

## A Study of the Kirlian Effect

*The Kirlian technique makes interesting photos, but the effects seen have natural explanations.*

Arleen J. Watkins and William S. Bickel

**A**N INTERESTING photographic phenomenon called Kirlian photography can be demonstrated by applying a high-voltage (15,000–60,000 volts) high-frequency discharge across a grounded object placed on a sheet of film laying on the high-voltage plane. A typical configuration and one used for this study is illustrated in Figure 1. When the object placed on the film plane is grounded to complete the current loop, a discharge occurs between the object and the high-voltage conducting plane creating an air-glow discharge, which appears to the eye as a purple-blue fuzzy light called an aura. The aura is a very real physical phenomenon and can be recorded directly on photographic paper, on film (black and white or color), or on photo plates. When the plates are developed, the aura appears as a fuzzy glow around the boundary of the image.

Beginning in the 1970s, the origin of this aura image and its relevance to the state or condition of the object producing it became a topic of great popular interest. Claims were made that the aura of human objects—fingers, toes, etc.—contain information about the physiological, psychological, and psychic state of the individual. For plant and animal parts—leaves, stems, legs, wings, tissue, bone cross-sections, etc.—the aura was claimed to carry information about the “life-force,” “life-energy,” or “bioplasma” of the object. If the aura were indeed a probe for such conditions and carried information about important parameters inaccessible by, or more accurate than, other techniques, it would be a powerful and important technique for such studies.

Literature on Kirlian photography reports many studies by various

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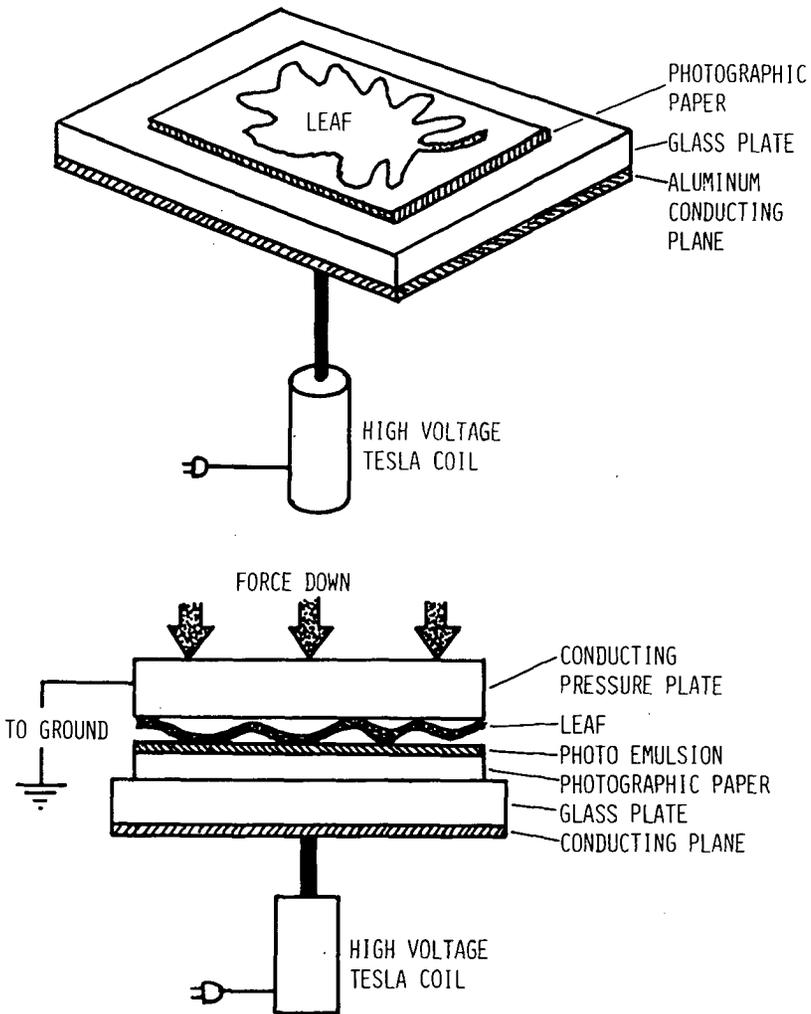


FIGURE 1. Arrangement of the high-voltage coil, glass plate, conducting plane, photographic paper, sample, and press for making Kirlian photographs.

people and groups. One universal and puzzling point is that it is often discussed with an air of mystery. It has been referred to as a new phenomenon, an unknown phenomenon, and a mysterious phenomenon carrying important information about life. For most physicists, the first guess is that the effect (the aura) is a corona discharge in air. If this is the case, the phenomenon, although it may be complicated to explain in detail, is well known and will be governed by the laws of physics. Therefore, any scientist setting out to investigate it will first document all observables relating to this phenomenon. Many serious studies have done exactly this. This was the motivation of this study, which we carried out with an

apparatus we constructed to generate Kirlian photographs.

We took more than 500 Kirlian photographs to study the aura from three sets of objects with various configurations—animal, plant, and mechanical. Figure 2 displays some typical aura images. It is rather easy to recognize the objects used. The boundaries are quite distinct; the aura is rich in detail and shows much variation from object to object. We now discuss specific aura patterns to substantiate or refute certain claims and interpretations made by Kirlian investigators.

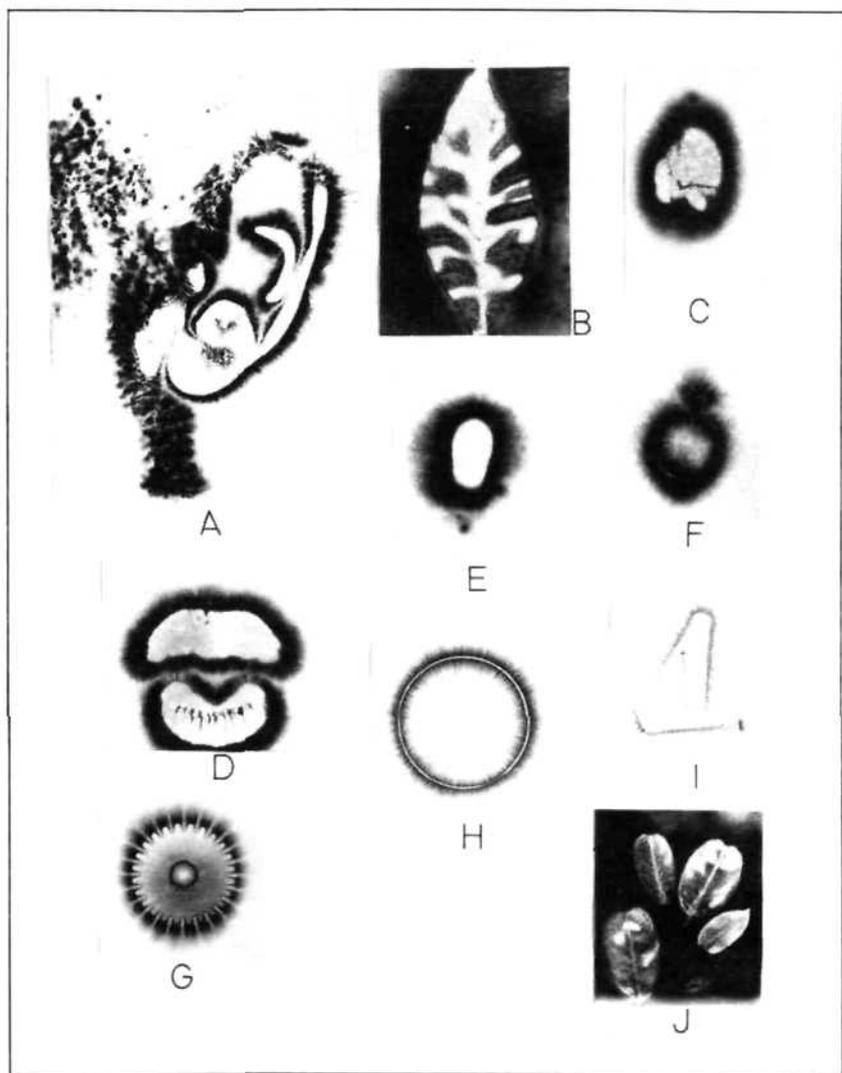


FIGURE 2. Kirlian photographs: (1) ear, (b) leaf, (c) thumb, (d) lips, (e) finger, (f) diamond ring, (g) brass gear, (h) metal ring, (i) paper clip, (j) leaves.

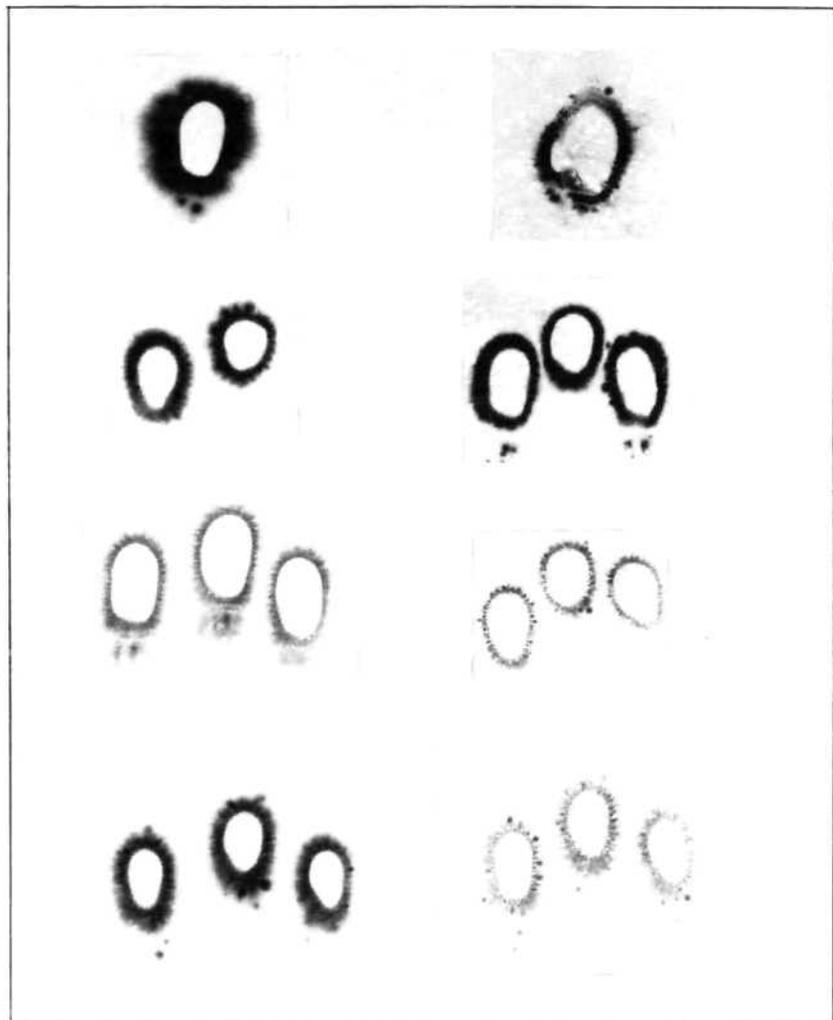


FIGURE 3. Assorted auras of thumb and finger prints of different people using different photographic paper, exposure and development times.

### Claim 1

The aura is related to the “life-energy” or “bioplasma” of the animal or plant. The shape, size, intensity, and structure of the aura depend on the psychic energy, state of mind, emotion, well-being, illness, etc., of the object. Figure 3 shows a set of aura pictures of three different individuals. Figure 4 shows the aura of mechanical objects—coins, wire, water, gears, and sharp metal points.

*Question:* If the aura is due to the “bioplasma” or “photo energy” of the living object, then why does it appear from mechanical objects?

*Answer:* Since the aura appears from dead and organic objects as well as living or once living objects, the aura does not represent a “bioplasma.”

### Claim 2

The aura is supposed to represent the condition of the object via its size, shape, intensity, and structure. Figure 5, a, b, c show three sets of finger auras, from three different people. Each set was taken within a period of 15 seconds. Note that the aura varies from finger to finger in each set and very markedly in set 5 c.

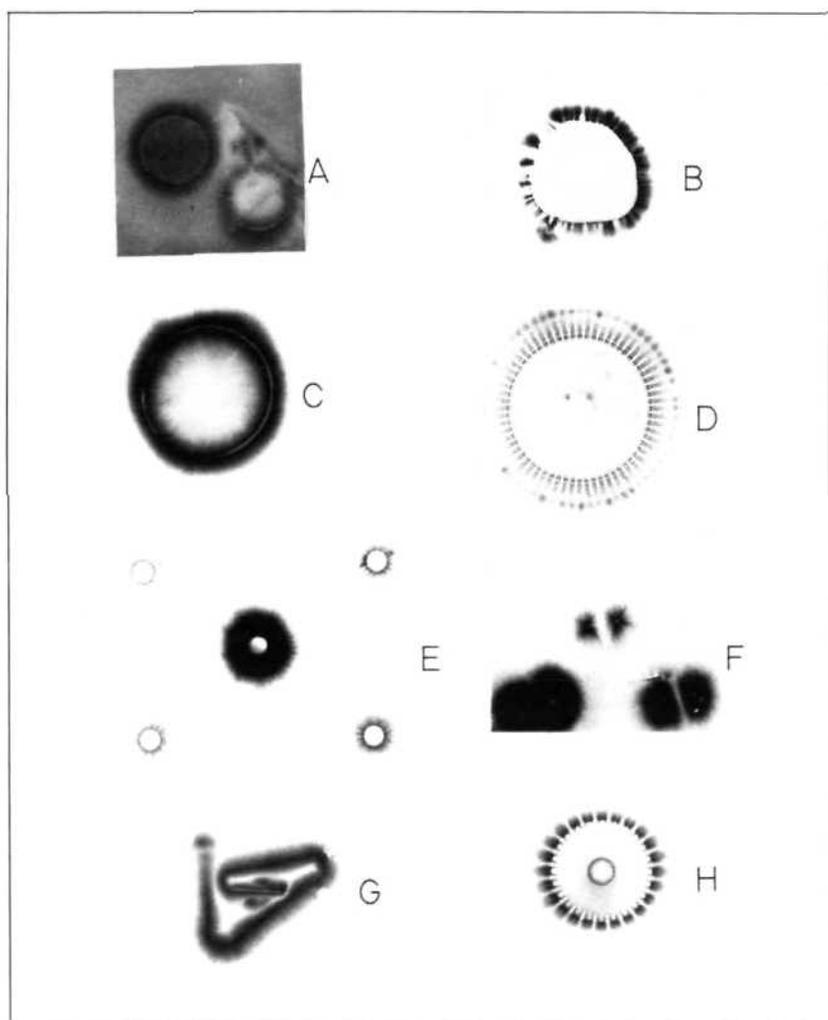


FIGURE 4. Assorted auras of mechanical objects: (1) penny ring, (b) water droplet, (c) ring, (d) brass spur gear, (e) small metal discs, (f) sharp point pairs, (g) paper clip, (h) brass gear.

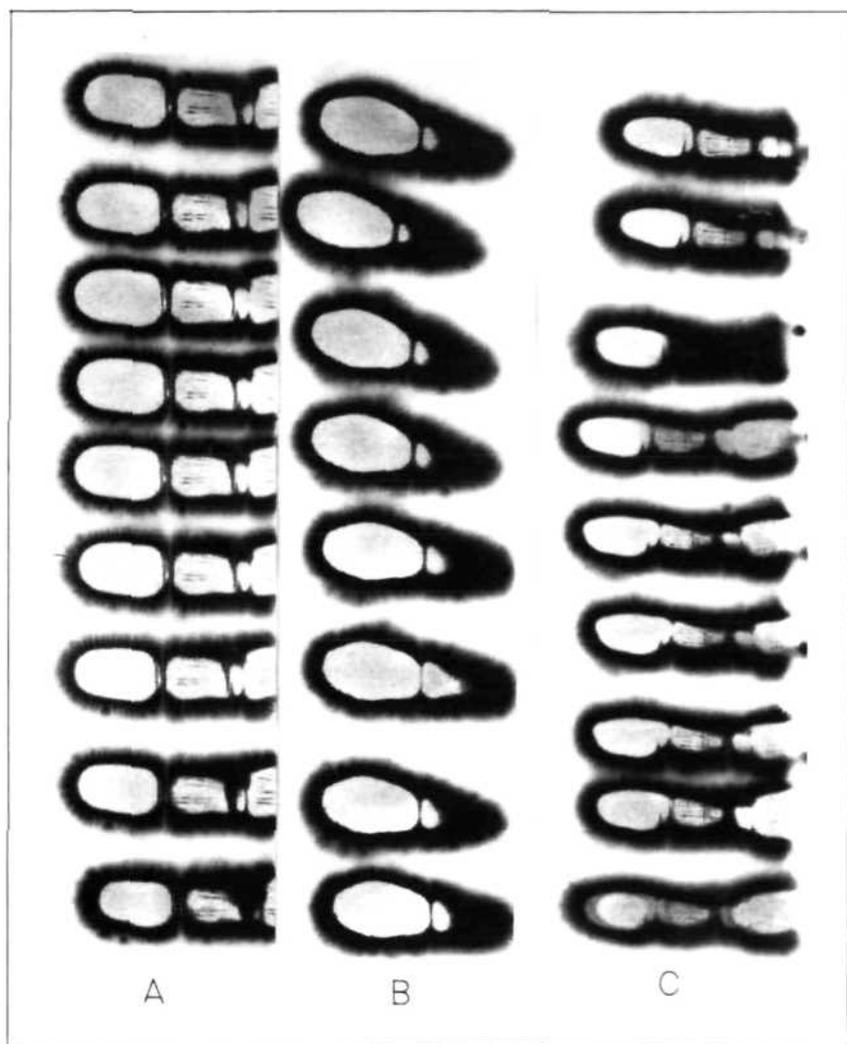


FIGURE 5. Aura of three sets of fingers from three different people.

*Question:* If the aura represents the condition of the object, what interpretation do we give for the markedly different patterns?

*Answer:* For this set, none. We do not suspect at this point that the change in aura from one print to the next in any strip represents a change in mental or physical condition or personality of the individual. We suspect instead the cause of the differences is due to lack of experimental control, which will be discussed in detail in the last section.

### Claim 3

When two fingers of two *different* people are placed side by side simultaneously, the aura pattern shown in Figure 6 results. Note the combined aura shows a sharp boundary between the two images. This is said to be due to the incompatibility of the two individuals; and the sharpness of the boundary, a measure of the degree of incompatibility. However, Figure 6b shows an aura created by two fingers of the *same person* simultaneously, 6d and 6f the aura of two pennies, 6e of a dime and a quarter, 6g of a metal bar and a dime, 6c of three fingers of the same hand simultaneously.

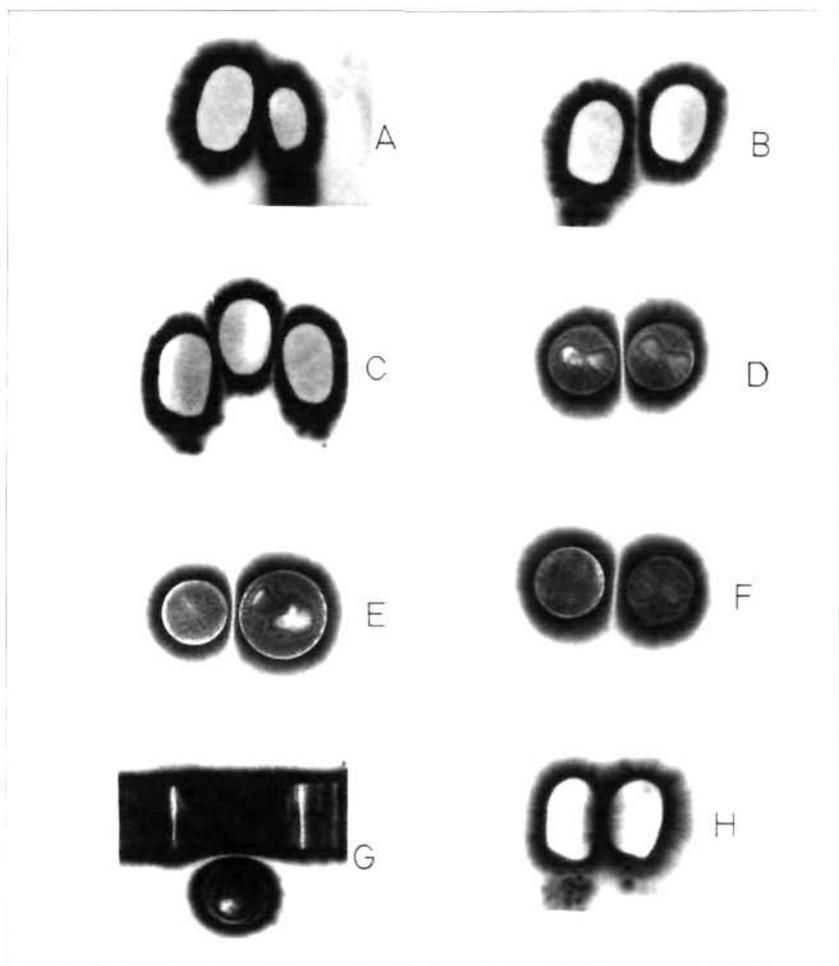


FIGURE 6. Aura pairs showing equipotential boundary between aura patterns (a) fingers of two different people, (b) and (c) fingers of the same person, (d) and (f) two pennies, (e) penny and quarter, (g) dime and metal bar, (h) aura pattern of two fingers of same person not taken simultaneously.

In *all* cases a sharp boundary occurs between the auras.

*Question:* If the sharpness of the boundary is an indicator of incompatibility, what interpretation do we give for the sharp boundary between the auras created by two fingers on the *same hand* of the *same person*, as well as between metal objects?

*Answer:* The interpretation of incompatibility is wrong unless two or three fingers on the *same* hand are incompatible with one another, or a dime is incompatible with a quarter, etc. The sharp boundary and its shape is easily explained in all cases using well-known physics laws. The boundary where no aura occurs is caused by the lack of electron motion in the film plane. Since both objects are at equipotential and both seek to neutralize the surrounding film plane, an area somewhere between the two objects will be at zero potential, i.e., an electron there is attracted with equal force in both directions. Therefore, it doesn't move. There is no electron flow, no current, no excitation of the air molecules, and therefore no aura. These physics principles also exactly explain the curved boundary of Figures 6e and 6g. Figure 6h shows the aura of two "compatible" fingers. However, it was made by placing first one finger, *then* the other, on the photographic paper. Since the images are not made simultaneously, the electrons can flow into the other image area, causing an aura there.

#### Claim 4

When Kirlian photographs are taken with color film, in addition to the size, intensity, structure, and shape of the aura, we obtain the new parameters of color and color distribution. Color photographs of auras are very dramatic, showing a rich color distribution, which is claimed to contain information about the emotions of the subject—red = anger, strong emotion; blue = coolness and composure; etc. Although no color photography was done in this study, an examination of many color slides from a previous study brings up the same questions as the black and white pictures do *and more*.

*Question:* Are emotion and personality related to the color distribution of the aura?

*Answer:* Until proper controls show that the color photograph contains information *in addition to* what can be explained by laws of physics and the photographic process, this question cannot be answered. (Color emulsions contain three color dyes with different sensitivities to photon and electron stimulation.)

#### Claim 5

The aura of leaves and stems shown in Figure 7 is very rich in detail. As with finger auras, there is a large difference in aura patterns even though they are of the same leaf. There is a rather remarkable claim that one can



FIGURE 7. Aura of various leaves.

get an aura pattern of an entire leaf even though part of the leaf has been torn or cut away or otherwise removed. This is called the "phantom-leaf effect." It is evidently difficult to reproduce but has been reported by several investigators and recorded on movie film. (There is also a "phantom salamander-tail effect.") None of our photographs demonstrated the phantom-leaf effect. Figure 8 shows the aura of torn and cut leaves. In no case was an aura detected in the region of the missing leaf or around its boundary.

*Question:* Is the "phantom-leaf effect" due to the bioplasmic body of the leaf?

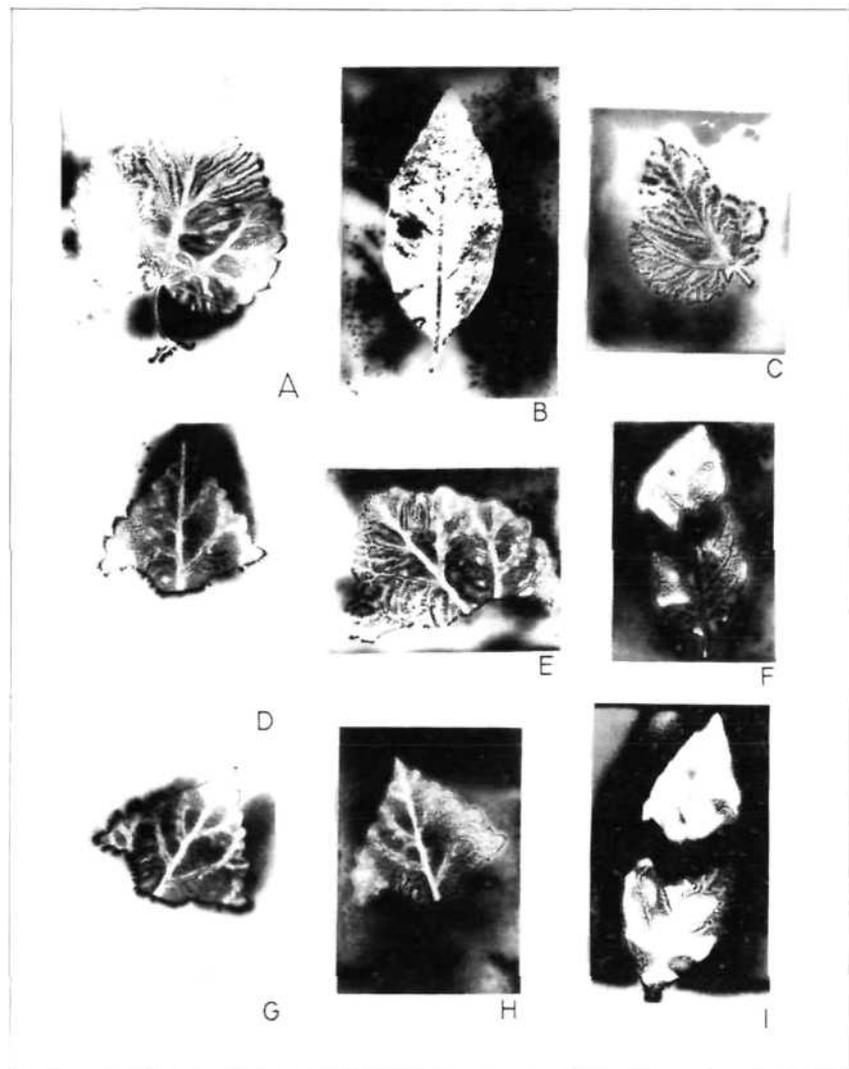


FIGURE 8. Aura of whole and broken leaves: (a), (b), and (c) whole leaves; (d), (e), (g), and (h) broken leaf with one piece missing; (f) and (i) broken leaf with broken sections separated.

*Answer:* The several cases we investigated where a phantom-leaf effect seemed to occur were *artifacts* and quite easy to explain. When a whole leaf is pressed against the film plane with a metal plate, moisture, dust, and a minute amount of juices are squeezed from the leaf, leaving an image. Sometimes this image could even be seen with the eye. When the whole leaf was removed and the metal plate returned to its original position, the new photograph showed a weak, fuzzy, ill-defined, and "mysterious" shape of the missing leaf. Figure 9b. shows the aura of the entirely missing leaf shown in 9a. This image, however, is totally an artifact.

## The Kirlian Technique: Parameters Involved and Controls Needed

Although Kirlian photographs are very easy to make—needing a minimum of talent, equipment, and money, the entire Kirlian process from sample preparation to photo interpretation involves very many parameters and a very complex interplay between parameters and conditions. The following list contains 22 of the many parameters that must be controlled. Some of the more crucial ones will be discussed in detail. The parameters can be grouped into the following areas: (A) electronic and mechanical configuration, (B) sample and environment, (C) film, plates, and photographic process, (D) photographic image interpretations.

A. *Electronic and Mechanical:* (1) Voltage discharge. (2) Current in discharge. (3) Current density through sample. (4) Frequency of the discharge (pulses per second). (5) Pulse shape. (6) Total resistance in circuit consisting of the air, emulsion, and sample. (7) Electric field configuration; point-plane, high-voltage plane, shape (square, rectangular, circular), grounding plane shape. (8) Sample holder and pressures used, size, shape and electrical characteristics of the press used to flatten sample against film plane.

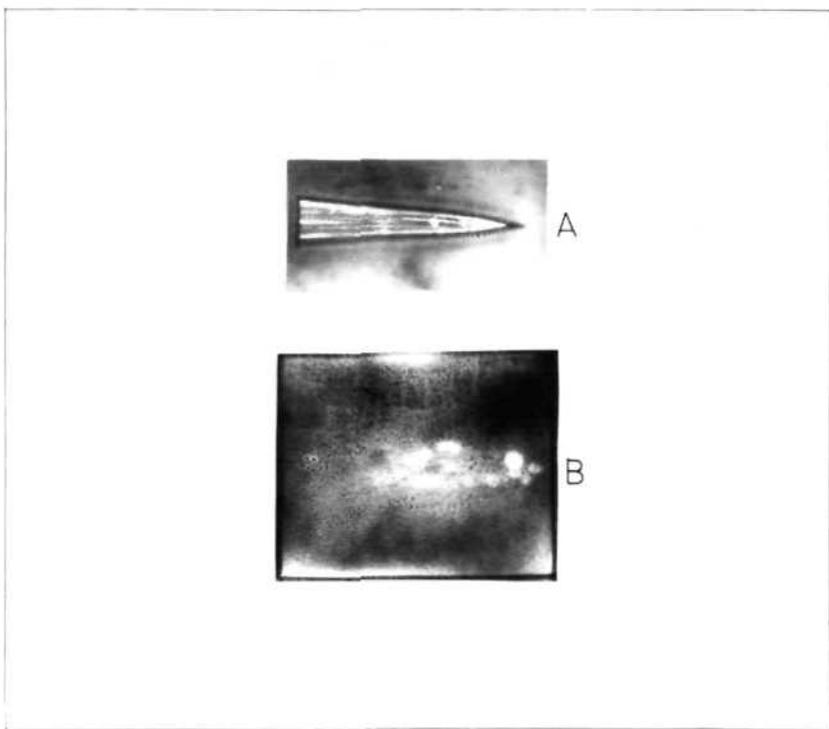


FIGURE 9. "Phantom Leaf Effect": (a) entire leaf aura, (b) aura of image of missing leaf shown in (a).

B. *Sample and Environment*: (1) Size, shape, and surface regularity of sample. (2) Conductivity (moisture content), salt or other local chemicals. (3) Surrounding atmosphere: (a) atmospheric pressure, (b) humidity, (c) temperature, (d) chemical content. (4) Complete history of the sample. (5) Cleanliness—lack of dust, specks, stains, moisture.

C. *Films, Plates and Photographic Process*: (1) Film and paper type, ASA, RMS granularity, H-D characteristics, and *all* other film properties. (2) Emulsion properties—dielectric constant and conductance sensitivity to electron excitation, contact pressures (these are not usually published data). (3) Exposure time—continuous, pulsed, long, short, over-exposed. (4) Development—time, temperature, and chemicals used. (5) Reproduction of negatives—magnification, types of paper used (all paper characteristics). (6) For color photographs, peak wavelength sensitivity of dyes and sensitivity to pressure, electrons, and temperature.

D. *Photographic Image Interpretation*: (1) Qualitative—comparisons, relative intensity, shapes, size and structure of aura usually made by the eye. (2) Qualitative—microdensitometer studies of intensities recorded on *calibrated* plates. (3) Color—spectral studies of radiation emitted and of images formed according to quantitative color theory.

In the set of experiments reported here we found lack of control of the pressure on the sample, exposure time, development time, sample structure and preparation, and applied voltage caused the greatest variations in aura for the *same* sample. Indeed, even in cases where the aura was recorded under “identical” conditions, for the same object, the aura had significant variations in its properties. Of course a “significant variation” is a qualitative, subjective opinion.

## Conclusions from These Experiments

In this rather short scientific investigation of the Kirlian technique, we were able to turn up a number of artifacts and puzzling signals that after a little thought and study were found to fit into the normal scheme of things. Moist fingers, varying pressures, different paper sensitivity, exposure and development times were responsible for most of the variations in the auras. *We conclude there is no need to evoke psychic phenomena to explain results and there is no evidence that psychic conditions affect the aura patterns.*

There is no reason to relate the aura to a “bioplasma.” The body of course does radiate in the infrared. (It is a black body at 98.6° F.) The Kirlian aura is a visual or photographic image of a corona discharge in a gas, in most cases the ambient air. Its color depends on the composition of the air, pressure, and impurities emanating from the sample as well as the voltage and current of the source. Other gases, such as nitrogen, helium, argon, and carbon dioxide, that we have used also produce aura, but with color differences and shapes that depend on the spectroscopic and electrical

properties of the particular gas. (Caution! In no case should hydrogen be used. It is extremely explosive when mixed with air and ignites with a spark. Remember the Hindenburg!)

The discharge ionizes and excites the molecules and atoms in the air, causing light to be emitted. The radiation emitted from excited gases in virtually all physical conditions has been extensively studied by spectroscopists since the early 1800s. The shape, size, intensity, and fine structure of the aura depends on exposure times, conductivities, pulse rates, voltages, and photographic properties of the plates and film used. When there is no applied voltage, there is no discharge. Then there is no aura because there is no light.

There is no evidence as yet that any *feature character* or *property* of the aura pattern is related to the physiological, psychological, or psychic condition of the sample. Although the aura surely depends on some physical properties of the system—i.e., the conductivity of the sample (sweaty fingers, perspiring hands), force exerted on the sample—it also depends on many other complicated effects. There is no doubt that some psychological and physiological conditions do manifest themselves in external signals: lie-detectors can work, heat sensors can detect tumors, shaking hands represent nervousness or illness, and so on. However, the Kirlian technique has not yet been shown to be a direct or meaningful link to these conditions. In fact, while most Kirlian investigators acknowledge the effects of the physical parameters, they make no attempt to standardize their research by controlling the parameters, nor do they appear to be concerned with the significance of changing parameters. Indeed, for the most part, the parameters within their research are only vaguely reported if at all, making replication studies by other researchers impossible.

The difficult and pressing challenge then would be to control the parameters and demonstrate in several specific cases that the aura produces information inaccessible to, or better than, other techniques. Its usefulness then would not need to be advertised; it would be picked up immediately by all laboratories that can use it to extend their research into new directions. Within two months after Roentgen discovered X-rays, his device was used by doctors to examine bones.

The Kirlian aura will most likely remain a fascination to *nonscientific* people because of the ease in producing the aura and its “mysterious manifestations” of sparks, discharges, corona, and aura coupled with the words “life force,” “photic energy,” “bioplasma,” “life energy,” and so on. Most Kirlian claims will come from “experimenters” who will combine the complicated effects of gaseous discharges with samples having complicated structure and electrical properties, and film recordings involving complicated photographic processes and interpretations based on ignorance of the phenomena and the need for proper controls.

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