

Scientists Debate The Question Of UFO's

Editor's note: With this article, the Star starts a two-part series on the fascinating subject of unidentified flying objects. At the Washington meeting of the American Society of Newspaper Editors last April, Dr. James E. McDonald of the University of Arizona, spoke at the invitation of the editors, taking as his subject UFO's. He was followed by Dr. Donald H. Menzel of Harvard University. The minutes of the ASNE meeting now being transcribed and available, the Star, because of the special public interest in the differences of opinion between Dr. McDonald and Dr. Menzel, presents the remarks of both. Dr. Menzel's side of the case will appear Wednesday. Dr. McDonald was introduced by John Quincy Mahaffey, editor of the Texarkana, Tex., Gazette.

Mr. Mahaffey: And now I should like to present our first scientist, Dr. James E. McDonald, who now holds the position of senior physicist, Institute of Atmospheric Physics, and professor, Department of Meteorology, University of Arizona.

Briefly, his educational background includes a B.A. in chemistry from the University of Omaha, an M.S. in meteorology from Boston Tech and a Ph.D. in physics from Iowa State University. He has been a research physicist at the University of Chicago and has taught physics at Iowa State University prior to his current position. He is a member of the American Meteorological Society, the American Geophysical Union, the Royal Meteorology Society and Sigma Xi.

I am honored to present our distinguished guest, Dr. McDonald.

Dr. McDonald: Ladies and gentlemen, I am pleased to have the chance to talk with you and discuss the results of what I have found in approximately a 12-month intensive study of this extremely interesting problem of unidentified flying objects.

About last April I began to take a close look at the problem, having been moderately interested in the problem for some years prior to that. I have been to Wright-Patterson at Project Blue Book three times and I have examined 150 or so cases in their files and talked to the scientific and military staff at Blue Book.

I have talked with people in the Air Force, both scientific and military, about other aspects of the problem. I have been around the country discussing it with independent groups, such as NICAP (National Investigations Committee on Aerial Phenomena) here in Washington. NICAP is one of the outstanding independent groups; it has done an excellent job over the years of digging into this fascinating problem.

I have, on my own hook, interviewed dozens of key witnesses in important cases around the country and have examined hundreds of cases in a good deal of detail. I have gone over Air Force evaluations, Dr. Menzel's analyses of problems and other evaluations.

It is against that background that I now tell you that the sighting Mr. Powell

discussed, and which I was quite interested to hear about, is by no means unrepresentative of the categories of sightings that demand immediate serious scientific attention in this country and all over the world. And that is part of what I am here to tell you today.

(Editor's note: William C. Powell of Radnor, Pa., and a friend, Miss Muriel McClave, had already reported to the editors on their May 21, 1966, sighting of what they said was a saucer-shaped object with a slightly raised dome on the top. They said the bottom was brilliant red, the top a brilliant white. They said they saw the object while flying near Willow Grove Naval Air Station in Pennsylvania.)

This is not a nonsense problem, as it has been made out. A lot of you have had fun, I suppose, writing feature stories about little green men and hoaxers and so on. Believe me, that is the wrong part of this problem to look at.

In the past week I have spent all of my time discussing my serious concern with scientific colleagues and with military people here in

Washington. This week I think I have given 10 talks and briefings. I am glad to say to you that scientific and official concern is beginning to change. I have been at the Naval Research Lab. I've been at the Pentagon twice this week briefing civilian, military, Air Force and other personnel. This week I have also talked to the National Academy people, the National Science Foundation and other persons whose influence on the problem I believe will quickly show up, but whose affiliation I am not free to discuss with you.

I have to say to you that, as a result of a pretty close look at this problem, I think we have all missed the boat. I think we have been misled. I think the problem has been most seriously mishandled officially for 20 years. The problem has been misrepresented by many interacting factors including yourselves and scientists such as myself.

I have tried to put all of this down in a rather long paper that is available to you at the back of the room. It is entitled "UFO's: Greatest Scientific Problem of Our Times?" In 20 minutes I can't possibly go over all of the details. But I will refer to the sections of this 28-page paper as I go along. Since I know you can't read it now and I doubt you'll be able to

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DR. JAMES E. McDONALD

read it before you leave, I hope that all of you will take it, either to read on the airplane or to carry it home to read and then pass on to your scientific editors or aeronautical editors or what have you. The paper goes into considerable detail and explains my point of view.

I think the problem has been superficially and incompetently handled by the Air Force. I have said that in many open discussions. I have said it to Air Force generals this week. I said it to Air Force generals months ago. And I say it again.

The history of the problem, as Maj. Quintanilla (Maj. Hector Quintanilla Jr., chief of Project Blue Book and also a convention speaker) indicated, began in 1947. The pivot point in the history of the UFO's was the Robertson Panel of 1953 — five well-known scientists assembled by the Air Force and CIA to have a look at the problem. The security agency's concern that led to formation of the group grew out of the heavy wave of reports of 1952, not exceeded even by last year's 1,000 reports.

I was startled when I went into Maj. Quintanilla's office and saw five feet of shelving just devoted to the 1952 waves of sightings. There were so many cases that the

cerned with the clogging of intelligence channels.

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good men all — spent two days together, and two days is just not enough to look at this problem. They ruled that there was no evidence for existence of any "artifacts of a hostile foreign power" and suggested that an educational program be launched. This was never done. It would have been a good thing.

Their fourth recommendation came after strong interaction with the CIA representatives at the final session. (I am in the peculiar position of being almost the only one outside official Air Force channels who has seen this document. Maj. Quintanilla gave it to me and I made extensive notes from it. When I asked for a copy on a subsequent visit, things happened, and it has been reclassified by the CIA. I made no comments about this for several months. It was fully clear to all the personnel at Blue Book and in the Foreign Technology Division that I had all these notes. I have no hesitation now to discuss it in full . . .)

The fourth recommendation asked for a systematic "debunking of the flying saucers." The stated objective of the "debunking" was to "reduce public interest in flying saucers."

• No Deception

I wish to make it very clear that I do not regard this as a dark and sinister action of a covert body trying to deceive the citizenry. They wanted to get the "noise" out of the "signals" that were clogging the intelligence channels. Hence, viewed narrowly from security viewpoints, it made good sense to get this "noise" suppressed. But it was a scientific tragedy that at that time this problem was not turned over, in the face of nonhostility, to scientific groups. It was not. It

stayed in the Air Force; and, gradually, as near as I can see, it has been downgraded to an extremely low priority project which, when I was there first, involved the major, a sergeant and a secretary.

Now Maj. Quintanilla has indicated that the Air Force draws on other sources of expertise. And when we read the press releases from the Pentagon desk, we do indeed get the impression that Air Force expertise, which is not zero by any means, has been used.

My examination of the problem strongly indicates that the Air Force expertise has had very little to do with Project Blue Book, and that this is the heart of the trouble. For instance, in the case of radar, I talked not very many days ago to the Air Force's best radar propagation man, Dr. David Atlas, who indicated to me he had never been brought into any discussions of propagation anomalies or anything like that in all his years at the Air Force Cambridge Research Lab. And I could go on to illustrate examples of that sort.

The question of what the UFO's are is crucial when you look at sightings such as Mr. Powell and Miss McClave talked about and when you realize, as I now do — but did not 12 months ago — that these are not unrepresentative sightings. The close-range sightings of disks and cigar-shaped objects frequently seen at tens of feet in populous areas are on the increase. There are credible observers, multiple witnesses. A case in Beverly, Mass., where five adults — two of them police officers — were within 20 feet of an object that was right over the middle of the street. In the back of my paper are 18 cases out of thousands. And this particular case of last spring is cited.

That sort of thing and Powell's observation are representative of the interesting sightings. They are not confined to the United States. One finds this going on all over the world. I can vouch only for the American reports that I have checked, and those are completely staggering.

• Balderdash, Rot

The Book tells you and me, as we just heard a moment ago, that there is nothing in the unidentified flying objects that defies present-day explanation in terms of science and technology, that's balderdash; it is utter rot, I assure you. How would you explain the kind of a dome-shaped object that Mr. Powell

saw? Well, if it was the only one you ever heard of, you would forget about it. But look at the unidentified cases: Exeter, N. H.; Damon, Tex.; Port Huron, Mich. Look at the sightings only a couple of months ago in Davis, Calif. Look at the cases that simply fit no conventional, no scientific, no known explanation.

Something is going on here of the greatest scientific interest that has been shoved

under a rug, ridiculed and laughed out of court. You and your feature writers have helped ridicule it. It's easier to write a funny story. And once the Air Force tells you there is nothing to it, what is more logical than to say, "People see things; there are a lot of nuts around the country?" And that has led to the net effect that very few of these are reported.

For example, Mr. Powell's report never got on the wires. He told me he called the Naval Air Station at Willow Grove after a day's deliberation, and they weren't very interested; and he didn't go any further with it.

The number of embittered citizens who have been hurt by Air Force callous rejection and discrediting, saying they saw twinkling stars and so on, is very large and I have had firsthand contact with many of them. As a citizen I am a little disgruntled at this kind of treatment. If there were some reason for it, if there were a national security reason — but it's just incompetence in operation.

It has led to a lot of serious students of the problem to speculate that there might be some conspiracy. And I have

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given that very careful thought for a number of reasons. The group at NICAP here in Washington has had much more contact with this problem than either the Air Force or I, and they have again and again encountered cases where it looked to them as if there must be some really high-level conspiracy.

People have suggested that maybe Blue Book is only a front organization and doesn't know that it's only a front organization. Well, I can't begin to tell you the sources that I have checked on this. But I do not think it is a grand coverup. It is a grand foulup, a foulup of incredible proportions, unprecedented in my experience.

There have been scientists who have looked at the problem — not very many. Dr. Menzel is one. I cannot agree with the optical-physical-astronomical principles — the arguments that Dr. Menzel uses.

• Plasma Phenomena

Another person who has recently looked at the problem is Philip Klass, who has thought that these, perhaps, are plasma phenomena. That is a reasonable thing to have a look at, and I have had a look at it. I can't agree with Philip Klass that any substantial portion of the cases can be accounted for in terms of plasma phenomena associated with corona discharges on power lines or balls of lightning. In the best labs in the country it is the biggest problem in fusion research to get plasma lifetimes of more than seconds. But how did Mr. Powell see this plasma coming along at him from ahead and watch it for tens of seconds? How did two California Highway Patrolmen at Red Bluff, Calif., stand about 150-200 feet from a 100-foot-long object that had great big bright blinking lights on it, that maneuvered up and down and led them a chase of about 70 minutes? How did the Portage County, Ohio, sheriff's deputies last spring follow for an hour and a half a plasma or a twinkling star or, as Maj. Quintanilla

has said, a combination of Echo and Venus — an explanation that is unsurpassed? And it still stands as the official explanation. Congressman Stanton (Rep. John W. Stanton, R-Ohio) has been told that a reinvestigation confirms that. That too is utter rot.

I tell you that this sort of thing has to stop. And you

editors are in an excellent position to help stop this by pressing for what I am afraid, at this juncture, may be the only way to escalate serious scientific concern, and that is to ask for a full and fair congressional inquiry into the past 20 years of mishandling of this extremely important problem.

The scientist doesn't usually like to pursue these kinds of routes. I don't. You often get not only less than you hoped for but you also lose scientific progress. We must have a hearing that is not like the one last spring which was called by Congressman Ford (Rep. Gerald R. Ford R-Mich.) as a result of constituents' concern over Air Force handling of the Michigan cases that were explained in terms of swamp gas. No single explanation has brought the Air Force more ridicule. The swamp gas theory is nonsense. And it still stands as the explanation. This is the explanation that came directly from Dr. Hynek, and Maj. Quintanilla has assured me that it is Hynek, not him, with whom I must have any discussions. And I have, but the explanation has not been retracted.

(Editor's note: Dr. J. Allen Hynek of Northwestern University is the Air Force consultant on UFO's.)

When Ford got an investigation, who conducted it? The Armed Services Committee. Who testified? Three Air Force-related people, period. That we can't have. We must have what NICAP, for example, has been pleading for for years.

• The Best Source

If you want to get the single best source of information about the whole UFO problem, I refer you to a

comes to mind at the moment because it contains a long record of the successful attempts to persuade congressmen — they were almost successful several times — to launch an investigation. And this, as I've said, is needed. We scientists have been assured for so long there is nothing to it. As I have gone around the country and I suppose I have talked to 15 scientific groups, including Rand, the University of Washington, my colleagues in the American Meteorological Society — over and over again I have encountered the conviction that "there can't be anything to this; the Air Force has investigated it for years and years and shown that there is not a shred of evidence" — the sort of phraseology you heard a moment ago.

This even shows up abroad. Jacques Vallee, a French investigator of UFO's, who is now in this country, has written two fairly good books on the subject. I asked him; "Why doesn't the French government, for example, do something? He replied, "When we go to the French government, they say the U.S. Air Force has been spending a lot of money for many years on this and has shown there is nothing to it. Why should we spend French money?" And so this image of expertise that has been spread abroad — which has behind it zero — is holding this problem in a limbo that it must be blasted out of.

Although I saw some progress this week — progress of an entirely different sort — I don't think we are really going to get the serious concern among many top-notch scientists. What we need are scientists who are much better equipped than myself to look at this problem. This has to go to the top-caliber scientists all over the world, because something is involved here that is of concern to all of us. It is not a simple problem. I mean, obviously, how am I going to explain a 30-, 40-, 50-foot disk that goes by an experienced pilot like Mr. Powell, who, I understand has logged 18,000 hours and he sees this object just as he might see a Cadillac a few

Even the very best scientists are going to be very bewildered when they examine, as I, for example, have examined, the astounding volume of evidence that exists on this problem that has been generally put under the rug.

• Wire Services

The wire service editors know it's a lot of nonsense. If something happens out in Sauk Center, maybe even the Sauk Center Gazette doesn't report it. But if it does, the wire service editor is sure disinclined to report it. And so the discrepancy between what you as editors suspect is the nature of the problem and what you see in just looking at clipping service coverage — where you get all the Sauk Center Gazette reports — is, well, it's almost incredible.

I couldn't believe it when last spring I saw the NICAP clipping service coverage. I thought I knew something about the problem, but the number of incidents in Shamokin, Penn. or Custer, Wash., or what-have-you — you never hear of them, and nobody else hears of them. If you read the New York Times and your own paper, you won't have heard of them, because we have collectively helped the Air Force forget about this somewhat uncomfortable problem. And you have helped. Yet, the evidence is simply astounding.

Well, I much prefer to talk about the purely scientific aspects of some of these explanations. I have no startling scientific illumination of the problem. It's baffling to me. Nothing in my scientific education prepares me to give you a pat explanation of what is going on here.

There are hoaxes; there are misinterpreted phenomena; there are all these things, of course. But there are not advanced test vehicles, believe me. No Air Force test vehicle is going to go for five miles behind a loaded gas truck in Oklahoma — this sort of thing — landing in the middle of cities. No

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American test vehicle is going to be tested in Brazil or New Zealand and no Russian test vehicle is going to be tested in the United States or England. There is every reason to believe that the phenomenon is global. They are not advanced test vehicles; they are not hallucinations. I have had three sessions with psychologists and I have asked them, "Is there anything in your clinical experience that would match this?" The answer is, "No, it certainly doesn't sound like anything psychological." After all, there are cases involving dozens of witnesses and

others involving radar sightings — although if the Air Force is involved, the sightings are disclaimed and blamed on weather, electronic malfunctions and so on; at least that's how they have been so attributed since 1953. If you want to get all the Air Force radar sightings, you go back before the CIA request for a "debunking" policy and Air Force Regulation 3000-2.

• A Beginning

Well, what is to be done? The Colorado Program (an Air Force-sponsored study) is a beginning, but I am uneasy about the Colorado Program. There is not nearly enough scientific talent on that program. I have said that quite openly — without intending to carp — to many people in Washington. It should be beefed up immediately. What we need is much more attention to this problem, and that, unfortunately, requires money. But it also requires people and that is what is short out at Colorado. I'm afraid they have not taken the problem seriously enough to muster the scientific talent to do justice to that.

We need an immediate escalation of the problem. Congressional inquiry, if you can press for it, will perhaps do the trick; it might also send the problem awry. I don't have great confidence in a congressional inquiry being the greatest solution. I'll

continue to try, as one scientist, to pursue it in other ways. The problem belongs to a science-oriented agency, not the military. And by their own statement, with which I agree, there is no clear-cut evidence of hostility. But let's get it into a scientific agency.

Amusingly, all my efforts to interest NASA in this gives me the feeling that they think it's nonsense too. I think they have been hoodwinked and sort of unintentionally brainwashed for years and years. And all this is not as a result of any high-level conspiracy. It's just a foulup. But a foulup of really incredible proportions. We must launch a new level of investigation.

There are very specific things. Radar is already depl-

oyed. The trouble is it's compromised by present regulations. There are many radar sightings. This would be an immediate objective source of information that could be put into scientific terms and be very useful.

There are a number of electromagnetic effects known in the evidence — car-stopping cases, for instance. In Texas, in 1957, the fascinating case, nine different vehicles stopped. But this is going on all the time. NICAP must have 150 examples of this. It's going on in Australia, England and so on.

Associated with this are apparently interference effects, radio and TV, magnetometers, compasses, a lot of electromagnetic effects. Science knows a lot about electromagnetic sensing devices, and many things could be done quickly if only the problem were taken seriously.

• Airline Reports

There are many airline reports in the old evidence. But once the Air Force began to discredit pilots — and they have, in some cases, unmercifully discredited them — that source of information pretty much dried up.

That can be changed. Mobile teams need to be prepared to get out into the field in a hurry with a lot of gear. And this can be done. I discussed this in the Pentagon last week with the people

about that sort of thing than I do.

The whole question of the pre-1947 sightings, which I

must be looked at by historical scholars as well as students of the history of technology, to examine the interesting question of whether sightings that appear to constitute a continuum at low levels, running back to the turn of the century at least, are the same phenomena. NICAP is coming out with a volume in a few months, one that represents a good compilation of evidence. But historical sophistication is needed to assess the evidence. That is a very important thing to do, because the whole nature of the problem is quite different, if it is the case — and I lean in this direction — that aside from the marked increase beginning in 1947, there appears to be the same phenomenon of craft-like, machine-like objects operating in our environment for tens of years.

The heart of the problem is the "ridicule lid," and you're sitting on it. You're sitting on it in a way that is very important. Get off that lid! That is, get your wire service people to take it seriously; look at the problem yourself; examine it for yourself and get off that lid, because that is a big part of the problem now.

You don't know whether changes in the frequency of sightings is a real change, or whether they occur just because you have given it serious credence in your area, which makes people come out with reports that they wouldn't otherwise have told a soul about.

You are on the lid. Get off it. Ask for congressional investigation.

My report lists 18 or 20 editorial comments. It shows that some of your colleagues have already pressed for this — too faintly — in the past. Have a look for yourself at the evidence. You will find an astounding picture of enormous interest that has been mishandled and misrepresented for far too long.

Well, I too have examined the evidence and I have drawn slightly different conclusions from those presented by the previous speaker.

(The previous speaker was Dr. McDonald, who said that he had concluded, after a 12-month study of "the extremely interesting problem of unidentified flying objects" that a proper approach was not being taken toward them by the Air Force or others, and that a closer look should be taken. Dr. McDonald said, "Something is going on here of the greatest scientific interest that has been shoved under a rug, ridiculed, and laughed at." Dr. McDonald's view is that UFO's very well may be visitors from space.)

Similar sightings of flying saucers go far back in history, where they have assumed different forms for different people. Old records refer to them as fiery dragons, fiery chariots, wills-o'-the-wisp, jack-o'-lanterns, fire-drakes, fox fire and even the devil himself.

And now we are having urged on us a new legend to explain a rash of mysterious sightings. Certain UFO buffs argue that the peculiar properties and maneuvers of these apparitions, as reported by reliable people of all different kinds, are so remarkable that only one explanation for them is possible: they must be vehicles from outer space, manned by beings far more intelligent than we, because the operators have clearly built vehicles capable of something far beyond anything we can conceive of. This is the argument that we are asked to accept.

On the face of it, it sounds much like the reasoning of Sherlock Holmes, who said on several occasions, "It is an old maxim of mine that when you have excluded the impossible, whatever remains, however improbable, must be the truth." I am willing to go along with this formula, but only after we have followed Holmes and excluded every possibility but that of manned UFO's. And we must also show that no further possibilities exist.

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Deceptive Reasoning

The believers, I feel, are much too eager to reach a decision. Their method is quite simple. They try to find someone whom they can establish as an authority, someone who will support their views. Then they quote and often misquote various authorities, or they misquote one another, until they believe what they are saying. Having no real logic on their side, they resort to innuendo and ridicule and try to discredit those who fail to support their view. The UFO magazines all refer to me as the archdemon of saucerdom!

To the buffs all sightings are true UFO's unless proved otherwise.

I concede that the concept of manned spaceships is not an absolute impossibility. Neither are the concepts of ghosts, spirits, witches, fairies, elves, hobgoblins or the devil. The only trouble with this last list is the fact that they are somewhat out of date. We live in the age of space. Isn't it natural that beings from outer space should exhibit a similar interest in us? But when we consider that these beings — if indeed they are beings — have been bugging us for centuries, why should not one have landed on the White House lawn and shown himself to the President of the United States, to a member of the National Academy of Sciences or at least to some one of you editors?

Now, please don't misunderstand me. I think it is very possible that intelligent life, hopefully more intelligent than we — may exist somewhere in the vast reaches of outer space. But it is the very vastness of this space that complicates the problem. The distances are almost inconceivable. The time required to reach the earth — even at speeds comparable to that of light — range in hundreds, if not thousands, of years for some of our nearer neighbors. And it takes light some billions of years to reach us from the most distant galaxies, times comparable with that for the entire

life history of our solar system. The number of habitable planets in the universe is anybody's guess. Any figures you have heard, including mine, are just guesses. I have guessed that our own Milky Way many contain as many as a million such planets. That sounds like a lot, but the chances are that if this figure is right, the nearest inhabited planet would be so far away that if we sent out a message to it today, we should have to wait about 2,000 years to get a reply. Alas, the evidence is poor for intelligent life in our solar system, although I would rather expect to find some low forms of life on planet Mars.

Other Reasons

With respect to UFO's, my position is simply this: that other natural explanations exist — Dr. McDonald to the contrary — for the unexplained sightings. The Air Force has given me full access to their files. I concur with Dr. MacDonald that there is no vast conspiracy by either the Air Force or the CIA to conceal the facts from the public, as many groups have charged.

The Air Force has made its mistakes. They never have had enough scientists in the project. They have failed to follow up certain sightings of special importance. To me their questionnaire is amateurish, almost cleverly designed in certain cases to get the wrong answers and lose track of the facts. The Air Force is aware of my criticism. And at Major Quintanilla's invitation I have been making constructive criticisms and trying to help them in a revision of the questionnaire. It is not an easy job.

From 1947 until 1954 a bewildered group of Air Force personnel tried honestly and sincerely to resolve the UFO problem. Many highly reliable persons had reported seeing objects moving at fantastic speeds and apparently taking evasive action in a manner impossible for known terrestrial craft. By 1952 a sizable number of those in the Air Force group had concluded that extraterrestrial vehicles were the only explanation. Some of this report leaked out. Popular writers ex-

ploited these ideas, and soon various UFO clubs came into being. In 1953, after I had heard, a committee of scientists headed by H.P. Robertson of Cal Tech met at CIA to consider a number of the Air Force's most convincing cases. These cases were supposedly the ones that had convinced the Air Force personnel who had worked on them as the 20 to 30 most outstanding cases, the ones that looked as if there was absolutely no other explanation except UFO's from outer space to account for the sightings. The Robertson Committee immediately solved a number of them. The rest they could not solve only because of poor or insufficient data. The questionnaire again! They concluded that all cases had a natural solution. And the report states that there is no evidence to support the idea that UFO's are vehicles from another world.

Nevertheless, the UFO buffs believe, almost as an article of faith, that special observers, such as military or airline pilots, couldn't possibly mistake a meteor or a planet or a star, a sundog or a mirage for a UFO. This viewpoint is absolute nonsense, and the Air Force files bear witness to its falsity! They contain thousand of solved cases — sightings by the same kind of "reliable individuals," like the pilots. But such persons have often made huge errors in the identification.

Meteor Mistaken

A huge meteor flashes by in the sky! The copilot thinks it is going to strike the plane and takes evasive action. He may even imagine that his plane is hit by the backwash from this UFO. The pilot disagrees, the pilot is right. The UFO proves to be a bright fireball or meteor a hundred miles away! such occurrences are frequent, not rare.

Distances, especially in space, are hard to estimate. If you're in the air, a thing you might think is 100 feet away from you actually may be a star that is clear back in the firmament.

A bird's feather, shining brightly in the sun, floating a mere 20 feet overhead may, to someone on the ground, seem to be a distant object moving at a very high speed.

Conversely, a pilot may think the bright object on the horizon, in reality a star or planet, that lies just beyond his wing tip is a UFO. Sometimes a layer of warm air, sandwiched between two layers of cold air, can act as a lens, projecting a pulsing, spinning, vividly colored saucer-like image of a planet. (I have seen this phenomenon myself, despite the fact that the previous speaker in his lengthy manuscript tries to discredit my sighting.) Pilots, thinking they were dealing with a nearby flying object, have often tried to intercept such images which evade, of course all attempts to cut them off. The distance may seem to change rapidly as the star fades or increases in intensity. Because, as the pilot flies along, the star may even be completely cut off at times by a mountain or by a forest and it will seem to buzz in and out from the plane, attacking the plane. It's realistic and very frightening.

The observations of this type fortify the UFO legend that these objects "maneuver as if under intelligent control." But the pilots fail to realize that the "intelligent control" came from within themselves, and I think that the Air Force personnel of Project Blue Book still do not appreciate this important UFO phenomenon.

Mirages aren't the only apparitions that appear to maneuver. I think I was the first person to point out that a special kind of reflection of the sun (or moon) from ice crystals, sometimes called a sundog (or moonog), can also perform evasive action. Layers of ice crystals are necessary like those found in cirrus clouds. An aviator, flying through cirrus, sometimes sees a peculiar metallic-appearing reflection. The reflection often has a reddish tinge on one side, a reflection of the sun or moon. He may elect to chase it. The apparition will recede if approached.

the pilot reverses course and the object seems to execute evasive action. As the pilot runs out of ice crystals the UFO will seem to put on a burst of speed and disappear into the distance. It is the ice-crystal analogue of a rainbow.

Material Causes

But such behavior does not imply, as the UFO addicts try to imply, the presence of an intelligent pilot to guide it.

As we look over the Air Force files, we find that some 90 per cent of the solved cases result from the presence of material objects in the atmosphere, reflections from planes banking in the sun and balloons — child's balloons, weather balloons, lighted or unlighted, especially those enormous plastic balloons as large as a 10-story building, which carry scientific instruments sometimes to 100,000 feet — reflecting full sunlight while the earth below lies in dim twilight. Such balloons shine more brilliantly than Venus. Advertising planes or illuminated blimps frequently become UFO's.

Birds, by day or night, often reflect light from their shiny backs. Windblown kites, hats, paper, plastic sacks, feathers, spider webs, seed pods, dust devils have all contributed their share of UFO sightings. Insects — single insects or insects in swarms — saucer-shaped clouds, the reflection of a searchlight on clouds, special space experiments, such as rocket-launched sodium vapor releases or balloons launched from rockets from Wallops Island, have also produced spectacular apparitions, visible all up and down the East Coast. Ball lightning and the aurora borealis occasionally contribute.

Reflections from powerlines, insulators, television antennas, radars, radio telescopes, even apartment windows! These too have, in their turn, produced realistic UFO's and I could go on adding almost indefinitely to this list.

But the chief point that I want to make is that a simple phenomenon like any of the above have tricked intelligent people into reporting a UFO.

But there are still a few other phenomena that can be mistaken for UFO's. As far as I know, the Air Force still does not recognize and I think I am bringing them to the public's attention for the first time today. You will see occasional reference to some of these phenomena but only indirectly.

Let me quote from an article on "Vision" in Volume 14 of the McGraw-Hill Encyclopedia of Science and Technology: "...any observant person can detect swirling clouds or spots of 'light' in total darkness or while looking at a homogeneous field such as a bright blue sky." So, if you want to see flying saucers, just look up. If you don't see them, you probably aren't "observant."

I can see them most clearly in a dark room or on a moonless night with the sky even darker with heavy clouds. I find the background of stars on a clear night somewhat distracting. Just lie on your back, open your eyes and see the saucers spin. You will almost surely see bright irregular patches of light forms. Some of them seem gray-green but I occasionally see silver or gold and occasionally red. I can even imagine windows in some of them. As you move your eyes, they will cavort across the sky. To speed up the action, just rub your eyes like a person coming out of a sleep. Occasionally, the whole field will become large and luminous. Now, I ask you, how can you be sure that the UFO reported by an airline pilot is not just one of these spurious images? And even if an alerted copilot confirms it, he might also be responding to a similar effect in his own eyes, since we don't know that he is seeing exactly the same thing that the other man is reporting.

Eye Errors

The chemistry and physiology of the human eye are certainly responsible for many UFO sightings. The eye responds in a different way to different kinds of stimuli. Taken a sudden burst of bright light like that coming from a flashbulb. You newspaper editors, and especially in the first row, would know

that when you look at a sudden flash you will have an enduring effect on the eye. The light from the flash produces immediate change in the so-called visual purple of the retina. In a sense the retinal spot where the light fell on the eye becomes fatigued and, for some minutes after the flash, you will be able to see a bright usually greenish

floating spot which could be mistaken for a UFO by someone unfamiliar with the problem.

But let me take an actual case which is typical of a large number in the files of Project Blue Book. A child going to the bathroom turns on a bright light and accidentally awakens one of this parents who is blinded by the sudden illumination. The child turns off the light and the parent, for some reason, also gets up and just happens to glance out of the window. He is startled to see a peculiar spot of light floating over the trees and making irregular jerky motions. He watches the UFO for a minute or two until it finally disappears. He can't be blamed for failing to realize that the erratic and often rapid movements of the UFO are due to similar movements of his own eye. The UFO simply appears in the direction in which he happens to be looking, and that's all. And yet he may describe it graphically as a luminous object "cavorting across the sky."

Many such stimuli are possible by day and night. A few weeks ago I was driving toward the setting sun. I came to a stoplight and looked out the side window of the car. I was startled to see a large black object shaped something like a dirigible surrounded by dozens of small black balloons. I suddenly realized that these were after-images of the sun. The big one was where I had been looking more fixedly. The spots were images where my eye had wandered. A UFO buff could have sworn that he was seeing a "mother ship" and a swarm of UFO's in rapid flight.

I once had another similar experience. I suddenly glanced up and was surprised to see a whole flotilla of UFO's in formation across the sky. They looked like after-images, but I hadn't been conscious of the visual stimulus responsible. I quickly retraced my steps and found it: sunlight reflected from the shiny surface of the fender of a parked car.

I am sure that many UFO's, still unknown, belong in this class. Look fixedly at the full moon for at least 30 seconds and then turn away. A greenish balloon will swim over your head and perform maneuvers startling or impossible for any real object. I have been able to attain the same effect with the planet Venus when it is near maximum brilliance. Yet most observers will swear that such UFO's are true objects. And the Air Force questionnaire, failing to recognize even the existence of this kind of UFO, contains not a single question that would help them identify it. In fact, the words signifying UFO, unidentified flying object, showed the state of mind of the Air Force personnel who invented this abbreviation. What I am saying, is that the UFO's are not identifiable. They are often not flying and many are not even objects. It is this point of view, to regard the apparition as actual solid objects, that has retarded the solution so long.

After-images possess still another complicated characteristic. Colored light tends to produce an after-image of complementary color. A green flash will cause a red after-image and vice versa.

Color-blind persons and persons with defective vision will often experience effects dif-

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ferent from those of people with normal eyesight.

Another optical phenomenon that can produce an illusion: you may forget that the eyeball jumps a little every time that you blink. Walking transmits vibrations to the eye at every step. Many individuals think they see stars, planets or satellites oscillating when the movement is actually that of the eye itself.

Let me give you this quotation from a book:

On our return across Minnesota we had an experience which I have always remembered as illustrative of the fallacy of all human testimony about ghosts, rappings and other phenomena of that character. We spent two nights and a day at Fort Snelling. Some of the officers were greatly surprised by a celestial phenomenon of a very extraordinary character which had been observed for several nights past. A star had been seen, night after night, rising in the East as usual, and starting on its course toward the South. But instead of continuing that course across the meridian, as stars invariably had done from the oldest antiquity, it took a turn for the North, sank toward the horizon and finally set near the north point of the horizon. Of course, an explanation was wanted.

My assurance that there must be some mistake in the observation could not be accepted, because this erratic course of the heavenly body had been seen by all of them so plainly that no doubt could exist on the subject. The men who saw it were not of the ordinary untrained kind, but graduates of West Point, who, if anyone, ought to be free from optical deceptions. I was confidently invited to look out that night and see for myself. We all watched with the greatest of interest.

In due time, the planet Mars was seen in the East making its way towards the South. "There it is!" was the exclamation.

"Yes, there it is," said I. "Now, that planet is going to keep right on its course toward the South."

"No, it is not," said they; "you will see it turn around and go down towards the north."

Hour after hour passed and as the planet continued its regular course, the other watchers began to get a little nervous. It showed no signs of deviating from its course. We went out from time to time to look at the sky.

"There it is," said one of the observers at length pointing to Capella, which was just rising a little to the East of North; "there is the star setting."

No, it isn't," said I. "There is the star we have been looking at, now quite inconspicuous near the meridian, and that star which you think is setting is really rising and will soon be higher up."

A very little additional watching showed that no deviation of the general laws of Nature had occurred, but that the observers of previous nights had jumped at the conclusion that two objects, widely apart in the heavens, were the same.

Those words came from a book called "Reminiscences of an Astronomer," published in 1903 by Simon Newcomb, who was in charge of the American Nautical Almanac office from 1877 until 1897. This event actually occurred in 1860. The similarity to modern UFO's is overpowering. A star cavorting across the sky! Military officers as reliable and responsible witnesses!

Light Reflections

For you who wear eyeglasses, there is still another way of seeing a UFO. Look directly at some bright light. There are a lot of them around the room here. Keep your head turned slightly to the left or right and you will undoubtedly see a faint, roundish, out-of-focus spot. This is light reflected from the front surface of your eyeball, back to the lens and then back into the pupil of your eye. A bright source, to one side and slightly behind you, can also reach your eye through reflection from the internal surface of the spectacle lens.

To this moment I haven't mentioned still another method of detecting saucers — one not subject to the vagaries of the human eye. I mean radar. Radar is a machine. It can't make mistakes. Or at least that is the common argument advanced by the UFO buffs.

The previous speaker in his document violently discredits my work and reveals his ignorance of the phenomenon of radio propagation of these radar waves. It so happens that during that three-year service in the Navy, which has already been referred to, and 22 years since then as consultant to the Central Radio Propagation Laboratory of the National Bureau of Standards, I have had a little experience with this particular phenomenon and the conditions. Radar is cursed with all of the potential afflictions that any complicated electrical gadget can suffer. But let me mention only one: mirage.

Let me explain briefly what a radar does. It sends out a pulse of radio waves. We know the direction, northeast for example. We know the elevation above the horizon. An echo returns. From the interval between the transmission and the return of the signal we know how far away the object is that reflected the pulse. We think, therefore, we detect a plane — or a UFO in flight — because the radar directs its pulse upward.

But we haven't any way of following the pulse in its path toward the target. A layer of warm, dry air or even a layer containing a few bubbles of warm air will bend the radar beam back to earth. This is what we call partial trapping and this is, for example, what happened in Washington in the famous sighting in 1952.

The reflection of the beam after it has been directed backward comes back from a distant building, a train or a ship. No wonder that planes that were sent out to intercept the radar UFO found nothing. In one such case a well-known writer on flying saucers wrote: "The discovery of visible saucers had been serious enough. The discovery now of invisible flying saucers is bound to frighten anyone."

I know of no reliable cases of simultaneous visual and radar sightings. In view of the physical properties of the eye, the surprising fact is that so few cases have been reported.

Time won't permit me to elaborate on still another relevant phenomenon. The Air Force appears to have neglected completely the psychological angle of mass hallucination. Back in 1919, in Spain, a not unrelated phenomenon occurred. Thousands of people — reliable people — swore that they had seen images of saints rolling their eyes, moving their hands, dripping drops of blood, even stepping out of their panels. One person would call out, "Look, there it goes!" and everyone else would look and they would see this phenomenon. There were many similar events recorded through history.

Many Hoaxes

Then there are hundreds and thousands, perhaps, of hoaxes, like that at the University of Colorado when some enterprising pranksters made hot air balloons from candles and plastic bags and it gave the university officials who were investigating the UFO phenomenon an opportunity to see how poor the evidence can be, a fact well known to the legal profession. This is still another point that the Air Force has sometimes failed to realize. Moreover, their poor questionnaire has only further confused an already confused picture.

Several times during this talk I have used the phrase "UFO's cavorting across the sky." I did so deliberately because it seems to be a favorite phrase of my good friend, Dr. J. Allen Hynek of Northwestern University, and consultant to the Air Force Project Blue Book. He has sometimes expressed doubts about the UFO because stars don't "cavort" across the sky.

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What I have tried to show today is that many kinds of optical stimuli can produce weird effects. With all these kinds of phenomena masquerading as UFO's, many of them, like those related to the physiology of the human eye still practically not investigated, I think I can reasonably claim, applying the criterion of Sherlock Holmes, that we have not excluded all of the impossibles. I have shown that the arguments advanced in favor of the interplanetary nature of UFO's are fallacious. Their alleged high speeds and ability to maneuver, their alleged short distances are completely underestimated and they have natural explanations.

I think it is time for the Air Force to wrap up Project Blue Book. It has produced little of scientific value. Keeping it going only fosters the belief of persons that the Air Force must have found something to substantiate belief in the UFO's. In making this recommendation I am not criticizing the present or recent administration of the project. But it's time that we put an end to chasing ghosts, hobgoblins, visions and hallucinations.

As for the true believers, bless their little hearts, let them go on believing in UFO's, fairies or Santa Claus, if they want to. Nothing will change their minds. They will go on forever demanding more dollars for investigation and more congressional investigation of the UFO's and the Air Force.

Incidentally, I would like to mention that a complete discussion of many of these phenomena appears in the book, "The World of Flying Saucers" by Lyle G. Boyd and myself.

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