NARCAP Investigator Support Paper 02, 1989

Infrared Photographs of "UFOs"

Vicente-Juan Ballester Olmos
International Technical Specialist - Spain

and

Miguel Guasp [i]

During the *I Congreso Nacional de Ufología*, in Barcelona in December of 1977, there were presented to the public two independent communications that were based on series of photographs taken with infrared film that showed strange images of different shapes and colors. Nevertheless, the unusual common element between both groups of slides was that the shots were made *without* any luminous stimulus being perceived by the photographers at the time. These photographs were interpreted totally in the UFO context, that is, they were believed to be luminous effects produced by the appearance of unidentified flying objects at that point in space just when the shots were taken.

Subsequently, our UFO research team in Valencia (Spain) took notice, either directly or indirectly, of several additional series of photos that had been achieved by different people following the same system: a camera loaded with a color spool sensitive to infrared radiation is used up by shooting at the sky at night, and even though the photographers never observed any anomalous object or phenomenon (just by chance). When the rolls were developed, there appeared points, spheres, and other luminous shapes either separate or in groups, which were immediately attributed to UFOs **(Fig. 1)**. In one of the cases, the photographer tried to sell the photographs to a magazine for a considerable sum of money… "because they represented an irrefutable proof of the existence of UFOs."

Fig. 1. A pseudo UFO. This infrared photograph was achieved by simply pointing the camera toward the night sky by chance. The image might correspond to a *thermal* or hot globe formed spontaneously in the atmosphere, or to any latent heat source in the environment.

The purpose that motivates this short essay is to try to demonstrate that what some photo- negatives record accidentally has absolutely nothing to do with the UFO phenomenon.

The explanation of the controversial and apparently wild images that arise in such photographs is based on a most everyday effect, heat. Any body, at any temperature, radiates a certain amount of energy, whose wavelength[ii] is in the region of the spectrum of electromagnetic waves called *infrared*, between approximately 10^{-6} and 10^{-3} meters, and if its effective temperature has a value not above some $3{,}500^{o}$ Kelvin, the radiation emitted is almost all infrared. Hence infrared radiation is frequently called thermal radiation or heat rays. This infrared radiation exposes film that is sensitive to it, despite the emitting source being invisible to the human eye. This happens when it does not reflect enough light, and it appears on the photo as if it were a material object that was being made visible.

This technique has multiple practical applications. In the military, for example, its use is notable for the night-time locating of supposed enemy devices, for the purpose of intercepting them (the heat that they give off, whether residual or active, gives them away, even though they cannot be seen), or in the development of air-to-air or ground-to-air missiles, which are directed right to the target by being headed toward the jet propulsion system, which generates heat. In the scientific field, its use is limitless. Reconnaissance satellites have been put in orbit that have sensors sensitive to infrared for the observation of the polar regions, and, in general, aerial photography with infrared film

is often used to search for mineral resources, plagues, etc., as infrared photographs taken from great distance or heights present a great sharpness of detail due to the atmospheric diffraction being less in the near-infrared than in the visible spectrum, and also because the contrast of distant objects can be greater as a consequence of their reflectance in the near-infrared. **(1)**

Returning to the case that concerns us, any area in the nearby surroundings of the photographer who records a latent heat greater than that of other adjacent areas, due to the escape of hot air from chimneys, the proximity of industry, the residual temperature of a warm day, and numerous other causes, could be blamed for the environment-related radiation to have the film emulsion being altered and producing the "lights." In another vein, the implications also strike us that, from the point of view of the possible comparison between the UFO phenomenon and an extraterrestrial intelligence, would hypothetically be derived from the fact that *any* person, at *any* time and in *any* place, could capture the passage of unidentified flying objects by only aiming a camera loaded with infrared film at the sky. There is no doubt that if it was really like that, it would not escape anybody that the UFO phenomenon would then be a basic constituent of the very biosphere of the planet, though invisible by being outside the electromagnetic spectrum embraced by the human eye, something normal and coexisting with the Earth, not abnormal, infrequent, and rare. What such photos would demonstrate, if they really had to be interpreted as examples of the movement of UFOs, is that all of humanity would be materially surrounded by a "culture broth" formed by millions of unidentified bodies that give off heat radiation and that cross the skies at all hours and at all latitudes.

Obviously, the deduction of the previous paragraph is little less than absurd, unless we consider UFOs as biological beings that populate our atmospheric surroundings, which seems highly extravagant to us. Moreover, the multiplicity of shapes of the images that arise, some globular ad others transparent, some resembling discoid structures and others like unstable amoebas, etc., shapes the hypothesis of a *natural* genesis of the images, and of a total absence of any artificial source of the luminous shapes. And this is without considering the lack of "UFO" images produced by the observation of Earth from space by means of devices that detect infrared radiation and which, by being used to locate terrestrial resources, exist in a great number.

Physical Explanation

Let us next dedicate ourselves to an etiological study of the photos, that is, let us examine the physical processes by which the emulsion of the film was changed and recorded the "lights" or the strange shapes—trying specifically to fix the limits of the origin of the luminous marks.

There are many different causes capable of producing the appearance of luminous figures on the negatives of these films, but we find that the most interesting ones, and those that are most likely to frequently fool the amateur into the illusion of having photographically caught the passage of an authentic UFO, are, without doubt, some concrete natural processes that take place in the heart of the atmosphere.

Even when the atmosphere seems to be calm, there are numerous natural processes that take place in it which, if they were visible to the human eye, would remind us of a turbulent sea. Convection currents and air masses in motion and many variations in pressure and temperature, accompanied by heat exchanges, continuously occur in its heart. One major task of meteorology consists precisely of studying all these phenomena on a large scale, and using them to predict the condition of the atmosphere in the coming hours, but the numerous micro processes that take place in small geographic regions escape all possibility of consideration in the forecasting maps.

The movement of air masses in the atmosphere can, in general, be of two basic types, horizontal and vertical. It is the latter that present a great interest for us. Let us discard the ascents produced by the frontal blow of air masses hitting individual mountains and ranges, in which it is forced to go up on the windward slopes and subsequently go down the leeward slopes. We are then left with processes which, involving the exchange of heat, are the most important ones. One of these processes is ascension due to convection currents of certain globular masses called thermals **(2)**. They are produced in areas that have had a rapid cooling of the surroundings, and the air masses then finding themselves at a greater temperature than that of the atmosphere around it, they rise like bubbles formed on the surface of boiling water, and ascend to a height at which the saturation point of the water vapor contained in it is reached, and there they stabilize. This height is ordinarily about six hundred meters, but the exact height depends on the temperature inside the radiation “cloud “or “globe”. A curious fact is that the geometric shape of these thermal bubbles—invisible ones—is very propitious for amateur infrared photographers to confuse them with UFOs. They are born from below with circular shapes, and their height being much less than their diameter, they present the appearance of discoid objects **(Fig. 2)**. As to the dimensions of thermals, we must say that they offer a broad spectrum, normally varying between 100 m. in diameter **(3)** and 400 m. **(2)**, though they can even reach a size of several kilometers in a horizontal direction, and hundreds of meters in a vertical direction **(2)**.

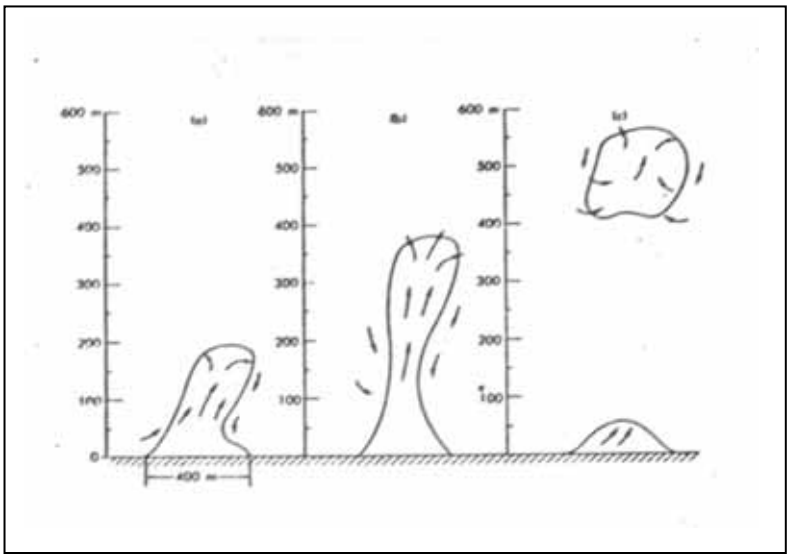

Fig. 2. Development of convection bubbles produced by *thermals*. (Notice that the vertical scale has been exaggerated. (According to Miller.)

Thermals ascend at speeds that can vary between a few centimeters per second, to more than 30 m. per second, and they carry different particles along with them as they go. The greatest speeds that vertical currents reach is in electrical storms, but in clear air—cloudless—values of several meters per second have been recorded **(4)**.

As it very name indicates, thermal bubbles are at a temperature greater than that of the surrounding atmosphere, and, consequently, they give off a greater quantity of heat radiation than the air around them. Any camera, loaded with infrared film, which is pointed in the appropriate direction, would capture the radiation of these invisible "globes" or "bubbles." Later, proceeding to process the films, we would be surprised to find the recording of a "luminous" circular shape, either regular or irregular, without the eye of the photographer having perceived the presence of any strange object.

Amateurs who undertake these shots consider them, erroneously, authentic UFO photographs, and it is difficult to convince them otherwise, as it would undermine their unfounded ufological enthusiasm. Nevertheless, there are simple arguments for them to reconsider their stance themselves. If they were authentic UFOs, they would respond to the most common characteristics profiled in years of accumulated UFO cases. Thus, we currently know that the most trustworthy reports rarely involve the presence of gigantic "ships." Despite there having been several spectacular observations of enormous cigar-shaped objects, they constitute the exception to the rule. The most common diameter of UFO, according to statistics derived from landing cases **(5)**, indicates typical dimensions of around 3 and 11 meters, and the distances at which they are commonly observed (in the aerial state of the phenomenon) can reach without difficulty one or more kilometers. When such perspectives, i.e., the visual angle or apparent magnitude is very limited, this means that if they were really UFOs captured in these photographs, the negatives would only show relatively small bodies; the contrary supposition would required that UFOs always "pose" abnormally close to the camera.

Moreover, given that the closer to the camera an object is, the greater is the size of the image recorded, in the case of physical bodies, there should then be found a *direct* relationship between the apparent diameter of the image and the density of the film grain. Instead, with thermals the opposite occurs. Their size and altitude are such that their apparent magnitude is considerable, and in negatives, areas of relatively large dimensions appear, which is habitually what happens. Moreover, the height of the thermals varies linearly with the temperature, and, nevertheless, the radiation emitted by the sort of "heat bubble" is proportional to the fourth power of its absolute temperature (the Stefan-Zoltzman law). To make up for that, the amount of energy intercepted by the camera's objective diminishes proportionally with the square of the distance. In accordance with balancing these three factors, the apparent size and intensity of the "lights" will vary *inversely* with the square of the temperature and, therefore, with the energy that exposes the film, which is manifested in the grain density (energies corresponding to a quadratic variation). This should be appreciated all the more when the stimulus that has produced the photographic exposure is closer to the zenith, where the height of the "lights" and its distance from the objective must be the same.

References

(1) Mª Cruz Sánchez Dalmau, "Unos ojos para la luz invisible", *Ibérica*, 76, September 1968, pp. 332-335.

(2) Albert Miller, Meteorología, Editorial Labor, S.A., Barcelona, 1977, chapter 3.

(3) Lucien Rudaux & Gerard de Vaucoleurs, Astronomía, Editorial Labor, S.A., Barcelona, 1966, second book, chapter 2.

(4) Louis J. Battan, La naturaleza de las tormentas, Editorial Universitaria de Buenos Aires, Buenos Aires, 1964, chapter 2.

(5) Vicente-Juan Ballester Olmos, OVNIS: El fenómeno aterrizaje, Editorial Plaza & Janés, S.A., Barcelona, 1978, chapter 6.

Notes

[(i)]This text is from the book by Vicente-Juan Ballester Olmos and Miguel Guasp, *Los OVNIS y la Ciencia - Introducción a la Ufología Científica* (UFOs and Science – An Introduction to Scientific Ufology), originally published in 1981, Editorial Plaza & Janés, Barcelona, pp. 186-191. A revised edition was published under the same imprint, 1989, pp. 184-189.

[(ii)] Visible light, X-rays, ultraviolet radiation, etc., have a wave nature. The length of any sinusoidal wave is the distance between two consecutive crests of this wave, and it is called *wavelength*.

(Translated by Richard W. Heiden)