements about the UFO's motion. Since the ground observers remained in one place, their position relative to the sundog did not change and it seemed to remain stationary. The pilot, however, was in a moving plane and changing his position relative to the UFO; hence it seemed to move rapidly away from him. In the same way a rainbow seems stationary to a person who merely stands and watches it. But if he begins to chase it, hoping to catch up and perhaps find the legendary pot of gold, the rainbow seems to move away and elude its pursuer. The pilot's belief that the UFO had exhibited fantastic speed was, according to his own statement, an inference based on the fact that the UFO quickly dwindled, became very small, and vanished. It disappeared, however, not because it was speeding away at thousands of miles an hour, but because of a change in the relative positions of sun and ice clouds that produced the sundog in the first place. One final point nailed down this explanation. The angular distance between sun and UFO was exactly that to be expected between sun and mock sun, at that time and place.

The details of this sighting obviously show a striking resemblance to some of those in the Mantell case (p. 33), in which the UFO and the sun had the same bearing from the pursuing plane as in the Salt Lake City incident. With the information now available, there can be little doubt that Mantell was actually chasing a Skyhook balloon. But in 1948 when so many of the relevant facts were not known, the sundog theory was a reasonable solution and may still be the correct one.

Bright Spots on Films

A bright blur, a ring of light, or a circular image something like the typical disk-shaped flying saucer sometimes appears on a film,

much to the surprise of the photographer, who had not noticed any such object when he took the picture. These UFOs are usually caused by reflections from unnoticed drops of moisture in the air or by defects in the camera itself (see Figure 17). If the source of the image is something peculiar, it may pose a real problem (see Plates VIIIa and b).

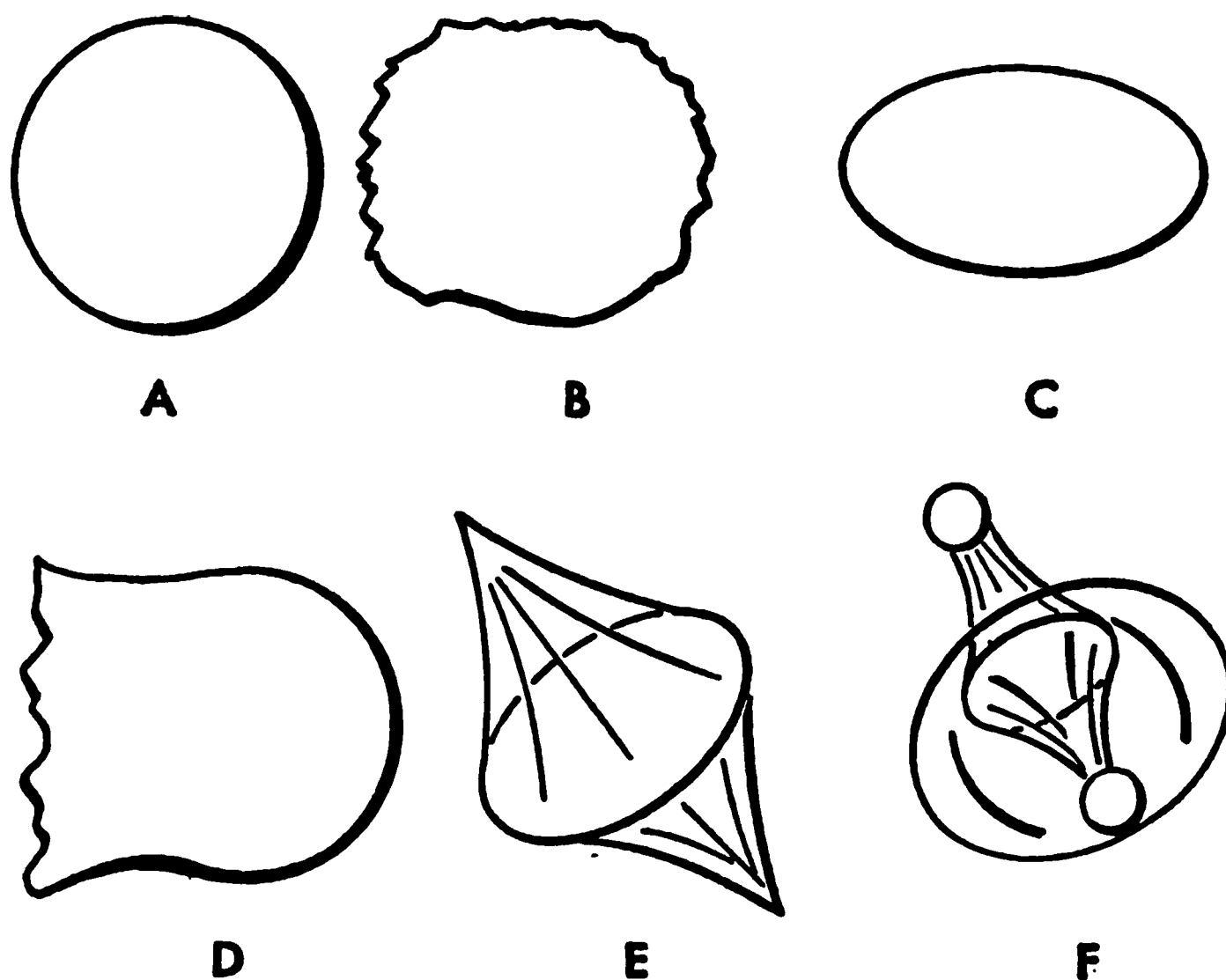


Figure 17. Distorted images produced on film by lens defects. A, True image; B, image produced by poor lens, not well figured; C, by astigmatism; D, coma; E, off-axis beam; F, off-axis beam and coma.

On July 24, 1957, an American tourist in Norway snapped a picture of a group of houses on a cliff above the seacoast, and was amazed to find some time later that the print showed a large white, doughnut-shaped object hovering in the sky above the coast. Puzzled by this apparent evidence of a saucer that had been visible to the camera but not to her, she submitted the facts to ATIC investigators. Thorough study of the negative, the camera, possible sources of reflection in the landscape at the time the photograph was taken, all failed to account for the mysterious intruder. Obviously not a cloud, the image closely resembled a smoke ring, but the photographer had not been smoking and there were no sources of smoke in

the neighborhood. The experts were baffled until one of them thought of a new possibility and again questioned the witness: had she by any chance been wearing a ring when she took the picture? She had—a sparkling diamond. If the angle of the sun, the direction she was facing, and the position of her ring finger in relation to the camera lens and to the sun had been exactly right, the annular image would have been reflected into the lens at the instant she snapped the picture. The resulting bright ring would look exactly like the UFO that appeared on the negative [1] (see Plate VIIb).

An unusually fine large UFO inserted itself into a photograph taken on February 6, 1959, near Boulder, Colorado. The witness had spent the afternoon climbing on Flagstaff Mountain and, about 5:00 P.M., snapped a picture of the town of Boulder, to the southeast. Although he had seen nothing unusual in the sky or in the air, the negative, when developed, showed a small black blob that printed as a white, luminous, roughly spherical object—a typical flying saucer (see Plate VIIa).

Civilian saucer investigators in the area procured a copy of the photograph and sent it to NICAP for evaluation. The witness himself did not immediately assume that he had photographed an interplanetary spaceship hovering over the city of Boulder; instead, he sent a print and a description of the circumstances to Dr. Menzel, who was well acquainted with the geography of Boulder and Flagstaff Mountain. Dr. Menzel suggested that the blob of light could have been produced by some type of reflection: "The sun appears to have been pretty low at the time. Is there, in the approximate position of the blob, some house with a fairly large window that could have been reflecting the sun? Stand at approximately the same spot and look over the region with a field glass. A bright spot like this often spreads enormously on the film. You can see from the picture that the sun must have been shining brilliantly. The shadow, especially of the large barn on the right, gives us some idea of the height of the sun. This was in February, and the angle of the sun will now have changed. Please make this test and let me know."

Not until the first week of May, however, was the witness able to repeat his excursion and make the necessary tests. Using a copy of his original picture as a guide, he was able to stand in the exact

spot from which he had taken the picture. He then realized that the Law Building of the University of Colorado stood in the place occupied by the UFO and that the big double window of the Law Building was at the exact center. In May no reflection appeared, but from calculations he found that the position of the February sun was such that the window, when open at just the right tilt, would reflect the sun's image to the exact spot on Flagstaff Mountain from which he took the picture. The image of the reflected sun is extremely bright and the film had been overexposed: therefore the image had spread on the film to create the large UFO. To confirm the hypothesis, the witness tried overprinting the negative so that the entire picture came out practically black, and with successively longer exposures the size of the bright UFO diminished. As he got it down to the smallest size on the blackest print, he could see the fuzzy outline of a window [2].

Unfamiliar Lights on Planes

In the spring of 1961, a leading saucer publication stated that unidentified objects were still surveying the earth and cited, among other cases, a bright UFO seen maneuvering the night of March 23 near Fort Pierce, Florida [3]. The report failed to mention that unidentified lights were seen on several other nights during that week in the skies over Jacksonville, Miami, and Cocoa-Titusville, as well as over Fort Pierce. Newspaper offices and radio stations in the area received many telephone queries about the mysterious lights, which were observed from the ground and from the air for periods of time ranging from five minutes to an hour. The descriptions showed an impressive consistency: the UFO was a round, twinkling light with a red or orange color changing to white, and exhibited a bobbing up-and-down motion as it swept across the horizon. In all sightings the weather was clear and the visibility excellent.

On the night of March 24 an Eastern Airlines pilot reported the UFO to the Miami Traffic Control. An observer in the control tower at the airport could see the object, but lost sight of it when he took up a plane to chase it. On the following night the Cocoa-Titusville Airport reported a similar object. A pilot in the air sighted the un-

known and, about an hour later, encountered a turbulence unlike anything he had experienced in sixteen years of flying. Cruising in the region the next day, he observed a burned-out area on the ground below the place where the UFO had been. On the night of March 27, a ground observer watched the unknown through binoculars as it moved rapidly from west to north and gradually disappeared in the northwest.

Most of these witnesses were veteran airmen, well able to recognize conventional phenomena in the night sky. Studying their reports, officials at Patrick Air Force Base decided that the similarity of the descriptions warranted further investigation. In the preliminary study, an Intelligence officer took up a B-57 aircraft in the vicinity of Fort Pierce, while ground radar at Patrick Air Force Base kept his plane under constant surveillance. At 7:20 P.M., when at 25,000 feet, he saw the UFO, a white light three times brighter than the brightest star. It appeared in the western sky and was moving north to south. When viewed with the naked eye, the light looked like a star that dimmed and brightened in a regular cycle; through binoculars it also displayed the red and green navigation lights of a plane. Soon after the visual sighting, the ground radar informed the investigating pilot that the object was approximately fifty nautical miles from his plane and was a jet airliner bound for Miami; the jet was observed for approximately ten minutes as it descended toward the Miami airport. The investigating plane remained in the air and, about five minutes after the jet had landed, observed a second, similar, high-intensity light that appeared in the western sky, moving from north to south. The radar at the Miami air-traffic control center positively identified this light as a Delta Airline jet, Flight 833, proceeding southeast. From these facts the officers concluded that the UFOs seen in Florida that week had been produced by commercial jet airliners [1].

Two questions remained: How had the experienced pilots and ground observers failed to recognize so familiar a phenomenon as a night-flying jet? What accounted for the unprecedented turbulence experienced by one pilot, and the burned-over ground below the region of the sighting?

The first question was soon answered. ATIC investigators telephoned the Federal Aviation Agency and learned that experiments

with a new type of anti-collision beacon were being carried out from various field offices, and that several jet airliners as well as some turboprop aircraft were using the new light. The standard beacon was a rotating sodium light, whose color is yellow. The new beacon was an intense white light which, viewed at a slant, becomes a spectacular phenomenon even more brilliant than Venus or Jupiter seen rising or setting through a hazy atmosphere. Since the witnesses were not familiar with the appearance of the experimental beacons, they had not recognized the newly equipped jets.

The answer to the second question came later, an example of the "luck" required to solve some of these UFO puzzles. Major W. T. Coleman, then Air Force Information Officer for the UFO project, was flying over the Fort Pierce region on the afternoon of April 29 in calm, clear weather when his plane ran into moderate turbulence of the short-wave type, "like riding in a car over a washboard road." The wind-shear component was not large enough to explain the turbulence, and though a cold front was approaching from the Gulf of Mexico, it was still far out on the edge of the western horizon. Then, being a native of Florida, he suddenly remembered that muck fires were fairly common in the Everglades region, which lay below the plane. Peering down at the glades, he noticed a very large muck fire. He concluded:

"Now, as typical with a cold front situation, the surface wind was blowing from the east pushing the smoke and heat toward the west coast of Florida. This relatively warm air naturally was lifting in the surrounding cool air. When the continuing warm air rose rapidly to the higher altitudes it ran into the reversed upper winds (high altitude westerly). In the process of being lifted the smoke filtered and cleared, yet the air remained relatively heated. It was moved directly across our course, thereby causing turbulence." [4]

The fires explained both the turbulence reported during the week of the UFO sightings and the burned-out area below the region of turbulence. Thus these Florida UFOs were not spacecraft watching the earth, but were a special effect created by the chance combination of unrelated factors: a new and unfamiliar anti-collision beacon, an advancing cold front, and fires in the Florida swamps.

Inversions in California

An unusually complex combination of events produced an epidemic of UFO sightings in northern California during the week of August 12 to 20, 1960. Nearly every night dozens of reliable citizens throughout Tehama County and the Mount Shasta region (long famous for its mysterious lights) reported UFOs at various times and of various descriptions: round, bright, metallic UFOs glowing with a reddish-purple fluorescent type of light, cigar-shaped UFOs trailing a long fiery exhaust, oval UFOs with red lights at each end and white lights in between, yellow-colored UFOs like a flying railroad car with flashing red lights at each end and white lights glowing at the windows. Radios roared with static and radar sets were plagued with phantoms, as the state was apparently invaded by a whole fleet of patrolling saucers.

The most important factor in these sightings was the weather; prolonged and extensive temperature inversions prevailed in the area all that week. From southern Oregon through northern California multiple inversions of 3 to 18 degrees occurred nightly. Under these conditions, practically any light shining into the night was apt to be projected upward as a mirage and to perform weird antics. Determining what was the particular light source of some specific phenomenon is almost impossible.

As complicating factors, certain heavenly bodies made their own contribution to the excitement. Most of the objects observed late at night and watched for periods of one to three hours were refracted images of the stars Capella or Aldebaran or the planet Mars.

Some of the most spectacular sightings were those reported from Red Bluff on the night of August 13-14. Two highway patrolmen were chasing a speeding motorcycle when, at about 11:50 P.M. P.D.S.T., they saw what they at first supposed to be a brilliantly lighted aircraft falling directly toward them. Jumping out of their car, they watched the object as it apparently reversed its course, shot upward, and began to perform fantastic maneuvers in the eastern sky. The performance continued for more than two hours. Before it ended, a second UFO had joined in the celestial dance, which

was observed by dozens of excited witnesses in the Red Bluff area.

Air Force bases in the neighborhood were notified, and ATIC investigators gathered and studied the evidence. There was no real mystery [1]. The UFO first noticed by the patrolmen was probably the star Capella, which at Red Bluff is circumpolar; it rose at 10:50 P.M. and at the time of the sighting was about 4.7 degrees above the northeast horizon. About an hour later (12:48 A.M.) Mars rose, also in the northeast; and close behind it (1:15 A.M.) came the bright star Aldebaran, which made a striking pair with Mars. With three brilliant heavenly bodies just above the horizon, on a night of fantastic multiple inversions of temperature and humidity, the only surprising fact is that the number of UFOs reported was not larger.

A person who has never been lucky enough to see a good mirage may feel skeptical about the phenomenon. But those who have encountered a first-rate specimen—for example, the Chicago skyline suspended upside down in mid-air above Lake Michigan—know how startlingly real it can seem. When the source of the mirage is not apparent, the displaced image can seem mysterious and even frightening, as do many UFOs.

One such phenomenon, which might easily have been interpreted as a flying saucer, appeared shortly after dark one evening in mid-July, 1954, and was described by Dr. Menzel in a letter to a friend:

"My wife and I were driving to Alamosa, Colorado, on one of the longest, straightest stretches of highway in the United States, commonly referred to as the 'gun-barrel highway.' I had turned over the wheel to her and was settling back for a rest, after a long turn at driving over the mountains, when I became aware of unusual driving behavior on her part. First she would step on the gas; then on the brake, then on the gas again. 'What is the matter? What are you trying to do?' I asked. 'See that truck ahead?' she replied. 'Every time I try to pass it, it speeds up, and then it slows down when I try to give it a chance to get ahead of me. It's making me nervous.'

"I peered ahead through the darkness and there, sure enough, about three hundred feet ahead of us was a truck, its dark body brilliantly outlined with red and white lights. I studied the situation and glanced at the speedometer, which read forty miles per hour. 'Well,' I advised her, 'you certainly ought to be able to pass that,

dear, the way you usually drive.' And this time she really stepped on the gas, pushing the speed up to sixty, seventy, eighty, and finally eighty-five. And would you believe it, that truck took right out ahead, still holding its estimated three hundred feet clearance, and matched us for every mile of that speed. By this time I was beginning to get an idea. 'Slow down,' I said. My wife obliged me by coming to a dead stop, brakes squealing.

"'Now see there,' she said, 'I just escaped running into that truck.' And the truck had stopped, still 300 feet ahead. At this point I ventured my conclusion. 'That isn't a truck,' I explained. 'It's a flying saucer.' 'You have flying saucers on the brain,' she said. Well, to shorten the story, she started the car again and the 'truck' moved off. And we chased it in that fashion for about fifty miles. On rare occasions, as we dipped slightly in a hollow, the truck would seem to dash ahead at speeds close to 1000 miles an hour. Or sometimes it would jump straight up, momentarily vanish, and then drop back into the road.

"The explanation was quite simple. The hot day had warmed the air close to the pavement, but the cooling of the surface at the onset of darkness had caused a layer of warm air to be sandwiched in between the cold air close to the road surface and the cold air above. This acted like a lens which produced an out-of-focus image of a bright tavern sign more than fifty miles away, a real mirage. There were few cars on the road, but as we met them the effect was most startling because some of them were so enlarged by the lens effect that a car five miles away seemed to be rushing directly at us only a block or two ahead. Sometimes these cars would appear to come to a sharp stop, reverse their course and disappear in the distance. At other times they would appear to be rushing on us upside down, with part of the road itself in the sky. Altogether it was a weird experience, but not in any sense supernatural. Lenses of air, either close to the ground or in the sky, can produce strange illusions."

In this case, as in many UFO puzzles, the solution depended on a knowledge of the weather conditions and of the facts of local geography. If the pursuing car had turned off the road or stopped for the night before reaching the tavern, the specific cause of the phenomenon might still be a mystery.

The Chesapeake Bay Case

Two of the most famous UFO cases, the Nash-Fortenberry and the Tombaugh sightings, have never been completely explained even though the witnesses were unusually competent, the incidents fully described, and the basic facts not in dispute. Although the probable type of mechanism involved is clear in each case, determining specifically what factors combined in exactly what way to produce the phenomenon has so far proved impossible. Neither case, however, supports the theory that the UFO had an extraterrestrial origin.

On the evening of July 14, 1952, a Pan-American DC-4 was flying from New York to Miami, carrying ten passengers and a crew of three including First Officer William B. Nash and Second Officer William H. Fortenberry. As a pilot spending much of his life in the air, Captain Nash had long been interested in the question of UFOs, and during the long night hours of over-water flights he had often cut down the cockpit lights to search the sky. In five years of watching he had observed hundreds of meteors, various types of auroral display, the lights of other aircraft, and the multicolored images of stars and planets distorted by refraction, but he had never seen any unidentifiable aerial phenomenon that appeared to be under intelligent control—until this particular night, when he was not watching for UFOs.

Shortly after 8 P.M. E.S.T. the plane was cruising on automatic pilot at about 8000 feet over Chesapeake Bay, and approaching Norfolk, Virginia. The sun had set and the night was almost entirely dark, although the coast line was still visible. Fortenberry, sitting at the right as copilot, was making his first run on this particular course and Nash, in the pilot's seat at the left, was pointing out the cities and landmarks of the route. Nash had just called attention to the lights of Newport News and Cumberland, ahead and to the right of the plane, when at 8:12 a brilliant red glow suddenly appeared in the west, apparently between Newport News and the aircraft, and so low that it might almost have been on the ground. One of

the men exclaimed, as have so many incredulous witnesses on first seeing a UFO, "What the hell is that?"

Looking through the front windows of the cockpit, they watched the unidentified light traveling northeast at incredible speed on a horizontal course roughly a mile below the plane. Almost immediately they perceived that the unknown was actually a procession of six red-orange lights, glowing like hot coals. Shooting forward like a stream of red tracer bullets, the line of lights moved out over Chesapeake Bay until they were only about half a mile away from the plane. They appeared to be sharply defined, large, circular disks, arranged in a narrow echelon formation—like a set of stairs tilted slightly to the plane's right, with the leader at the lowest step, each following disk slightly higher and to the rear, and the last disk at the highest point (see Figure 18). Realizing that the line was apparently going to pass under the plane at the right on the co-pilot's side, Nash flipped off his seat belt so that he could move to the window on that side. During this brief interval he was not able

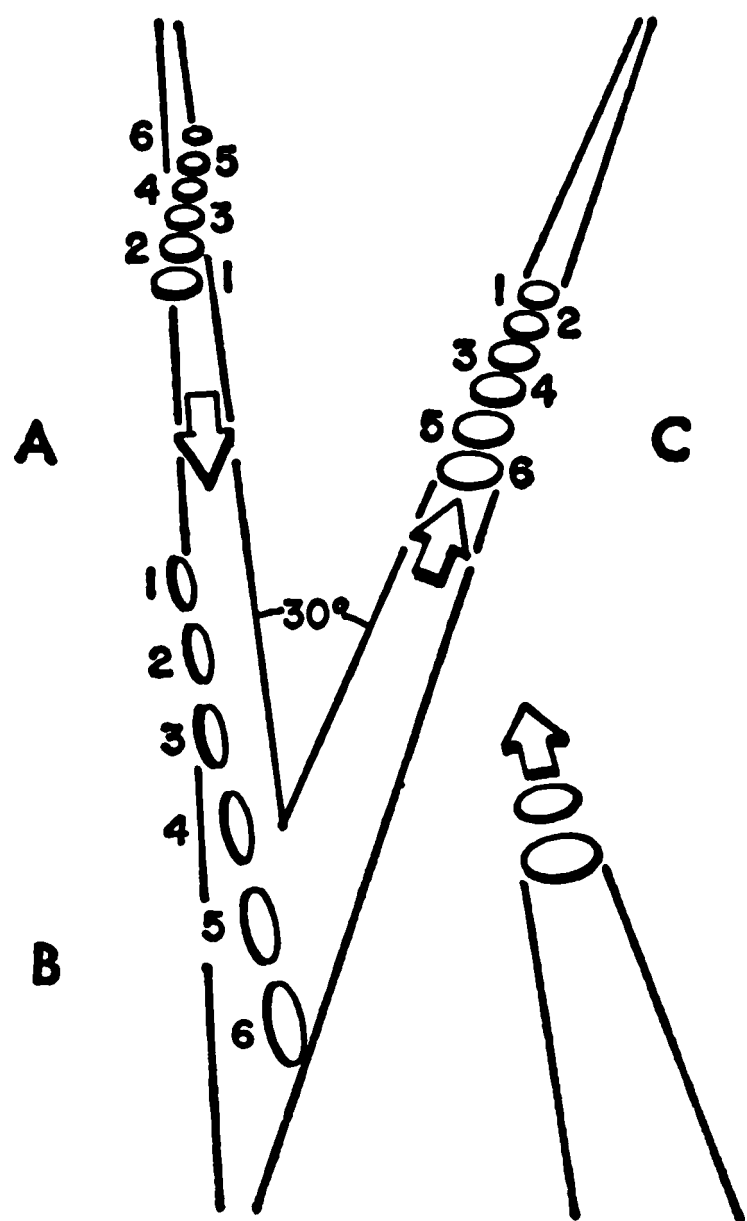


Figure 18. Reported movements of the Chesapeake Bay disks. A, Disks at first approach; B, they flip over and reverse order; C, they change direction and recede.

to see the objects, but Fortenberry kept them in view. As he later described their amazing behavior, all the disks simultaneously turned up on edge, like coins, so that the glowing surfaces were tilted to the right. Still on edge, they suddenly reversed their relative places so that disk 1 now occupied the last place in line and disk 6 became the leader.

This shift had taken only a brief second and was completed by the time Nash reached the window. Both he and Fortenberry then observed the disks flip back from the on-edge to the flat position. In the same fraction of a second, the entire line changed direction as abruptly as a ball bouncing off a wall and shot away to the west on a heading of 270 degrees. An instant later two similar disks darted out, apparently from beneath the plane, and joined the line as numbers 7 and 8 (Figure 18). The lights receded to the west, suddenly disappeared, immediately reappeared, abruptly began a steep climb to an altitude above that of the plane, then vanished not in sequence but in random order. The sighting had lasted for a period of twelve to fifteen seconds [1, 5, 6, 7].

After a quick check showed that no one else in the aircraft had observed the lights, the pilots radioed a message to the CAA station at Norfolk for forwarding to the Norfolk Navy Base, reporting eight unidentified objects traveling at speeds in excess of 1000 miles an hour. In Miami, next morning, Air Force officials questioned both witnesses. According to their estimates, the disks had moved horizontally about 2000 feet above the ground until their final climb and disappearance, were about 100 feet in diameter, and about 15 feet thick. Since they apparently traveled fifty miles during the twelve to fifteen seconds they were in view, their velocity would have been 6000 to 12,000 miles an hour.

Intelligence officials first checked the air traffic. Five jets from Langley Air Force Base, near Newport News, had been in the region at the time of the sighting, but they were ruled out as an explanation for the disks. Both pilots were informed that seven other persons, apparently on the ground, had reported unknown lights in the Norfolk area; the Air Force files contain no record of these reports and it is probable that some, at least, of these persons mistook the sunset-reddened jet trails for UFOs.

Few sightings of unidentified aerial phenomena have been more

clearly described. Both witnesses were experienced pilots. Nash had flown more than 10,000 hours at altitudes of 7000 to 8000 feet and had held the rank of captain for eight years. Both men had been trained to observe accurately, to check and double-check every factor that might affect safe flying, and to regard the word "assume" as a potential killer. They shared the attitude of all cautious air-men: "In God we trust—everyone else, we check." [5] Unlike many UFO descriptions, their report distinguished rigorously between fact and inference, and it included the exact time of the sighting as well as the position, height, speed, and direction of flight of their plane. Using a kind of "instinct-judgment" gradually developed during their many hours in the air, they had made careful estimates of the position, height, speed, and direction of flight of the unknowns. Nevertheless, no reasonable explanation of the disks was found.

At the time of this incident flying saucers had been big news for many weeks. Both *Life* and *Look* magazines had recently published serious discussions of the possibility that flying saucers came from other planets, and newspapers were printing dozens of reports of weirdly glowing machines trailing fiery exhausts, streaking through the air at meteoric speeds (see *Chapter VII*). At ATIC, the small staff of nine men was swamped with saucer reports, far more than they could deal with properly, and some of the investigators were privately convinced that UFOs did come from outer space [6]. For those or other reasons, the Norfolk sighting unquestionably received a less adequate study than would a similar incident today. The case was dropped and filed as an Unknown.

The incredible velocity and instantaneous change of course reported were obviously impossible for any earthly vehicle; no known metal could have escaped being melted by the frictional heat produced during so swift a passage through the dense atmosphere at 2000 feet, and no human flesh and bone could have survived the smashing inertial forces involved in the instantaneous change of direction. Nash and Fortenberry frankly stated their own conviction: "Though we don't know what they were, what they were doing here or where they came from, we are certain in our own minds that they were intelligently operated craft from somewhere other than this planet." [7]

A Possible Explanation of the Nash-Fortenberry Disks

In the hope of solving the mystery, even though a decade has passed, the authors of this book have made a thorough study of the available evidence and present the results in the pages that follow.*

When puzzling observations in a laboratory seem to point to a conclusion that contradicts the main body of scientific knowledge, the researcher first tries to repeat the experiment and duplicate the observations. If this is impossible, as with the Chesapeake Bay phenomena, he next re-examines the assumptions on which the conclusion is based. The belief that the UFOs had an extraterrestrial origin is based chiefly on two assumptions: first, that the estimates of the disks' size, distance, and speed were reasonably accurate; and second, that the disks were solid objects. If either assumption is unsound, the extraterrestrial theory is unnecessary and the incident becomes much less of a puzzle.

Both witnesses were able and experienced observers. Nevertheless their determinations of distance and size, and hence of speed, are open to question because of the very fact that the disks were unidentified phenomena. Angular estimates are usually reliable when an observer is judging the position and speed of other known aircraft moving in the sky. But when the moving object is a strange one and is seen against an empty sky or flat ground containing no standards of comparison, estimates of actual size mean very little.

The ability to judge distance depends largely on the binocular vision of the observer's eyes, separated by a span of about 2.5 inches. Focused on an object at 300 feet, they subtend an angle of about one fortieth of a degree, less than one tenth the diameter of the full moon. This is a physiological fact, and means that if the observer is more than 300 feet away from an object of unknown size, he cannot determine its distance accurately unless he knows how large it is or unless he can compare it with a known object. Using

* We wish to thank Professor C. A. Maney and Captain W. B. Nash for their generous help with this problem. Although they do not agree with our conclusions, Professor Maney has kindly made available certain useful documents and Captain Nash in a lengthy correspondence has patiently answered a great many questions of detail.

angular estimates, the witnesses in the Chesapeake Bay case calculated that at the point of closest approach the disks were a mile lower than the plane and about half a mile to the north—a distance of roughly 7000 feet. Mentally comparing their appearance with that of a DC-3 aircraft at this distance, the observers arrived at an estimate of size—whose accuracy depends on having a known distance. The circularity of this process indicates the weakness of all the estimates given. Even the most skillful observer cannot accurately judge the distance of an unidentified object when he does not know its true size, and he cannot judge the size unless he knows its actual distance.

Over Norwich, Connecticut, on May 15, 1962, a cloudless day with perfect visibility, a Navy aircraft and a commercial-airlines plane reported a near collision at about 7000 feet. The Navy pilot filed a complaint, stating that the two planes had missed each other by a distance of only about 600 feet. According to the commercial pilot, who did not file a complaint, the planes had had a leeway of about 4000 feet—a more than sixfold difference! [8]. Thus good pilots can differ widely in estimating the position of objects in the sky, even known aircraft seen in full daylight. With an unrecognized phenomenon seen in darkness or in semidarkness, as in the Chesapeake Bay case, good estimates are impossible.

The extraterrestrial conclusion depends even more strongly on the second assumption, that the UFOs were material objects. Nearly every part of the description is in direct conflict with this idea. The instantaneous reversal of course, for example, if performed by solid objects, should have produced a shock wave that would have broken windows in Norfolk, Newport News, and points west. Only one observation even suggests that the unknowns had a material nature: when the disks flipped on edge they seemed to reveal bottom surfaces, which would indicate a solid body. The witnesses specifically qualified this statement, however, by adding that though they had the impression that the bottom surfaces were unlighted, the “bottoms” were not clearly visible. Thus the three-dimensional structure was not actually observed, but only inferred. The night was dark, the UFOs were glowing like hot coals, and were supposedly more than a mile away. Even if the disks had been solid objects, an observer could actually have seen only a circular-shaped

light that suddenly narrowed to a very thin ellipse; if he believed the object to be solid, he might infer the presence of other surfaces, but a side edge 15 feet thick and an unlighted bottom surface, even if they had existed, would not have been detectable.

Of the other observations, all are inconsistent with the theory that the UFOs were material in nature. All, however, are completely consistent with the theory that the disks were immaterial images made of light.

Images made of light can glow with brilliant colors, can show well-defined circular shapes, and can flip on edge. Since they are not subject to the forces of gravity and inertia, they can travel at incredible speed, change direction sharply and instantaneously, and perform all of the maneuvers ascribed to the UFOs. On this new assumption, the observations become credible and the major part of the mystery vanishes.

Only one problem remains. Just exactly what produced the images? Of the many possible explanations, we first considered the simplest, an astronomical source. The UFOs appeared low in the western sky at 8:12 P.M. E.S.T., about forty-five minutes after sunset. The night was dark, for the moon had just entered its last quarter and did not rise until much later. Apparently the only planet that could have been involved was Mercury. Setting a little more than an hour after the sun, it should have been visible above the western horizon at the time of the sighting, but since it was not particularly brilliant, having a magnitude of a little more than +0.6, we put aside the astronomical theory, for the moment, as improbable.

We next explored the possibility of multiple reflections in the glass windows of the cockpit, produced by a light source inside the plane (such as a cigarette), or in the air outside (such as the bright-red exhaust trail of one of the jets in the area). Like the astronomical theory, this idea was set aside as improbable. Learning to distinguish between a reflection and a real light seen through a cockpit window is part of every pilot's training. When he sees a strange light, he automatically makes the proper checks. Furthermore, Nash and Fortenberry had observed the disks through three separate windows having different orientations.

Accepting the overwhelming probability that the source of the

UFOs was outside and below the aircraft, we concluded that it was almost certainly on the ground. The densely populated coastal region near Newport News and Norfolk, with several airfields and military installations, included countless possible sources such as a searchlight, an illuminated advertising sign, an air beacon. Stratified clouds or inversion layers of temperature and/or humidity could have multiplied such a light into a series of glowing disks (see Figure 19).

The soundness of this theory depended on the prevailing weather conditions. According to the reports, on the night of July 14 roughly a third of the sky at 20,000 feet was covered with thin cirrus clouds, practically invisible; at lower altitudes the night was cloudless and sharply clear, there was no apparent haze, visibility was unlimited,

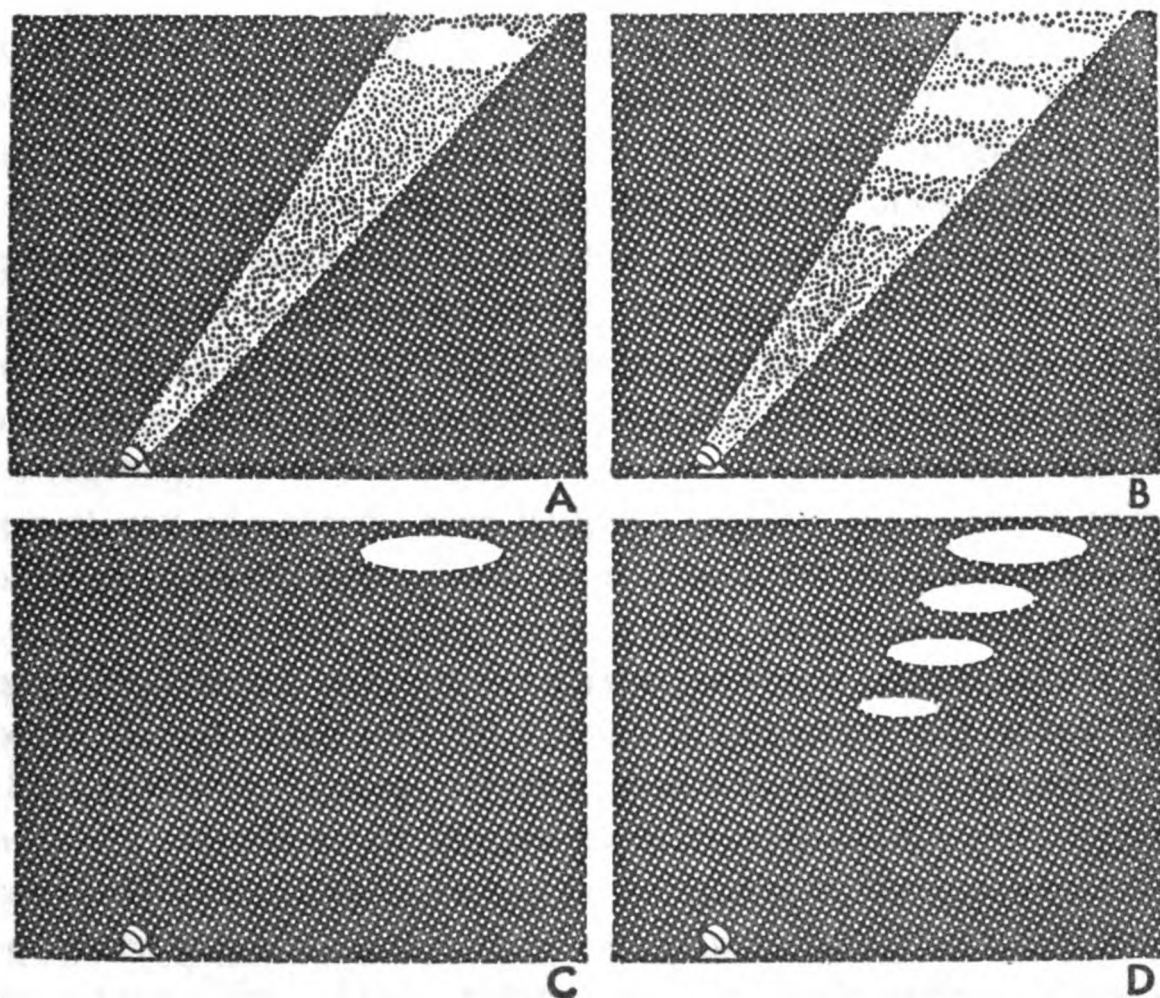


Figure 19. Searchlight shining on clouds. A, Through slightly foggy or dusty atmosphere, light cone plainly visible; B, through multiple thin cloud layers and foggy or dusty atmosphere; C, on cloud layer through clear atmosphere, no light cone visible; D, on multiple thin cloud layers, no light cone visible.

and no temperature inversion existed. Under such conditions the suggested mechanism would obviously not operate.

A more detailed survey of the weather conditions, however, quickly showed that this picture was greatly oversimplified. At 8:12, the time of the sighting, the night had already become quite dark. Yet the sun had set only forty-five minutes earlier and, according to the almanac, twilight should not have ended until 9:01 local time. Thus there must have been a dense cloud bank low in the west. Also, according to Captain Nash, there was probably some unstable air, which in itself indicates inequalities of temperature and/or humidity.

A thorough study of the situation showed that inversions of both temperature and humidity must have been present. In the summer of 1952 all the eastern states were suffering from an intense heat wave and drought, and the ground cooled rapidly after sunset, because of the lack of cloud cover during the day. In a period of heat and drought, the nightly cooling produces marked inversions favorable to extreme refraction or reflection. Small in extent, existing only briefly in one place, constantly changing location, such inversions may not be detected by radiosonde observations [9]. During July and August, temperature inversions occurred almost every night in the coastal regions and accounted for the radar angels so frequently observed in the Washington area during those weeks (see *Chapter VIII*).

The fact that the sighting occurred over Chesapeake Bay is significant. A body of water cools more slowly than the land, and the air over water is warmer than that over land. The cooler air from the land is carried over the water by convection currents, flows in and under the warm air, is heated by the water and rises, to be replaced in turn by the further flow of cold air from the land. The air over a lake, river, or other body of water also has a higher moisture content than over the land and can form an invisible haze.

All these facts lead inescapably to the conclusion that sharp localized discontinuities of both temperature and humidity must have existed over Chesapeake Bay on the night the UFOs appeared. A light on the Virginia coast, shining northeast toward the plane, could easily have been spread out into a series of images like those observed. A change in the orientation of the light or a shift in the loca-

tion of the inversion would account for the abrupt change of course made by the disks.

Since the plane was flying at a ground speed of about 195 knots (225 to 250 miles an hour), it would have traveled about a mile during the twelve or fifteen seconds the disks were in view. This distance would have changed the relation between moving plane and stationary ground light, so that the images would no longer have been visible from the plane. By flying on, the witnesses left the phenomenon behind them.

Obviously this solution does not identify the particular beacon, searchlight, or other ground light that produced the Chesapeake Bay disks. But it does offer a highly probable explanation that is consistent with all the observations and does not depend on the presence of an extraterrestrial spacecraft.

Other UFOs in "Stack" Formation

A correspondent has reported a UFO sighting very similar to the Norfolk case, almost certainly produced by the mechanism just described.

In the late spring of 1955 a physicist, Mr. Z, was driving west on the highway between Dayton and Yakima, Washington, in a region of low-lying hills. The time was shortly after dark; the sun had set but there was still a suggestion of light in the west. Suddenly a line of five glowing UFOs appeared in the western sky, apparently three to five miles away, traveling east at high speed, and accelerating as they approached. Flying in a "stack" with the leading saucer on top, the individual saucers were oriented in horizontal planes, but each follower was lower than and somewhat behind its predecessor so that the entire formation was "like a stack of pancakes" leaning at about a 45-degree angle toward the direction of flight. (Note that this arrangement is the reverse analogue of that of the Chesapeake Bay UFOs.) The top saucer advanced more rapidly than the bottom one, so that as they flashed through the sky at the left of the observer they appeared to be in single file. Startled, he stopped his car and got out to scan the sky, but the saucers had disappeared. Some fifteen to twenty seconds later a similar formation appeared in the

west. As they approached he could see that they were thin, flat disks, glowing with a white light, sharply defined and circular in shape, and apparently fifty to a hundred feet in diameter. As they passed, the stack again spread out into single file. When they were apparently about ten miles east, the three lead saucers suddenly disappeared, while the two that had been on the bottom made a sharp turn to the north, as abruptly as balls bouncing off a wall.

Concluding that the saucers might be images produced by an airfield beacon shining upward through very thin horizontal clouds, the observer continued to watch. They reappeared again and again, sometimes at the correct interval for an airfield beacon, but sometimes delaying for two or three minutes. To explain their occasional failure to appear on schedule, he reasoned that some very dense, fast-moving, low-lying clouds must lie in the west between him and the beacon, so that sometimes the light could penetrate to shine on the assumed stratified layers overhead, and sometimes not. After twenty minutes or so, the appearance of the phenomenon changed. The top three saucers merged gradually into an indistinct blur, while the bottom two remained sharp and distinct and continued to dart abruptly to the north just before disappearing.

Although the observer was not able to see the very thin layers of cloud overhead that would be required to account for the sharply defined shape of the saucers, he concluded that his explanation was the most reasonable one [10].

In the Norfolk sighting, unfortunately, the witnesses could not easily have remained in one place to watch for a possible reappearance of the UFOs. If they had circled and flown back, and had been able to find the exact location, they might have seen the disks again.

The Tombaugh Rectangles

A remarkable phenomenon observed in New Mexico in the summer of 1949 has remained among the most puzzling of the Unknowns. As in the Chesapeake Bay case, the facts are not in dispute. The witness was an astronomer, Clyde Tombaugh, at that time in charge of the optical instrumentation of the rocket-firing program at the White Sands Missile Range. He had had thousands of hours of

experience in observing the night sky and when still a student had gained fame, after months of patient searching of photographic plates, by locating the image of the planet Pluto near the position long predicted for it by Lowell and Pickering.

On the night of August 20 Tombaugh was sitting with his wife and his mother-in-law in the yard of his home in Las Cruces, watching the stars. There was no moon, and the transparency of the sky was extraordinary, so that even the stars of sixth magnitude, usually barely detectable by the naked eye, were clearly visible. About 10:45 P.M. a geometrically spaced group of six to eight rectangles of light appeared almost directly overhead. Of low luminosity, they were "windowlike" in appearance and yellowish-green in color. The individual rectangles were quite small, not wider than four or five minutes of arc, and the entire group covered a span of about 1 degree (about twice that of the full moon). As they moved noiselessly in a vertical circle path toward the south-southeast, the individual rectangles became foreshortened, the span of the group became smaller, the lights turned brownish and faded from view when 35 to 40 degrees above the horizon. They had been in sight for about three seconds. Mrs. Tombaugh, who did not see the lights until they had moved some distance from the zenith, observed them for only about 1½ seconds before they disappeared. To her they seemed a diffuse greenish glow, interconnecting a span of greenish spots of light. Her eyesight had always been less acute than that of her husband, and they attributed the difference in their descriptions to this difference in vision.

Although Tombaugh had been too startled to count the number of rectangles or to note some other features he wondered about later, he immediately recorded the facts of the observation, sketched the pattern of the formation, and noted his impression that the lights had been part of a rigid structure. He added, "I have done thousands of hours of night sky watching, but never saw a sight so strange as this." A report of this sighting was forwarded to Air Force officials, who could find no explanation. UFO enthusiasts unhesitatingly pronounced the phenomenon a huge flying saucer—an interpretation that the witness himself never made.

The accounts given to the public unfortunately suffer from various distortions of fact. In its Cassandra-like warning of possible visitors

from other planets, *Life* magazine included the Tombaugh sighting as one of the key cases and in a ten-sentence description managed to include at least six misstatements, some of which added to the “uncanny” nature of the incident. According to this summary [11] the year was 1948 (it was 1949); the time was about 11:00 P.M. (it was 10:45 P.M.); the lights were traveling south to north (they were moving northwest to southeast); the object had an oval shape (Tombaugh did not specify a shape); the lights exhibited a glare (they were of low luminosity); their speed was too fast for a plane, too slow for a meteor (no estimate of speed was given). On a nationwide TV show broadcast in 1958 one of the speakers stated specifically that Tombaugh had observed a cigar-shaped object with lighted portholes [12]. An “artist’s conception” of the UFO in one publication [13] depicts a long, tapered ship with a line of lighted windows, wholly unrelated to Tombaugh’s own sketch, which shows no unifying structure, merely six small rectangles arranged as though each one were at the corner of a hexagon (see Figure 20).

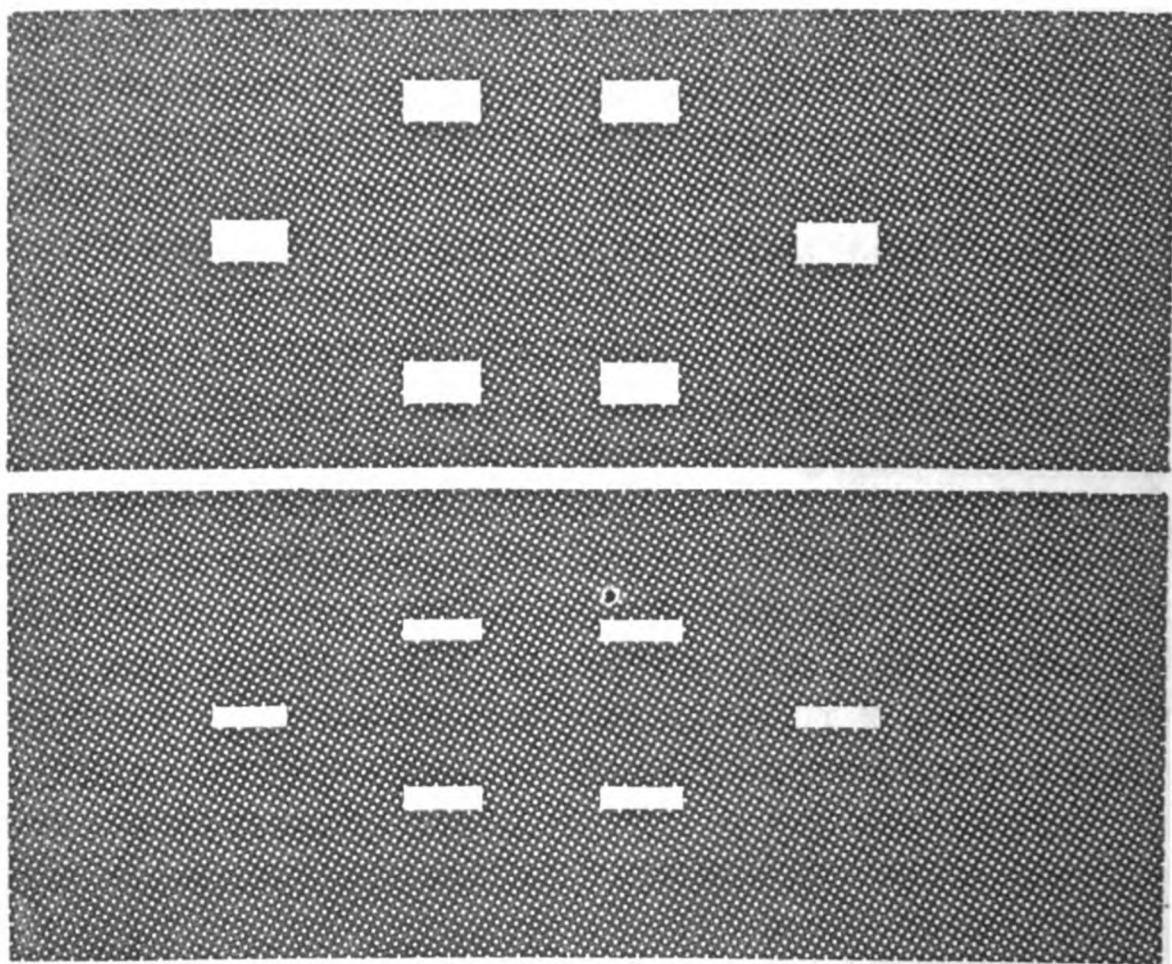


Figure 20. Tombaugh's rectangles. Top, when first seen at zenith; bottom, a few seconds later at 50° above horizon. (Based on sketch by C. W. Tombaugh.)

While keeping an open mind on the possibility of interplanetary travel, Tombaugh himself has never supported the spaceship interpretation so often attributed to him in print but has considered various possible explanations—insects or birds illuminated by ground lights, or reflections of ground lights against the boundary of an inversion layer in the air. Of these, the inversion theory seems the most probable. The layer in such a case must have been extremely thin or extremely weak, otherwise it would have dimmed the brightness of the faint stars he was observing. As in the Chesapeake Bay case, the mysterious rectangles were undoubtedly the special effect of some unique combination of circumstances, unlikely to be repeated. Conditions were ideal for the formation of small sharply localized inversions: the weather was clear, the day had been hot. A small temperature inversion existing at a relatively low elevation and smoke, haze, or dust collecting in a very thin layer at a relatively low altitude were the prerequisites that almost certainly existed. Some unknown cause—in the vicinity of an airfield there are many possibilities—could have produced a ripple in the thin haze layer. This ripple, tipping the haze layer at a slight angle, could have reflected the lighted windows of a house; as the ripple progressed in a wavelike motion along the layer, the reflection would have moved as did the rectangles of light. Conditions of refraction at the interface would have reflected the wave upward.

Tombaugh has recently summarized his convictions on the entire UFO phenomenon as well as on his own sighting:

“From my own studies of the solar system I cannot entertain any serious possibility for intelligent life on the other planets, not even for Mars (the planet to which I have devoted considerable observation and study over the past thirty-five years). The logistics of visitations from planets revolving around the nearer stars is staggering. In consideration of the hundreds of millions of years in the geologic time scale when such visitations may possibly have occurred, the odds of a single visit in a given century or millennium are overwhelmingly against such an event.

“A much more likely source of explanation is some natural optical phenomenon in our own atmosphere. In my 1949 sighting the faintness of the object, together with the manner of fading in intensity as it traveled away from zenith towards the southeastern horizon,

is quite suggestive of a reflection from an optical boundary or surface of slight contrast in refractive index, as in an inversion layer.

"I have never seen anything like it before or since, and I have spent a lot of time where the night sky could be seen well. This suggests that the phenomenon involves a comparatively rare set of conditions or circumstances to produce it, but nothing like the odds of an interstellar visitation."

- [1] Air Force Files.
- [1a] Menzel, D. H. "The Truth About Flying Saucers." *Look* magazine (June 17, 1952).
- [2] Johnson, C. L. Personal communication.
- [3] *UFO Investigator*, April-May 1961.
- [4] Coleman, W. T. Personal communication.
- [5] Nash, W. B. Personal communication.
- [6] Ruppelt, E. J. *The Report on Unidentified Flying Objects*. Garden City, N.Y.: Doubleday & Co., 1956.
- [7] Nash, W. B., and Fortenberry, W. H. "We Flew Above Flying Saucers," *True* magazine (October 1952).
- [8] *Boston Herald*, June 3, 1962.
- [9] "Radar Objects Over Washington," *Air Weather Service Bulletin* (September 1954), pp. 52-57.
- [10] Gifford, J. F. Personal communication.
- [11] "Have We Visitors from Outer Space?" *Life* magazine, April 4, 1952.
- [12] "Flying Saucers, the Enigma of the Skies," Armstrong Circle Theatre TV Script, Jan. 22, 1958.
- [13] Michel, A. *The Truth about Flying Saucers*. New York: Criterion Books, 1956.
- [14] Tombaugh, C. W. Personal communication.

Chapter XIII

INVESTIGATORS: AIR FORCE AND CIVILIAN

Few government employees in recent times have been subjected to more criticism than the men in the Aerial Phenomena Group at Wright-Patterson Air Force Base, Dayton, Ohio. This agency (usually referred to in this book as ATIC) has the responsibility of investigating all official reports of unidentified objects in our skies. Of the thousands of such incidents studied so far, none suggests that the UFO in question came from outer space. In fact, the term UFO has proven to be one of the worst misnomers of history. In the most perplexing cases, the phenomena reported are seldom material Objects, very few of them are Flying and, when fully analyzed, almost none remain Unidentified.

Identifying strange objects in the air over the United States is vital to the country's security. That military officers should be guilty of carelessness or casual guesswork in this serious business is unthinkable. Yet ATIC investigators, and through them the United States Air Force, of which they are members, for more than a decade have been the target of vicious attacks by civilian enthusiasts devoted to the cult of flying saucers.

Banded together in various "research" organizations and operating on the premise that UFOs are interplanetary in origin, most of these enthusiasts flatly reject the normal explanations—planets, meteors, satellites, balloons, reflections, birds, radar phantoms, hoaxes, or delusions. Flying saucers *obviously* cruise in our skies, the believers argue, and the Air Force failure to admit the obvious proves that its investigators are incompetent or dishonest or both, and that they are involved in a giant conspiracy to conceal the truth from the American public [1].

In the view of the saucer groups, the Air Force can do no right.

If, after receiving a UFO report, the investigators require some time to collect all the relevant facts and to reach a sound conclusion, they are berated for the delay and accused of cover-up tactics, as in the Killian case (p. 52). On the other hand, when the answer is found quickly and released to the newspapers, UFO addicts deny its truth and assert that the explanation was hurriedly rushed into print in order to deceive the public, as in the Pacific sighting on July 11, 1959 (p. 106) [1a, p. 8]. Some of these peculiar beliefs may rest on an imperfect understanding of the actual aims, methods, and resources of Air Force investigators.

Official Study of UFOs

The report of an unidentified flying object, in about 90 per cent of the cases, comes first from an ordinary private citizen, who often notifies the local newspaper or radio station. Not until he reports the incident to a military official, however, is ATIC empowered to start investigation. The commanding officer at the Air Force base nearest the place of the sighting then makes a preliminary investigation and, if the facts seem to warrant further study, forwards the information to Dayton for evaluation.

With years of experience to draw on, the Aerial Phenomena Group can often identify the unknown after a brief study of the report. If not, they try to determine whether the report contains all the facts necessary for an explanation and whether the unknown may be of interest to Intelligence officers. Does it represent a possible danger to the nation? Does it have possible military significance? Does it have possible scientific or technical significance? If, after this review, the investigators conclude that the unknown might be of some importance, they carry out an intensive study in which they may have the help of an organization directly connected with the Assistant Chief of Staff for Intelligence or of allied Intelligence agencies. When all the relevant facts are collected, a survey usually shows that the unknown fits a particular class of sighting. To complete the identification, ATIC can call on the expert knowledge of a specialist in the type of phenomenon involved.

Expert help is available from a large variety of sources:

1. Official consultant to the Air Force, Dr. J. Allen Hynek, Director of the Dearborn Observatory and Professor of Astronomy at Northwestern University, formerly Assistant Director, Smithsonian Astrophysical Observatory.

2. Members of the Air Force with special scientific and technical training, whose full duty is the study, investigation, and analysis of UFO reports.

3. A panel of military and civilian experts in all branches of science and technology.

4. The scientific and technical laboratories (photographic, ballistic, chemical, etc.) of all branches of the Air Force and of other government agencies.

5. The meteorological records of the United States Weather Bureau, the United States Coast Guard, and other government agencies.

6. Commercial laboratories under contract to carry out special work.

With the best scientific resources of the nation available, the Air Force can make sure that a puzzling UFO phenomenon will undergo study by an expert. Reports involving radar sightings are analyzed by the research scientists who know most about the behavior of radar. If satellites or astronomical objects might be involved, astronomers study the evidence. If the report includes photographs or physical evidence, experts provide the appropriate laboratory analysis. If a UFO still proves difficult to explain, the complete facts are laid before a panel of experts for discussion. When a sighting has been completely analyzed, the conclusions—known or unknown—are filed with the record of the case. If the newspapers have publicized the incident, a summary of the analysis is given to SAFIS (Office of Information Services, Office of the Secretary of the Air Force) for release to the press.

In the early years of the flying-saucer saga, almost none of the men assigned to investigate UFOs had any special training in the optical and astronomical sciences or in investigative techniques. Since the specific facts of so many cases were classified, civilian scientists who might have helped explain the UFO puzzles were not able to get the necessary information. Unsurprisingly, the per-

centage of unexplained cases sometimes reached as high as 5 to 10 per cent, and once reached the staggering peak of 20 per cent! In recent years the techniques of collection, investigation, and analysis of the facts have greatly improved. Air Force investigators not only have excellent training, they also have a solid body of experience behind them. In later reviews they have found the answers to many, but not to all, of the backlog of "Unknown" cases which, if reported today, would probably cause no problem. Some of the old cases will probably never be solved because the men in charge at the time did not always know what questions to ask. Essential information was not obtained and can never be obtained now.

The Air Force never closes an unsolved case. Reports that have been listed as Unidentified or Insufficient Evidence are reanalyzed when new evidence becomes available. Occasionally new evidence produces a more complete or even a different explanation for a case that was previously considered probably solved.

Statistical summaries of the UFO sightings for each month and for each period of six months are forwarded to SAFIS for release. In recent years ATIC has been receiving fewer than 600 reports per year and solving about 98 per cent. In 1961, 578 UFOs were reported. Of those in which all the necessary information was available, all but thirteen—about two per cent—were completely explained.

Believers in flying saucers tend to ignore the 98 per cent of cases fully explained by the Air Force, and to focus attention on the 2 per cent that remain puzzling. Yet no distinguishable difference exists between the types of observation described in solved and in unsolved cases. From considering the original reports, the competence of the witnesses, and the appearance and movements of the various UFOs, no analyst could predict in advance which will be fully accounted for and which will not. The witnesses (often technically trained observers or experienced airmen) in the cases that are solved are just as reliable as—and no less so than—the witnesses in the unexplained cases. They report the same classes of phenomena—glowing UFOs, hovering UFOs, UFOs moving at high velocities, making incredible maneuvers, and behaving as though under intelligent control.

The Air Force has accounted for nearly all of these flying saucers.

The various causes included aircraft, balloons, satellites, mirages, inversions, hoaxes, delusions, reflections, birds, lenticular clouds, ball lightning, radar anomalies, sundogs, meteors, planets, stars, the Aurora, and other astronomical phenomena. The few remaining cases report similar observations and undoubtedly have one of these causes—which cannot be proved because some essential fact is missing. No data in these unsolved cases suggest that the UFOs had an interplanetary origin or that they constituted a threat to the security of the United States.

When Air Force investigators have determined that a UFO report does not represent anything of interest to Intelligence, their primary duty ends. However, since many UFO puzzles are of interest for scientific or technical reasons, the investigators try to find the specific explanation of each case and, if it has attracted public attention, give the final solution to the press.

Civilian Saucer Groups

Since the first flying saucers were reported in 1947, dozens of civilian clubs have been organized throughout the world to collect UFO reports and publish “the truth” allegedly suppressed by government sources. During the last decade the roster in the United States has included such groups as the Borderland Sciences Research Associates (California), Interplanetary Intelligence of Unidentified Flying Objects (Oklahoma), Intercontinental Aerial Research Foundation (Nebraska), UFO Research Committee (Ohio), Civilian Saucer Intelligence (New York), Waukegan Contact Group (Illinois), Saucer Investigative Research Organization (Georgia), World Society of the Flying Saucer (Idaho), Civilian Research on Interplanetary Flying Objects (Ohio), and the National Investigations Committee on Aerial Phenomena (Washington, D.C.). The oldest of these saucer clubs, the Aerial Phenomena Research Organization (Arizona) was founded in 1952 and issues a bimonthly news sheet, the *APRO Bulletin*. More or less regular publications (some now defunct) of these groups have included the *Cosmic Researcher*, *Interplanetary News Service*, *CRIFO Orbit*, *Saucerian Bulletin*, and *UFO Critical Bulletin*. In recent years some

of the best factual accounts of UFO incidents (as well as some of the weirdest speculation) have appeared in the magazine *Flying Saucers*, which is not connected with any club.

A few clubs, chiefly in California, are semireligious in character, claiming repeated communication with ethereal beings in space. Some clubs accept "contact" stories as valid, others do not. Certain articles of faith are apparently common to all such groups: that UFOs are actually vehicles from outer space; that they sometimes land on earth and occasionally leave physical traces in the form of metallic or organic substances; that scientists who cannot accept these beliefs are hypocrites, archfiends, anti-Galileo reactionaries, stooges for the Army or the Air Force, and members of the conspiracy to delude the public.

NICAP

The largest and probably the most influential saucer group is the National Investigations Committee on Aerial Phenomena (NICAP), with affiliated subcommittees in various parts of the country. Many members of local organizations such as the UFO Research Committee of Akron, Ohio, also belong to NICAP and help maintain close liaison. The bimonthly news sheet, the *UFO Investigator*, is distributed to members of NICAP and to prominent persons in the government and other fields; it regularly lists recent UFO sightings reported by members, and occasionally prints a detailed report of a specific case. Few of the sightings reported can be independently evaluated because the accounts often omit such essential facts as exact times, dates, places, direction of motion, etc.

With headquarters in Washington, D.C., NICAP strongly reflects the views of its director, Major Donald E. Keyhoe, USMC (Ret.), that UFOs may be interplanetary in origin, sometimes land on earth, but rarely if ever make contact with human beings. Like most saucer believers, many members of NICAP tend to assume without adequate investigation that many unusual sky phenomena reported in the newspapers may be extraterrestrial objects, and they often maintain this attitude in the face of overwhelming evidence to the contrary. When the BOAC Comet exploded near Calcutta

on May 2, 1953, Major Keyhoe theorized that a UFO might accidentally or deliberately have collided with the plane. He continued such speculation even after British aviation officials announced, after months of study, that the crash was caused by metal fatigue [1]. Many of the items printed in the *UFO Investigator* are based on incomplete evidence. Under the headline "Strange Series of Fireballs Reported," NICAP listed a UFO observed on March 7, 1960, at about 8:10 P.M., visible from the Canadian border to Florida, and described by some observers as three or four UFOs flying in formation [3]. This phenomenon was actually the satellite Discoverer VIII making its final descent to earth.

NICAP membership is theoretically open to any non-Communist citizen [4], but applicants from the "contactee" fringe are not encouraged. The committee once canceled the membership of a space evangelist when he claimed publicly to be a spokesman for NICAP, and in 1958 it canceled the membership of seven famous contactees who had been admitted without the knowledge of the director [5].

Investigations are carried out as spare-time projects of the members themselves, some of whom constitute an advisory panel of experts. Although many are highly respected in their own professions—television, journalism, military science, religion, government, aviation, engineering, medicine, psychology, and teaching in the physical sciences—few are recognized specialists in the fields required for the analysis of most UFO cases—radar propagation, the physics of optics, meteorology, and astronomy.

Since 1957 a major goal of NICAP has been a Congressional inquiry that supposedly would reveal an Air Force conspiracy to deny the reality of flying saucers [7]. In 1957 the director lodged a formal complaint with a member of the United States Senate charging that the Air Force continually made false statements on UFOs to the press, the public, and members of Congress. In support of this accusation Major Keyhoe submitted summaries of more than two hundred incidents [7].

The list cited a number of UFO reports that had never been submitted to the Air Force for analysis. These included reports from foreign countries (one in Sumatra in 1944 and one in Holland in 1952) and from NICAP's private files. Others, such as the Kinross case (p. 154), had not been within ATIC jurisdiction. Many others,

such as the Mantell (p. 33) and the Chiles-Whitted (p. 108) cases, had long ago been fully explained. Still other cases, dating from the early days of the saucer era, remain unsolved only because vital facts, not determined at the time of the sighting, are necessary to a full explanation but cannot now be ascertained. The request for a Congressional inquiry was denied but has been repeated at intervals.

The "Conspiracy" Fantasy

Most UFO organizations cling to the belief that a conspiracy exists to conceal the existence of extraterrestrial vehicles, but they disagree on its precise composition. To NICAP and its affiliates, the chief culprit is the Air Force, helped occasionally by other government agencies and by well-known civilian scientists. APRO (Aerial Phenomena Research Organization), however, considers that the Air Force is involved only as the tool of still more powerful forces. The director of APRO has published her conviction that nobody in the Air Force, the Navy, or the Marines "has the brains" to contrive so successful a scheme and that the alleged plot "could only be borne [sic] of minds schooled in deception and contraception [sic]—the elite corps of the Central Intelligence Agency." [8] In still another version (which makes the plots of E. Phillips Oppenheim seem amateurish) NICAP itself is a pawn in a superconspiracy so vast that thousands of American citizens have been made its unknowing tools [9]. The hundreds of strange phenomena observed in the skies, the controversial photographs of UFOs, the "spacemen" who visited Adamski and others, the "contact" and little-green-men stories, the analyses made by the Air Force, the formation of the various saucer clubs, NICAP and its war against the Air Force—all these phenomena, events, and persons are allegedly parts of a colossal drama planned, supported, and staged as a deliberate hoax on the American public. The prime mover is supposed to be the Central Intelligence Agency, whose motive is to conceal—something; just what is not clear [10].

In comparison with this fantasy, NICAP's charges of simple Air Force cover-up seem tame.

UFO at Sheffield Lake, Ohio

One of the most notorious accusations of Air Force skulduggery, made in attempts to procure a Congressional inquiry, was that embodied in a saucerian study of the Fitzgerald sighting [11], published by the UFO Research Committee of Akron, Ohio, which maintains a close relationship with NICAP. Although the case was unimportant and was completely explained, we shall discuss it in detail to illustrate the peculiar views and methods of the flying-saucer groups.

In summary, a strange light observed on a dark night for roughly half a minute by a drowsy housewife was converted into a weapon to attack the Air Force. The incident inspired thousands of words of argument, caused the publication and distribution of a lengthy document, used the time of busy investigators, required an otherwise unnecessary expenditure of public funds, and evoked an exchange of letters among angry citizens, harassed Congressmen, and equally harassed Air Force officials. In all UFO history, no larger mountain has ever been made from so small a molehill.

On September 30, 1958, the Air Technical Intelligence Center at Wright-Patterson Air Force Base received a letter from Mrs. William Fitzgerald of Sheffield Lake, Ohio, reporting that on September 21 she had sighted a UFO which she would like to have investigated. She enclosed a three-page summary prepared by members of the UFO Research Committee of Akron, and added, "I assure you that I will contact my congressman about this matter if some action is not taken soon to explain it." [12]

The alleged UFO had appeared at about 3 A.M. in the yard of the one-story, two-bedroom house occupied by Mrs. Fitzgerald and her husband. She had been sitting up alone watching television and had gone to bed at the end of the late movie. The bedroom window was shut and the window curtains were closed. Outside, the night was dark; the moon had set, there were no street lights, and none of the neighboring houses was lighted. Lying with her arm over her eyes, trying to get to sleep, she suddenly realized that

the room was illuminated and stood up on the bed to look out of the window.

According to her account, a disk-shaped object with a hump in the middle, a dull aluminum in color, was moving across the yard at a height of about five feet. The object did not glow and did not have lights on it; she could not determine the source of the light that made it visible to her. About twenty to twenty-two feet in diameter and about six feet high, the UFO moved north across the driveway into a neighbor's yard, losing altitude on the way until it was only one foot above the ground. At a distance of fifty feet, it stopped and floated motionless for several seconds while pink-gray smoke billowed out from two openings in the rim and illuminated the UFO. Each opening contained seven pipes. The smoke did not come from the pipes but from the openings from which the pipes projected. The object then moved back into the witness's yard, rising to a height of five feet. No longer emitting smoke, it made two quick clockwise turns with a radius of about three feet, and rose straight up. The roof of the house, jutting out over the window, cut it from further view. During the entire time of the sighting, about thirty-six seconds, she had heard a muffled noise like that of a jet engine warming up. She had tried several times to waken her husband, by kicking him, but without success. When the object had gone, she went back to bed and slept.

When she awoke at 11:00 the next morning and mentioned her experience to the family, she learned that ten-year-old John Fitzgerald, sleeping in the second bedroom, had also seen a strange light. He had apparently wakened during the night to go to the bathroom and had returned to bed, when he saw a bright light shining into his room and heard an unusual noise. Climbing up on the radiator to look out of his window, he saw something the color of a tin cup moving across the yard. After watching for a few seconds until the light had gone, he went to bed and to sleep.

Puzzled by the incident, Mrs. Fitzgerald telephoned the local newspaper, the *Lorain Journal*, and the story appeared in several Ohio newspapers. Members of the Akron Committee, one of whom lived in the nearby town of Lorain, soon arrived to question her and prepare the summary of her experience. Other witnesses in Lorain were reported to have seen the same UFO.

Even at first glance, the situation presented several unusual features. The witness had delayed more than a week before notifying Air Force investigators, yet she threatened to notify her congressman unless some action were taken soon. She had not waited for action, however, but by the same mail had written to her congressman requesting him to obtain an explanation from the Air Force. The summary of her experience, prepared with the help of members of the UFO Research Committee of Akron, was equally remarkable. Even though her dark-adapted eyes had just been assaulted by a bright light and the object had been in view for a maximum of only thirty-six seconds, she provided a description so detailed that it almost suggested a photographic memory.

On October 3, three days after her letter reached ATIC, two Air Force men, Technical Sergeant A and Technical Sergeant B, who were specially trained in the investigation of UFO incidents, arrived in Lorain. After a day spent in studying such pertinent matters as the local geography, the records of the Weather Bureau, the Coast Guard station, and the local railway, on October 4 they called on the witnesses.

Again the situation was unusual. Mrs. Fitzgerald's husband did not appear. With Mrs. Fitzgerald and young John, however, was Mr. C, the member of the local UFO group who had spent several days helping her prepare her account. To the amazement of the sergeants, Mr. C seemed to assume that he was in charge of the interview, answered the questions put to Mrs. Fitzgerald, and continually interrupted with questions and statements of his own. After half an hour of this frustrating procedure, Sergeant A led Mr. C out into the yard. In the house, Sergeant B resumed the inquiry and filled out the official report form.

Few questions were asked of the boy because both the details and the phraseology of his description seemed to echo adult conversations overheard during the two weeks that had elapsed since the sighting. According to the account prepared by the Akron Committee, the boy had been frightened by a light so bright that he had to shield his eyes. (The time was unknown, and the light may or may not have been the one observed by Mrs. Fitzgerald.) Climbing on top of the radiator to look out of the window, he had seen the UFO and watched it take off into the air, and then had gone back

to bed and to sleep. Sergeant B had a young son of about the same age. That a normal ten-year-old boy should not call out and try to awaken the household when confronted with a whirling, humming, dome-shaped spaceship some twenty-two feet in diameter and six feet high, moving through his own yard in the middle of the night, seemed too improbable to warrant serious questioning.

After finishing with the Fitzgeralds, the sergeants called on other supposed witnesses in Lorain. Satisfied that they had completed a thorough investigation, they returned to Dayton and presented the information to their superior officers for evaluation. None of the evidence suggested that the phenomenon had been a spacecraft [12]. The UFO had been the "special effect" of a peculiar combination of circumstances:

1. The time. The sighting had occurred about 3 A.M.; the exact moment was not known and could not be determined.

2. The geography. The shore of Lake Erie lay about three fifths of a mile north of the Fitzgerald house. South of the house, roughly 100 yards away, ran the tracks of the New York Central Railway. Southwest of the house about one and a half miles stood a steel foundry.

3. The weather. A drizzling rain was falling at the time of the sighting. There was some haze and wind; no moonlight.

4. Other factors. (a) Between midnight and 4 A.M. a Coast Guard cutter equipped with an eight-inch spotlight had been plying back and forth on Lake Erie, searching for an overdue cabin cruiser. At about 3 A.M. the cutter had been headed east toward Lorain, reaching there at 3:15, had then continued east beyond Sheffield to Avon, before turning back to the Lorain lifeboat station and berthing at 4 A.M. (b) At 2:52 A.M. a train had left the Lorain railroad station, roughly three miles from the Fitzgerald house. Eight minutes later it would have been passing south of the house at a distance of about 100 yards. The engine was using a rotating headlight.

From these facts it was possible to reconstruct the probable sequence of events that produced the UFO: In the hour or so before the sighting, the witness had been sitting up alone watching the late movie on TV. The film that night was a horror movie, *Dracula's Daughter*. About 3 A.M., soon after the witness had gone to bed,

the Coast Guard cutter on Lake Erie was traveling east toward Lorain, was very near the harbor and was flashing its spotlight toward shore. The light had briefly illuminated the two bedrooms of the Fitzgerald house and had roused Mrs. Fitzgerald. At that distance, between three and four miles, the beam would have spread and would have been dispersed still more by the drops of rain falling. By the time Mrs. Fitzgerald reached the window and pulled back the curtains, the searchlight was gone. At the same time, however, the train that left Lorain at 2:52 was passing south of the house, using its rotating headlight and producing a roaring noise made more piercing by the moist atmosphere. Looking through the wet glass of the window, the witness saw the beam of the train's headlight moving through the haze in the yard. Smoke from the nearby foundry was also being blown into the yard. Illuminated by the circular beam of light, the smoke seemed to be a glowing, solid object that moved back and forth and emitted clouds of gray-pink smoke.

In summary, the Air Force concluded that Mrs. Fitzgerald's UFO was an illusion produced by a combination of factors: an excited frame of mind induced by *Dracula's Daughter*, the spotlight on the Coast Guard cutter, the rotating headlight of the train and the noise of its engine, drifting smoke from the foundry, and the haze of the drizzly night.

This conclusion provoked an explosion from the witness, who wrote her congressman suggesting mental incompetence on the part of the Air Force official who analyzed the case.

"The Fitzgerald Report"

The UFO Research Committee compiled and on December 1, 1958, published a thirteen-page pamphlet (later reissued in amplified form and copyrighted) entitled: "The Fitzgerald Report, A Complete and Detailed Account of the Sighting of an Unidentified Flying Object, Sheffield Lake, Ohio, September 21, 1958." This document charged "duplicity" in the Air Force treatment of UFO reports in general, and asserted that the Fitzgerald investigation in particular had been "criminally mishandled" and was a "disgrace to

the U. S. Air Force and an insult to the American public . . .” It further suggested that Sergeants A and B be “disciplined” because their investigation was not adequate or thorough, and that they had had “little or no intention of making an honest investigation of this sighting.”

Copies of the pamphlet were mailed to eminent scientists throughout the country, members of the United States House of Representatives and the United States Senate, officers in the Air Force, the Secretary of the Air Force, and the Secretary of Defense. The publication of such charges against an ordinary private citizen might easily have caused a suit for libel. The Air Force investigators, whatever their private reactions may have been, had no such recourse; their accusers could act with fair assurance of immunity from legal action.

The document made a number of specific accusations. Because of the wide publicity given this attack, we shall discuss each point fully. Our comments, appended in brackets, are based on official records of the Air Force, the New York Central Railway, the United States Weather Bureau, and the United States Coast Guard. Most of these facts were available to the Akron Committee itself.

Charge 1. Because of the position of the Fitzgerald house, the headlight of the train could not have shone into the bedroom windows. [Correct. But the point is irrelevant. The Air Force did not suggest that the train’s light shone into the window. The light could have shone into the yard, however, and would have been visible to a witness looking out of the window. The brilliant light that flashed in the window and roused the witness did not come from the train but from the spotlight of the Coast Guard cutter.]

Charge 2. Events taking place on the lake could not have had any relation to the sighting because the shore was 3000 feet away and, because of intervening houses and trees, a witness in the Fitzgerald house could not see the lake. [Incorrect conclusion from the facts. The beam of a spotlight on a boat moving one or two miles offshore (as was the Coast Guard cutter at about 3 A.M.) could have been seen from the house. The beam of such a light can be visible for great distances. Reflected from the clouds and spread by the drops of moisture in the air, it could easily have flashed into the window with great brilliance.]

Charge 3a. The spotlight used by the Coast Guard cutter was of a type that could not be focused like a searchlight; therefore the beam could not have been reflected from the clouds to the Fitzgerald house. [Incorrect. The spotlight used could operate with either a diffuse or a narrow beam, could be focused like a searchlight, and could have been reflected from the clouds to the house.]

Charge 3b. The Coast Guard cutter had used its spotlight and turned the beam in the direction of the house only once that night, while signaling another boat at a time two hours earlier than the sighting and a place roughly five miles from the house. [The December 1, 1958, edition of the document gives the distance as 4½ miles; the 1959 edition gives 5½ miles. Whatever the true distance, the statement is incorrect. A signaling incident did occur at the time and about the place specified, but it had no relation to the Fitzgerald sighting. The light was used frequently in the hours between midnight and 4 A.M., as the cutter carried out its search for the missing cabin cruiser. In a statement obtained by the Akron Committee itself, the chief boatswain's mate affirmed that "subject spotlight was flashed on and off a number of times during the night, picking up objects in all directions. It is hard to estimate how many times spotlights were snapped on and off during subject search, but they were used quite often during short periods of time."]

Charge 4. The statement that the supposed confirmatory witness, Mrs. S, could not recall anything unusual for the night of the sighting was "a lie," as evidenced by her signed statement. [Incorrect. When the investigators visited Mrs. S, she asserted that she had nothing to contribute. At about 2:30 A.M. (half an hour earlier than the Fitzgerald sighting) she had indeed noticed a bright-red glow that had startled her at first until she realized that it probably came from the nearby Ohio Edison plant or from the foundry. The signed statement printed by the Akron Committee in the December 1958 edition of the document bears no date. The notarized statement used in the 1959 edition is dated March 25, six months after the sighting had occurred. After the Air Force interview, apparently, Mrs. S had changed her mind for reasons unknown.]

Charge 5. The statement that another confirmatory witness, Mr. G, was not available for interview was "pathetic" because it was

Mrs. G, not Mr. G, who saw the UFO. [The point of this accusation is not clear. Because of a typographical error in a letter, "Mrs." was changed to "Mr." The fact remains that the supposed witness, Mrs. G, was not available. Also, the light she reported had appeared about 2 A.M., an hour before the Fitzgerald sighting.]

Charge 6a. It was not true that a misty rain with haze and mist had occurred at the time of the sighting; the witness herself stated that it was not raining. [Incorrect. The Cleveland Weather Bureau recorded continual slight precipitation between midnight and 7 A.M.: .20 inches were recorded between 2 and 4 A.M. When asked whether it was raining when she saw the UFO, the witness replied, "It had rained a few hours before," a vague response suggesting that she had not noticed the weather at the time of the sighting. Other parts of her account, however, strongly indicate rain. Although the night was warm (about 65 degrees F. at 3 A.M.), her bedroom window was closed.]

Charge 6b. It was not true that smoke from the steel plant southwest of the house could have been a factor in the sighting, because the direction of the wind was wrong. [Incorrect. The Weather Bureau recorded "WSW and SW" winds that night averaging ten miles an hour; coming from the southwest, the winds would have blown the smoke northeast, directly toward the house.]

Charge 7a. The sergeants did not make a house-to-house check among the neighbors to obtain confirmatory evidence. [Correct. Such a time-consuming procedure would not have been justified. The neighbors had had two weeks in which to report a visiting spaceship. No such report had been made, even by the neighbor in whose yard the noisy object was supposed to have hovered while emitting puffs of smoke.]

Charge 7b. They did not ask Mrs. Fitzgerald to make a drawing of the UFO. [Correct. Before their visit she had already made such a drawing, prepared with the help of members of the Akron Committee who had shown her a sketch of an alleged spaceship reproduced several years earlier in an Air Force pamphlet [13]. With this sketch before her to aid her memory, Mrs. Fitzgerald had described her UFO to a draftsman provided by the committee. Unsurprisingly, the resulting sketch was very similar to the picture

used as an example. A drawing obtained in this way could have no value as evidence.]

Charge 7c. The sergeants failed to ask enough questions about the motions of the object. [Incorrect. The standard form for reporting unidentified flying objects contains questions specifically designed to describe the motion of an unknown; all these questions were asked and answered.]

Charge 7d. They used only the standard report form; it did not include questions that allowed Mrs. Fitzgerald to express all her ideas of what she had seen. [Correct. The questions are designed to elicit observed physical facts; it does not require all the witness's interpretations.]

Charge 7e. They did not take notes during the interview. [Correct. In filling out the report form they obtained all the necessary information. They had been trained not to take additional notes because some witnesses become nervous when they see that their remarks are being written down.]

Basic charge 7. These "omissions" in procedure proved that the sergeants had little intention of making an honest investigation. [Incorrect. They omitted no query that might have yielded useful evidence. Their duty was to report and try to account for the phenomenon observed by Mrs. Fitzgerald, not to record her belief in a hypothetical spaceship. The details of structure and motion that Mr. C wanted to insert in the record were mere impressions based on his assumption that the UFO was a solid object under intelligent control.]

The document repeatedly charged that the investigators asked too few questions, and implied that they asked only five of Mrs. Fitzgerald—yet she answered all the many questions in the standard report form. Furthermore, Mr. C had no way of knowing just how many and what questions were asked; during all the latter part of the interview he was outside the house.

Perhaps the best comment on the Fitzgerald Report and on the activities of civilian saucer-investigation groups in general is that of Dr. Thornton Page, the eminent astronomer who in 1952 served on the scientific panel to evaluate UFO reports (see *Chapter VII*). After receiving a copy of the Fitzgerald Report, he wrote to a member of the Akron Committee:

"As a scientist I am interested in unexplained phenomena, but the one or ones responsible for Mrs. Fitzgerald's sighting is or are undoubtedly highly complex. It is just as false to say simply that she saw a flying saucer 20 feet in diameter as it is to say that she saw nothing, or that she simply saw the train headlight on a mist. Certainly, I would not expect a pair of Air Force investigators to be able to explain her sighting (and the others) satisfactorily from interviews two weeks after the event. It would be ridiculous to propose that a team of experts in the fields of physics, psychology, meteorology, engineering and railroading be sent to Sheffield Lake, Ohio, to study these sightings from all possible angles.

"I have already written to you and to others that your fundamental error is in oversimplifying your explanations of complex natural phenomena by assuming a common cause without justification. If you say that everything you cannot understand is caused by gremlins, then gremlins are everywhere! And the Air Force would need a much larger budget to investigate every sighting or hearing or feeling of a gremlin!

". . . The onus is not on the Air Force or me to prove that no flying saucer was present that night; the onus is on you and your UFO Research Committee to prove that there is *no* other explanation of what was seen and heard."

The Open Mind

Of the many astronomical observatories in the United States and abroad, none has ever photographed an object that remotely resembled a spaceship. Since 1957, hundreds of members of Moonwatch teams throughout the world have watched the skies to record passages of the many artificial satellites, but no Moonwatch team has yet reported the presence of a spaceship. Radar stations on all continents keep track of every artificial satellite and fragment of satellite orbiting the earth. In February 1963 there were 284 such objects, originating in Canada, Great Britain, Russia, and the United States. If an interloper from beyond our planet should join the parade, Space Track stations would at once detect its presence.

The Air Force has found no evidence of any kind that anyone has

ever seen, heard, smelled, photographed, touched, or in any way detected a trace of an interplanetary spacecraft. Extraterrestrial visitors have not yet arrived, and may never arrive. If and when they do, our Air Force wants to be the first to know.

The Air Force will continue to investigate reports of unidentified flying objects and to treat them as "serious business." [14] The security of the nation depends on this watchfulness. When a pilot sees a bright object flashing through the sky and cannot immediately recognize it, he knows that he may be looking at a meteor, a balloon, a bird, a sundog, a planetary mirage, or another plane. On the other hand, since he may be catching a significant glimpse of a guided missile or an aircraft from beyond the United States, he promptly reports another UFO. The Air Force cannot afford to guess what is in our skies. They want to *know*.

The creative scientist, eternally curious, keeps an open mind toward strange phenomena and novel ideas, knowing that we have only begun to understand the universe we live in. He remembers, too, that Biot's discovery that meteorites were "stones from the sky" was at first greeted with disbelief, and he hopes never to be guilty of similar obtuseness. But an open mind does not mean credulity or a suspension of the logical faculties that are man's most valuable asset.

Human beings now stand on the threshold of space. Visits to and from other worlds may occur in the future, bringing new facts and new interpretations of reality that we cannot now imagine. No evidence yet found indicates that such visits have begun. No fact so far determined suggests that a single unidentified flying object has originated outside our own planet.

[1] Keyhoe, D. E. *The Flying Saucer Conspiracy*. New York: Henry Holt & Co., 1955.

[1a] Tacker, L. J. *Flying Saucers and the U. S. Air Force*. Princeton, N.J.: D. Van Nostrand Co., 1960.

[2] Keyhoe, D. E. *Flying Saucers from Outer Space*. New York: Henry Holt & Co., 1953.

[3] *UFO Investigator* (March 1960).

[4] *UFO Investigator* (August–September 1958).

[5] *UFO Investigator* (April–May 1961).

[6] *UFO Investigator* (July–August 1960).

- [7] Keyhoe, D. E. *Flying Saucers: Top Secret*. New York: G. P. Putnam's Sons, 1960.
- [8] Lorenzen, C. E. "The Psychology of UFO Secrecy," *Flying Saucers* (October 1958), p. 12 ff.
- [9] Davidson, L. [Letter] *Flying Saucers* (October 1958), p. 79.
- [10] Davidson, L. "An Open Letter to Saucer Researchers," *Flying Saucers* (March 1962), p. 36.
- [11] *The Fitzgerald Report*, The UFO Research Committee of Akron, Ohio, 1958.
- [12] Air Force Files.
- [13] Project Blue Book, *Special Report No. 14*, ATIC, Wright-Patterson Air Force Base, Ohio. May 5, 1955.
- [14] *New York Times*, February 28, 1960.

APPENDIX

UFO AND OTHER INCIDENTS REFERRED TO

<i>Date</i>	<i>Place</i>	<i>Associated name</i>	<i>Page</i>
1913 February 9	Canada	Great Meteor Procession	107
1947 Jan. 12	Puerto Rico		99
June 24	Chehalis, Wash.	Arnold	13
June 31	Tacoma, Wash.	Maury Island	21
July 7	Kentucky		58
1948 Jan. 7	Louisville, Ky.	Mantell	33
Feb. 18	Norton, Kans.		102
July 24	Alabama	Chiles-Whitted	109
July 26	Southeast states		111
July 27	Tennessee		112
Oct. 1	Fargo, N.D.	Gorman	77
December	New Mexico	Green fireballs	93
1949 Aug. 20	Las Cruces, N.M.	Tombaugh	266
1950 March 8	Dayton, Ohio		70
March 17	Farmington, N.M.		48
June 4	Colorado		95
July 4	New Mexico	Fry	200
Aug. 11	Washington, Oregon		95
Sep. 20	Murray, Ky.		96
Sep. 20	Western states		96
Nov. 2	Eastern states		95
1951 May 29	Downey, Calif.		129
Aug. 25	Lubbock, Tex.	Lubbock lights	123
Nov. 2	Texas		95
1952 Jan. 6	California	Van Tassel	201
Jan. 22	Alaska		152

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1952 Jan. 29	Eastern states		100
May 7	Brazil	Ilha dos Amores	206
June 15	Virginia		39
June 21	Oak Ridge, Tenn.		76
July 2	Tremonton, Utah		130
July 5	Hanford, Wash.		135
July 7	Pacific Northwest		135
July 12	Indiana		135
July 14	Chesapeake Bay, Va.	Nash-Fortenberry	256
July 16	Salem, Mass.	Coast Guard photo	122
July 19	Washington, D.C.	Radar saucers	155
July 26	Washington, D.C.	Radar saucers	155
July 27	Manhattan Beach, Calif.	Stack of coins	49
July 27	Nevada	Bethurum	201
July 29	Port Huron, Mich.		160
Aug. 1	Bellefontaine, Ohio		162
Aug. 3	Hamilton A.F.B., Calif.		46
Aug. 8	Durango, Colo.		50
Aug. 10	Durango, Colo.		50
Aug. 19	W. Palm Beach, Fla.	Scoutmaster	136
Aug. 24	Hermanas, N.M.		47
Sep. 12	Sutton, W.Va.	Sutton monster	137
Sep. 24	Cuba		42
Oct. 10	Presque Isle, Me.		139
Oct. 10	France	Angel hair	220
Oct. 27	France	Angel hair	220
Nov. 20	California	Adamski	203
Dec. 6	Gulf of Mexico		5
Dec. 10	Odessa, Wash.		62
Dec. 29	Japan	Rotating lights	73
1953 Jan. 9	Japan	Rotating lights	73
Jan. 21	Japan	Rotating lights	73
Feb. 6	Rosalia, Wash.		
May 2	Calcutta, India	BOAC Comet	276
May 31	New South Wales		26
July 29	New York	Moon Bridge	228
Aug. 5	Rapid City, S.D.	Ellsworth A.F.B.	167
Aug. 19	New Haven, Conn.		231
September	England	Invisible saucers	165
Nov. 23	Michigan	Kinross	154
Nov. 28	Eastern states		99

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1954	Jan. 30	Indiana		85
	Sep. 18	San Francisco, Calif.		92
	Sep. 18	New Mexico, Colorado		92
	Oct. 2	France		123
	Oct. 22	Marysville, Ohio	Jerome School	222
	Nov. 30	Sylacauga, Ala.		88
	November	Taormina, Sicily		205
	Dec. 13	Campinas, Brazil	Silver rain	231
1955	Feb. 21	Horseheads, N.Y.	Angel hair	223
	March 3	Alaska		60
	May 19	Los Angeles, Calif.		130
	Oct. 31	Gainesville, Fla.		51
1956	Feb. 4	Accra, Africa		50
	March 20—22	Cincinnati, Ohio		67
	April 8	New York	Ryan	68
	Summer	U.S.S.R.		178
	Aug. 26	California		130
	Sep. 10	Salina, Kansas		164
	Sep. 25	Cincinnati, Ohio	Angel hair	224
	Dec. 29	White Pass, Wash.		28
	December	U.S.S.R.		178
1957	March 9	Atlantic Ocean	PanAm—San Juan	104
	July 24	Norway		248
	Sep. ?	Ubataba, Brazil		236
	Nov. 2	Levelland, Tex.		174
	Nov. 3	White Sands, N.M.		180
	Nov. 4	Orogrande, N.M.		181
	Nov. 5	Kearney, Neb.	Schmidt	183
	Nov. 5	Brazil	Itaipu Fort	184
	Nov. 5	Gulf of Mexico	Sebago	182
	Nov. 7	Ohio	Moore	185
1958	Jan. 16	Brazil	Trindade Island	206
	April 11	Johannesburg, S. Africa	The Thing	51
	April 14	Eastern seaboard	Sputnik II	116
	Sep. 21	Sheffield Lake, Ohio	Fitzgerald	279
	Sep. 29	Maryland	Nike site	239
	Oct. 2	Danby, Calif.		243
	Oct. 26	Maryland	Lock Raven Dam	180

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	Feb. 6	Boulder, Colo.		249
	Feb. 24	Pennsylvania	Killian	52
	March 13	Duluth, Minn.		72
	March 22	Ann Arbor, Mich.		241
	March–April	Coburn, Va.	Sheep Rock saucer	224
	June 20	Pacific Ocean		105
	July 11	Pacific Ocean		106
	Oct. 12	Washington, Ga.		225
	Oct. 19	Korea		73
1960	March 7	East coast		277
	March 31	France		245
	April 1	Wallops Island, Va.		44
	Aug. 12–20	Northern California	Red Bluff	253
	Oct. 5	Greenland		166
	Nov. 23	Michigan		225
	Nov. 23	New Mexico		99
1961	March 16	England		56
	March 23–30	Florida		250
	April 18	Eagle River, Wis.	Pancakes	226
	July	New Mexico		57
	July 23	Pacific Ocean		103
	August	Los Alamos, N.M.		177
	Oct. 2	Salt Lake City, Utah		245
	Oct. 17	Netherlands Antilles		57
1962	April 18	Eureka, Utah		189
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	Sep. 11	Sebree, Ky.		223

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