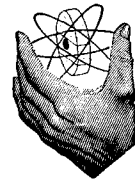


SR / Research

SCIENCE & HUMANITY



DEPARTMENTS: Research in America • Letters to the Science Editor

ARTICLES: The Elusive Code of Life

RESEARCH IN AMERICA

A SCIENTIFIC EXPLANATION FOR THE UFOs?

LAST MAY the Institute of Electrical and Electronics Engineers, biggest single society of scientists on earth, scheduled a symposium on unidentified flying objects (UFOs). The month of October 1966 was announced as the date. The symposium was designed as a major evening feature of an IEEE technical convention in Washington, D.C. For emphasis, the general public would be invited.

A number of the organization's members were sufficiently distressed by the proposed dimensions of the occasion to enter protests. Among them was Philip J. Klass, a bachelor of science graduate of Iowa State University, who went considerably further than any of the others in expressing his dissent. Because he is a senior editor of a respected technical journal, *Aviation Week & Space Technology*, he was granted a special hearing by the committee in charge of the IEEE convention. His argument failed to wipe the symposium off the convention agenda, but he did win a shift in the direction of the projected discussion: Instead of considering UFOs, the symposium panel would debate IFOs, or *identified* flying objects—"the Norman Vincent Peale approach," someone said. As a further concession to his personal and professional prestige, editor Klass received a summons to join the symposium panel, an honor he quickly accepted.

The IEEE convention committee meeting took place in June. Sometime in July, the editor got to thinking about the assignment he had talked himself into, and decided to fortify himself with background reading on UFOs. In *The Wall Street Journal*, he read a review of John G. Fuller's book, *Incident at Exeter*.

Thus Klass, an electrical engineer by profession and a writer by preference, came to take a serious look at UFOs for

the first time in his life. Like most other scientists, he had theretofore dismissed reports of "flying saucers" as unworthy of a thinking man's mind.

Incident at Exeter, Klass learned, after buying a copy of the book, was a compilation of interviews with sixty people who said they saw one or more UFOs outside the little town of Exeter, New Hampshire, in September 1965. According to these accounts, as John Fuller took them down on a tape recorder and then transcribed them, Exeter had been visited by some sort of brightly lighted phenomenon that dived and swooped frighteningly before soaring off into the sky. Time after time, in the conversations Fuller recorded, the UFO observers mentioned the proximity of electric power lines to the places where the UFOs were seen.

Soon the margins of the pages of Klass's copy of *Incident at Exeter* were filled with critical scribbblings. His scientific training would not allow him to accept Fuller's deduction that the UFOs were intelligently guided vehicles from planets of other stars and that the vehicle operators refueled their strange flying machines from the power lines. As a journalist regularly stationed in Washington, Klass could not accept a corollary to Fuller's conclusion, either. The corollary was that the U. S. Air Force made a practice of suppressing knowledge of the presence of the interplanetary invaders. Klass was confident that if the Air Force had anything like the information Fuller suspected it of having, the news long ago would have fallen into the hands of some such columnist as Drew Pearson or some such technical reporter as Klass himself.

Being expert in electronics, Klass knew a great deal more about radar than most UFO sighters do. He knew, for instance, that radar blips associated with

UFO sightings do not necessarily confirm the presence of physical objects in the sky. On the contrary, the plasma track laid down by a passing rocket is more visible on a radar screen than the rocket is.

Fuller's book had made a special point of radar tracking of UFOs by the Air Force. Klass mulled the coincidence of the radar sightings along with the repeated parallels between the locations of UFO sightings and the locations of electric power lines. He began asking questions of specialists in plasma physics. And he intensified his pursuit of this line of inquiry as the scheduled time for the IEEE symposium neared. On or about the twelfth day of August he sent to the journal for which he works, a manuscript embodying his own interpretations of the data Fuller had gathered.

BALL lightning, Klass surmised in this manuscript, is nature's model for most UFOs.

Before the manuscript was published in the August 22 issue of *Aviation Week & Space Technology*, Klass received in the mail an announcement from IEEE: The planned symposium on UFOs had been cancelled. Instead, the announcement said, the IEEE technical convention in Washington in October would star a discussion on electronics in the Vietnamese war.

This news, which once would have delighted Klass, now disappointed him keenly. He had hoped to hear qualified criticism of his UFO ideas from expert listeners at the IEEE meeting.

Since many IEEE members are readers of *Aviation Week & Space Technology*, Klass did not lose by any means all of the technically skilled audience he had in mind in doing his UFO research. But newspapers published the gist of

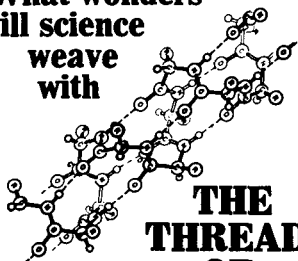
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what his journal printed under his byline, and UFO buffs who read the newspapers swarmed on him like hornets.

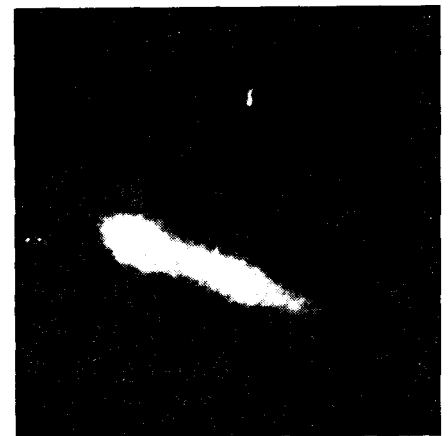
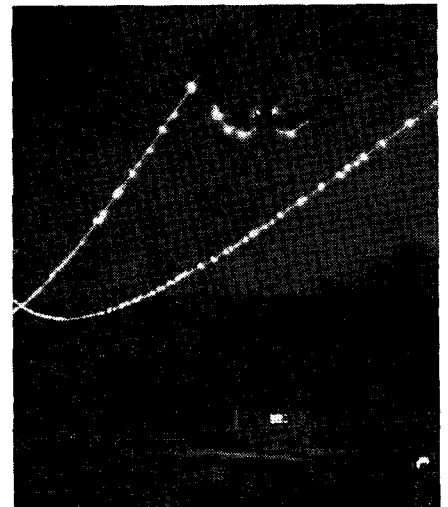
"A few of them seemed to appreciate my attempt to explain the UFO mystery rationally," he told *SR's* science editor in reply to questions by telephone. "But most of them acted as though I had shot Santa Claus or spat on my country's flag."

Spurred by the violence of the criticism, Klass dug deeper into his subject. He analyzed a 184-page booklet, *The UFO Evidence*, distributed by the National Investigations Committee on Aerial Phenomena (NICAP). Almost all of the UFO sightings described in that document could be explained by his plasma ball theory, he felt, especially if the theory were extended—as it logically could be—to include the possibility of free-floating plasmas being present in earth's atmosphere under given conditions. Whence would free plasmas draw the energy they would need to persist? How, Klass counters, does a hurricane power its build-up from a sea breeze?

Klass believes his theory is susceptible to confirmation by scientific experiment. How soon such confirmation may be tried depends largely on how successful the Air Force is in its present effort to persuade a leading American university to accept responsibility for guiding UFO research during the next eighteen to twenty-four months. The negotiations stand about where they did a month ago, but as these words are written the Air Force remains hopeful. In anticipation, new official regulations governing public information on UFO sightings have been written and rewritten and sent to the printer. They bear a new set of numbers—AFR 80-17—indicating that the whole UFO question has been shifted away from Air Force intelligence and placed under the authority of the Deputy Chief of Staff for Research and Development. Perhaps as many as fifty new UFO research proposals are awaiting action by the chosen university once the UFO surveillance contract is signed. Until those are appraised, speculation over the fate of Klass's theory can only be confusing. But the theory can be set forth briefly.

Ball lightning is, as its name suggests, a form of fiery gas ball that appears during or just after thunderstorms. The ball is believed to originate as a blob of air anomalous to the atmosphere around it, perhaps because the temperature within the blob is different from the temperature outside, perhaps because the blob is differently constituted than the surrounding air—maybe through congregation of contaminating particles.

However it comes into being, the anomalous blob of air is electrified by the passage of a lightning bolt. The blob thereafter glows, under certain conditions spins, sometimes moves about



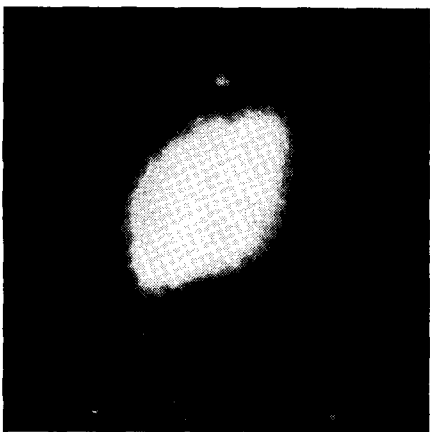
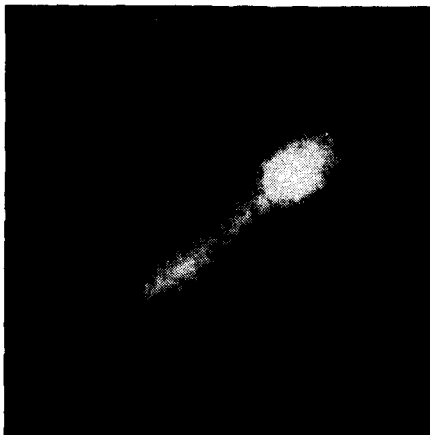
Stepping up of voltage on electric power lines, a practice increasingly adopted as demands for energy rise, can cause coronal discharge on the lines. Dust, salt crystals, or other particles facilitate corona's appearance. Dramatic display in photo above (at top) arose from deliberate overloading of General Electric's experimental 500,000-volt cables near Pittsfield, Massachusetts. Lower photo on this page and others on page opposite show ball lightning created artificially at Illinois Institute of Technology's Research Institute. These illustrations are reproduced by courtesy of *Aviation Week & Space Technology*.

erratically, and then collapses and disappears from sight through loss of the energy originally imparted to it.

AS was noted in these pages six years ago (see *LETTERS TO THE SCIENCE EDITOR*), ball lightning can be created artificially and set rolling in the air as a free-moving flame.

Klass believes that the UFOs described in *Incident at Exeter* developed from electrical corona on the power lines rolled along the wires, and perhaps broke loose. The following quotation is from Klass's report in *Aviation Week & Space Technology*:

Electric corona is a luminous plasma caused by ionization of the air sur-



rounding a transmission line or one of its insulators. . . . The corona can remain fixed or can travel along the power line until cooled and extinguished by external forces.

So long as a transmission line and its insulators are clean and suitably designed, corona does not normally occur. But if small particles of dust or salt crystals . . . become affixed to the line or insulators they can trigger the corona. . . . The reason is that . . . across the dust or salt crystal . . . an extremely high-voltage gradient develops [in excess of] . . . the breakdown voltage of air. . . .

Exeter is located only ten miles from the ocean. The power lines of the Exeter and Hampton Electric Co., which were involved in the sightings, run right down to the ocean beach beyond

Hampton. The company's chief engineer, Stanley Sawyer, says that corona occurs more frequently "when there is not much rain to clean off the lines."

A check with the U.S. Weather Bureau shows that conditions during the summer of 1965 preceding the Exeter sightings in September were especially conducive to corona in that area because it was an extremely dry summer. . . . During the months of July, August, and September the Exeter area received barely more than half of its normal rainfall. . . .

There is a striking similarity between the reported characteristics of ball lightning and the UFOs sighted in the Exeter area. . . . For example:

► **Color:** Ball lightning is multi-colored, but red is the most predominant color reported, followed by intense bluish-white and green. A vast majority of the sightings reported from Exeter said the object was red, while the remainder were either bluish-white, green, or a combination of all of these.

► **Shape:** Ball lightning normally is either spherical or ellipsoidal with many reports of a doughnut-shaped or ring configuration. The Exeter sightings were mostly round, oval-shaped or dome-shaped.

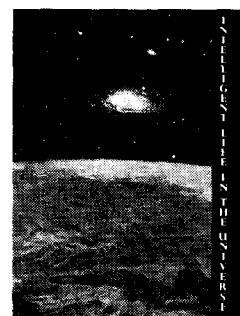
► **Sound:** Ball lightning is often accompanied by a sizzling or hissing sound. Exeter sightings reported that the UFO sometimes made a soft humming or hissing sound.

► **Dynamics:** Ball lightning has been reported as hanging motionless at times, yet able to move up, down, and horizontally at extremely high speeds. It appears to move by rolling and gliding, often along electrical conductors or structures and frequently exhibits a spinning motion. The Exeter sighting reports said the objects often hovered over a fixed location, frequently power lines, often rolled or bounced along, sometimes exhibiting a spinning motion and would then appear to zoom off at great speed and disappear.

► **Lifetime:** Ball lightning reports indicate that they can have a lifetime ranging from several seconds to many minutes. Observers at Exeter reported that objects remained in view for a few seconds or as long as fifteen minutes.

There is a strong parallel between Klass's theory of UFOs and another UFO theory propounded in SR seven years ago by Donald Robey. Robey also believed that most UFOs were plasma balls; he supposed that at least some may be the remnants of comets entering earth's atmosphere near stalling speed. For what the gesture is worth, Robey and Klass are here nominated to the Air Force as candidates for research contracts directed toward dissipating the UFO mystery.

—JOHN LEAR,
Science Editor.



INTELLIGENT LIFE IN THE UNIVERSE

I. S. Shklovskii, Sternberg Astronomical Institute, Soviet Academy of Sciences, and Carl Sagan, Harvard University and Smithsonian Astrophysical Observatory. Authorized translation by Paula Fern

The product of a unique international collaboration between a world famous Russian astronomer and a leading American space scientist, this book is the first popular and accurate modern discussion of the entire panorama of natural evolution—including the origins of the universe, the evolution of stars and planets, the beginnings of life on earth, and the development of intelligence and technical civilizations among galactic communities. Included is a great deal of new material, some never before published in any form.

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Some UFO History

I WAS VERY disturbed to read your articles on Unidentified Flying Objects [SR, Aug. 6], not only because of the apparent verbal sneering by science editor John Lear at TRADE WINDS columnist John G. Fuller but because of the poor and biased treatment of the subject.

Lear not only failed to unveil anything new on the subject but appears to have stacked the cards in his favor. He used a section from Mr. Fuller's book, *Incident at Exeter*, which is not only unrepresentative of the book, but was printed without Fuller's qualifying statements which preceded the section.

He also used a section from the book by Dr. Carl Sagan and I. S. Shklovskii, *Intelligent Life in the Universe*, which seemed very unrepresentative of the book.

Lear referred to Fuller's information as "second hand." Did Lear go to Exeter? Has he investigated any particular sighting in depth? Or does he merely sit back in his ivory tower and make pronouncements on the hard work of others which he has not bothered to check in detail?

In fact, Lear's apparent lack of much original research is infuriating to anyone familiar with the subject, especially in view of the fact that he draws important conclusions instead of just reporting the subject.

For example, an extremely intriguing picture of a UFO appeared on page 48 of the August 6 issue of SR. Lear referred to this as the "clearest photograph of a UFO" and then said it "looks like a straw hat floating through the air." He also said, in the caption under the picture, that "NICAP says the picture was taken through the windshield of a public motor vehicle at 11:30 a.m. on August 3, 1965, by county highway investigator Rex Heflin, Santa Ana, California."

"NICAP says"! Good grief! Is SR operating on such a tight budget that the science editor can't even make a telephone call to California himself and find out whether there is such a man as Rex Heflin and whether he did take such a photograph? Do they have to depend on the word of NICAP, an organization for which Lear doesn't seem to have much respect?

The science editor has implied, by saying the photograph "looks like a straw hat," that the picture is not genuine. I think Lear, as a responsible reporter working for a magazine with a nationwide circulation, either should have examined the photograph and photographer and declared it a hoax or should have done what the *Encyclopaedia Britannica* chose to do. Without any innu-

series of newspaper articles about them. However, I am neither a scientist, nor a science writer as such, but a reporter, and I draw no conclusions about the nature of the phenomena.

I feel that the shortcomings of the *Saturday Review* articles were best illustrated by the work of Philip J. Klass, writing for *Aviation Week & Space Technology* in the issue published August 22. Mr. Klass, senior avionics editor, concluded that the incident at Exeter, as well as many other modern UFO sightings, could be attributed to a little understood form of ball lightning, believed to be seen over high tension wires.

Klass's work on the topic is very commendable and does offer something new to the study of unidentified flying objects. However, it was Fuller who ventured into a field shunned by responsible writers as well as scientists and presented a case with enough details so that men like Klass could present plausible answers to the subject, instead of sneers and ridicule.

GREG STONE.

Westport, Mass.

EDITOR'S NOTE: It is hardly accurate to say that John Fuller, in writing recently about UFOs in the TRADE WINDS column of SR and later in the book, *Incident at Exeter*, "ventured into a field shunned by responsible writers as well as scientists." For seven years ago—in September 1959—SR's *Science and Humanity Supplement* carried a full-length article titled "A Theory about Flying Saucers." In that article, Donald Robey, then a physicist on the pre-design staff of Convair-Astronautics, a division of General Dynamics at San Diego, California, presented a scientific argument in support of the idea that many UFOs might be fragments of comets that had fallen into earth's atmosphere while still containing within them blobs of plasma, or electrified gas. Differential burning of the several chemical constituents of the cometoids, Robey suggested, could account for the lighting effects observed by UFO sighters. Furthermore, he pointed out, the plasma blobs would be free-floating entities responsive to electro-

magnetic forces and hence capable of the weird gyrations ascribed to many UFOs.

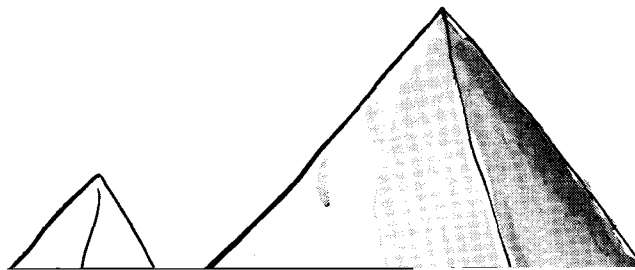
So far as SR's science editor knows, the Robey theory was the first attempt any responsible scientist had made in print to explain the UFO phenomenon in other than conventional terms that nonetheless lay within the accepted parameters of scientific discipline. One year later, in September 1960, SR's RESEARCH FRONTIER page carried a description by Dr. Donald Ritchie, of the Bendix Corporation, of experiments in which first Russian and then American scientists had artificially created free-floating blobs of plasma similar to those observed in the form of ball lightning.

UFO enthusiasts expressed no interest in either the Robey or the Ritchie contributions to SR. Both are scientifically related to the plasma ball theory of UFOs just published by Philip Klass in *Aviation Week & Space Technology*. According to Klass [see page 68] UFO buffs generally are cold to his ideas, too. The Klass theory had not been published at the time SR's second report on UFOs went to press.

SR's science editor cannot discover where he published any sneering—or even critical—comments about John Fuller's reporting. The only disagreement with Fuller expressed in these pages was a difference over two of Fuller's conclusions: 1) that UFOs are vehicles from the planets of other stars, intelligently guided to earth and here refueled from electric power lines; and 2) that the U.S. Air Force is suppressing knowledge of these vehicles.

The burden of proof also rests on those who say that the text of *Incident at Exeter* includes qualifying statements prefatory to the story of Mr. Barney Hill and his wife, Betty, and their experience with a UFO, which was excerpted in SR. The story of the Hills begins near the bottom of page 90 of the book, with no more warning or introduction than the one word, "meanwhile."

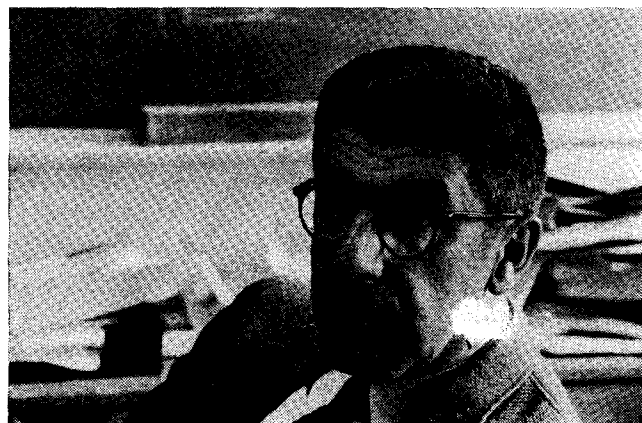
SR's science editor does not possess the facilities required to check the hundreds of UFO sightings that have been reported; consequently, he began by accepting all claims of UFO sightings.



THE ELUSIVE CODE OF LIFE

Is DNA really the master key to heredity?

Scientists are as loath to challenge scientific dogma as clergymen are to risk the established church's cry of "heretic." But Professor Barry Commoner, chairman of the botany department of Washington University at St. Louis, Missouri, being braver than most, boldly flies the banner of dissent in a book that will be published on October 28 next by Viking Press. Under the title "Science and Survival," Professor Commoner not only asserts the scientist's obligation to consider results before undertaking experiments; he traces some recent technological fiascos to over-simplification of the consequences of scientific theory. At the moment, no theoretical concept has wider popular acceptance than the idea that DNA is the key to the genetic code. With that key in hand, it has been presumed safe to experiment with potentially dangerous chemicals because life can always be tinkered back into shape with DNA. In the preview excerpt from "Science and Survival" reproduced immediately below, Professor Commoner points out some deceptive holes in the DNA theory. His book appears on the heels of two more softly spoken others that support his view: "The Thread of Life," by British Nobelist John Kendrew (Harvard University Press) and "Internal Factors in Evolution," by Lancelot Law Whyte (George Braziller, Inc.). Neglected by reviewers generally, these latter works can be



—Washington University.

Social flowering of a botanist: Barry Commoner.

seen in truer perspective through their pertinence to the Commoner theme. Hence selected passages from them appear in tandem on the pages following this page.

By BARRY COMMONER

AS WE HAVE SEEN, many of our recent technological mistakes crop up as an unexpected biological aftermath of a new advance in physics or chemistry. Our present grasp of biology appears to be inadequate to explain what happens when living things encounter radiation or the new synthetic chemicals. But this concept conflicts with reports of recent sweeping advances in our basic understanding of life. The claim has been made, for example, that twentieth-century science will be remembered more for its achievements in biology than for nuclear physics. Such claims reflect a conviction that the basic laws of biology have now been disclosed and, in particular, that we now know that life is a form of chemistry. In this view the undoubted ability of the modern physicochemical sciences to understand the workings of inanimate matter ought to give them the same power to penetrate the mysteries of life.

The main basis for claims that we now know "the secret of life" are recent discoveries about the chemical processes involved in the unique features of life—growth, reproduction, and inheritance. It is worth examining the background of these new ideas for some explanation of the paradoxical discrepancy between our technological failures and our apparent understanding of the basic laws of life.

Anyone who learned biology by dissecting a frog must find the reports of present-day biological research strange and unsettling: molecules that reproduce themselves; a molecular "code" that tells an egg whether it should turn into a turtle or a tiger; efforts to create life in a test tube of chemicals.

These new ideas seem to clash with long-familiar principles of biology. If a molecule possesses the essential property of life—self-duplication—then the cell theory, which states that the attributes of life reside in the whole cell and not in any smaller part, such as a mole-

cule, must be abandoned. If test tube synthesis of life were to be achieved, the hitherto unchallenged principle, *omnes ex ovo*—all life comes from pre-existing life—would have to be given up. If all the features of the adult are encoded in the fertilized egg, we must revive the supposedly disproved idea of "preformation," the molecular code taking the place of the tiny fetus which early microscopists imagined they saw curled up in the human egg or sperm.

Are the older principles of biology now outmoded by the new research? If so, modern science has made a major revolution in biological theory. On the other hand, if this interpretation of the new advances is wrong, that might help explain why we have blundered in our recent technology.

These questions reflect two conflicting concepts about the nature of life: classical biology and "molecular" biology. Classical biology is built upon observations and experiments with authentic living organisms, organs, and

