

UFO and Ball Lightning Research in the Scientific Literature

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Abstract

UFO and ball lightning research are often regarded as fringe science or pseudoscience. Here I discuss the essential scientific literature on these two subjects. I argue that ball lightning could be either plasma fireballs or oxidizing nanoparticle networks. Also UFOs deserve scientific investigation, although most of the reported cases have found conventional explanations.

Keywords

UFO, flying saucer, Condon report, nightmare, ball lightning, plasma fireball

1. Ball Lightning

Observations of ball lightning have been reported at least since the early nineteenth century. In most cases ball lightning appeared during thunderstorms. The ball is typically 30 cm in diameter. In individual cases its diameter has been reported to vary between 1 cm and more than 10 meters. Its colour is often orange, sometimes red or white, or in rare cases green, blue or yellow. In rare cases ball lightning has been reported to move against the wind or to pass through a wall or a roof intact. The last claim is uncertain, as it has usually not been checked that every window had been closed [1].

These reports were usually disbelieved as long as no qualified scientist has ever observed ball lightning. This situation changed when Brian Pippard reported that on Tuesday, 3 August 1982, during an exceptionally intense thunderstorm several people in the Bragg Building and the Mott Building of the Cavendish Laboratory of the University of Cambridge had seen for 4 to 5 seconds a bright blue-white ball of the size of a grapefruit which entered a building just before the window could be closed. Shortly thereafter the ball lightning faded away [2].

During the following years, Boris Smirnov published three review articles on ball lightning in which he investigated several hundred reports on ball lightning [3-5].

In 1991, Yoshi-Hiko Ohtsuki and H. Ofuruton produced ball lightning like plasma fireballs by setting off electric discharges in an atmosphere containing aerosol with varying concentrations of ethane and methane. These plasma fireballs were bright, red, orange, white or blue in colour, existed for several seconds, could move against the wind, and pass

a 3-mm-thick ceramic board intact [6]. This paper was accompanied by Stanley Singer's supporting mini-review [7].

Antonio Ranada and Jose Trueba suggested in 1996 that ball lightning could result from an electromagnetic knot [8].

In 2000, John Abrahamson and James Dinniss suggested that ball lightning is caused by oxidation of nanoparticle networks from normal lightning strikes on soil [9]. This hypothesis was confirmed by Gerson Silva Paiva et al. in 2007 who produced fireballs by electric discharges in silicon. The fireballs existed for 2 to 5 seconds, were either blue-white or orange-white, were spherical, burned objects during contact, rotated, and subdivided into smaller balls. However, they did not move against the wind or pass through walls [10].

It is still an open question whether the reported observations of ball lightning are related to Ohtsuki and Ofuruton's plasma fireballs or to the oxidizing nanoparticle networks.

2. UFOs

On 24 June 1947 pilot Kenneth Arnold observed nine sickle-shaped objects which were flying faster than expected for the then known airplanes near of the Mount Rainier, Washington. He compared the periodical ups and downs of their trajectories with those of saucers which are thrown on the surface of water. Journalists misunderstood this analogy and wrote of "flying saucers", as if this was the shape of the observed UFOs. Skeptics think that Kenneth Arnold may have observed new military airplanes.

In 1952, UFO contactee George Adamski who lived near of the Mount Palomar, California, presented a photo of a UFO which looked like a saucer. This photo shaped the popular imagination of a UFO (flying saucer). Adamski reported that the aliens looked like humans. Skeptics think that his report is fraud and that his photo shows a lamp.

In his 1953 book, Donald Menzel suggested conventional explanations for the UFOs. He noted that Adamski's contactee report resembled the description presented in the biblical book of the prophet Ezechiel [11]. See also Wylie's book review [12].

On 21 August 1955 Elmer Sutton and Billy Ray Taylor of the Sutton farmhouse near Kelly and Hopkinsville in Christian County, Kentucky, reported to police that they have shot at a number of aliens who had attacked their farmhouse. The aliens were reported to be dark, two feet high, have large ears and bright yellow eyes. Their colour was not mentioned as the observation happened at night. Journalists called them "Little Green Men", based on Mack Reynolds' story "The Case of the Little Green Men". Skeptics think that the alleged aliens could have been great horned owls.

In the night from 19 to 20 September 1961 Betty and Barney Hill saw a UFO south of Lancaster, New Hampshire. For the next hours they drove southward along the Daniel Webster Highway (U.S. Route 3) until one mile south of Indian Head. During the entire time they were followed by the UFO. Then they were brought into the UFO and medically examined by the aliens. The Hills described the aliens as being five feet tall, having black hair, large brain, dark slits as eyes, a prominent nose, narrow bluish lips, grey skin, and a small chin, they wore blue uniforms. The Hills did not remember the journey between Indian Head and Ashland, where they gained consciousness again. The Hills' description of the aliens differed completely from that of George Adamski and became the first description of the "Greys", as the slim aliens with grey skin, large brain, large dark eyes,

small nose, narrow mouth, and small chin were now called. Most of the description of the aliens resulted from nightmares which Betty Hill suffered from several nights after the UFO sighting and from later talks under hypnosis. Skeptics think that the original UFO could have been the planet Jupiter. Note that the German word for nightmare is *Albtraum* which means dream of elves. Indeed the appearance of Greys resembles that of elves.

In 1967, William Markowitz argued that those UFO reports were not reliable where the UFOs appeared to violate the known laws of nature [13].

In 1969, Peter Millman published a book review of the proceedings of a symposium on UFOs [14].

Also in 1969, the Condon Report appeared. It presented a number of US American UFO cases and gave a number of conventional explanations such as explaining the UFOs as stars, planets, meteors, clouds, satellites, airplanes, helicopters, balloons, birds or false signals of radar equipment [15]. See also the two book reviews [16, 17] and Philip Boffey's commentary [18].

Not all scientists accepted the skeptical view of the Condon Report. In 1972, Allen Hynek, a former member of the project Sign/Grudge/Bluebook, published the most systematic book about UFOs in which he categorized for the first time the UFO sightings. These categories include nocturnal lights (bright UFOs), daylight disks (UFOs which appear dark or metallic, the shape need not be disk-like), radar-visual observations, close encounters of the first kind (UFOs seen from a short distance), close encounters of the second kind (the UFO leaves traces or acts on the electrical system of the automobile), and close encounters of the third kind (aliens are seen) [19]. See also Bruce Murray's book review [20].

Also in 1969, Carl Sagan and Thornton Page headed an American Association for the Advancement of Science symposium on UFOs in Boston. The proceedings were published in 1973 [21]. A book review was written by Paul Sturrock [22] who in 1982 founded the Society for Scientific Exploration [23].

In 1975, David Jacobs wrote a book with a pro-alien-interpretation about UFOs [24]. See also Brian Gordon's book review [25].

In 2000, David Jacobs edited a book on UFO abductions [26]. One of the contributors to the book is Budd Hopkins, the author of the two most prominent books on UFO abductions [27, 28]. UFO abductions, including the Betty and Barney Hill case, are now usually regarded as close encounters of the fourth kind. Skeptics think that the alleged UFO abductions are either fraud or nightmares.

In 2006, Debora Battaglia's book "E.T. Culture" appeared. This book discusses mainly the sociological and anthropological aspects of the UFO subject [29].

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