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PHOTOESSAY

Imaging "Auras" Around and Between Plants: A New Application of Biophoton Imaging

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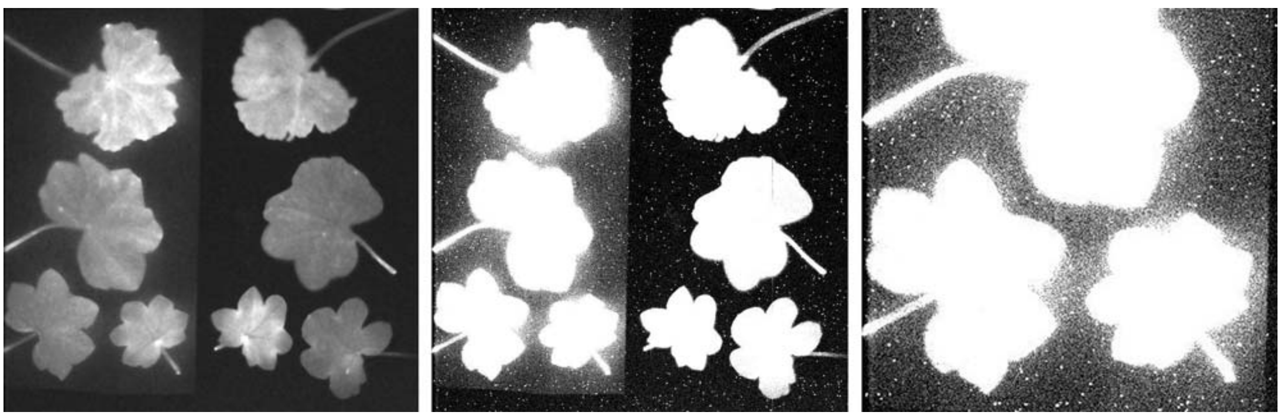

Left: Biophoton image of geranium leaves taken as a 2-hour exposure in total darkness inside a light-tight chamber. Leaves on the left side of the image are on nonfluorescing white paper and those on the right are on black paper. **Middle:** Same biophoton image rescaled in software to enhance the area between the leaves. **Right:** Enlargement of lower left quadrant of middle image.

As shown in a previous photoessay, beautiful images of plants and other biologic systems can be obtained in total darkness.[1] In a deep sense, underlying metabolic processes cause them to "glow in the dark." This low-level biologic chemiluminescence is commonly known as biophoton emission. State-of-the-art low-light charge-coupled device cameras originally developed for applications in astrophysics enable imaging this emission in a light-tight chamber. We have observed variations in patterns produced by various plant parts such as leaves and vegetables as a function of time and noted that injury (e.g., cutting) is associated with clearly visible increased biophoton emission.

As we studied the thousands of images we recorded over the past 2 years, we began to observe there were also patterns in the "noise" surrounding the plant parts. It appeared that not only did the biophoton patterns extend beyond the plants but also that patterns were strengthened between plants when they were in close proximity. Could these patterns represent "auras" surrounding plant parts, and were the plants expressing some kind of communication or resonance?

When a plant is placed in darkness, the chlorophyll fluoresces for a few minutes. After this fluorescence decays, biophoton emission persists as a by-product of metabolic function. Published studies indicate that processes increasing oxidative metabolism producing singlet oxygen and other oxygen-related free radicals correlate with measured biophoton emission.[2,3] Some recent theories consider the possibility that this radiation helps regulate biologic and

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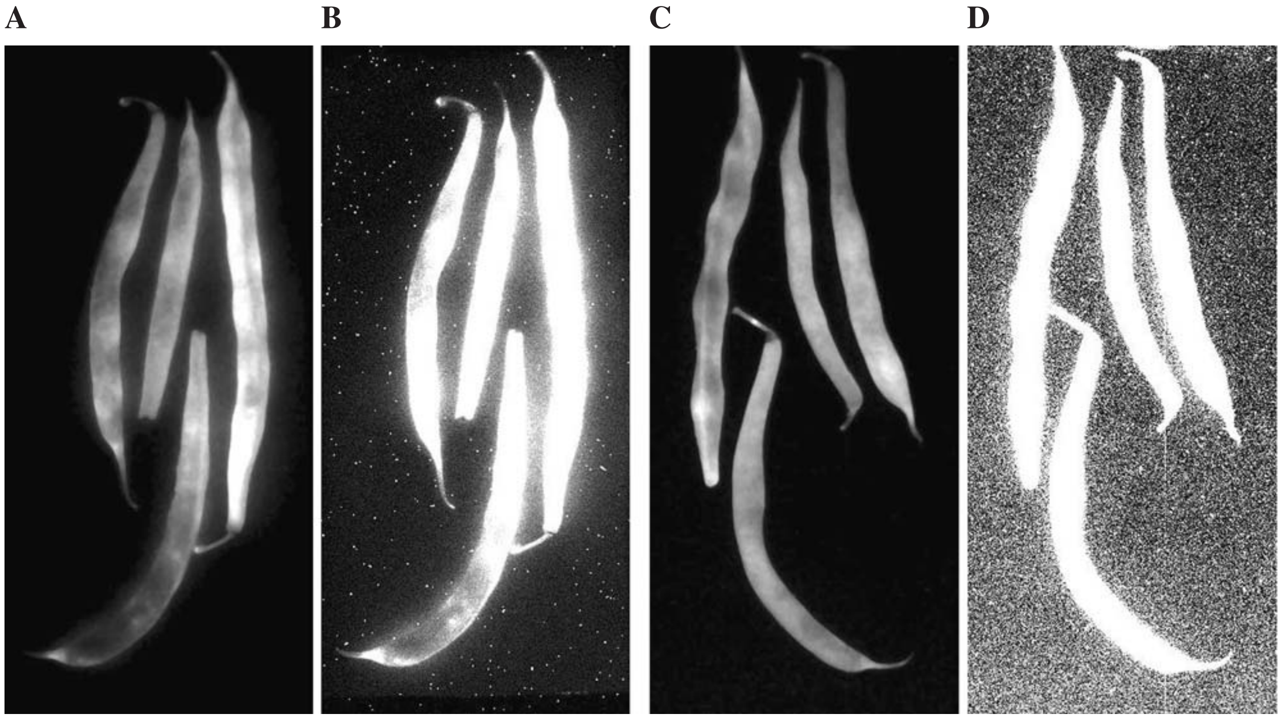

FIG. 1. **A.** One-hour biophoton image of string beans on nonfluorescing white paper scaled as a normal photograph. **B.** Same image with gray scale stretched in software to enhance areas between beans. **C.** One-hour biophoton image of string beams on black paper taken at the same time as **A** scaled as a normal photograph. **D.** Image of **C** with gray scale stretched in software to enhance areas between beans.

biochemical functions within and between cells.[4] Other researchers postulate that biophoton emission may be a potential mechanism responsible for intracellular and intercellular communication.[5]

In our experiments, initially we placed the plant parts on a black background that absorbs light. To look more closely at the patterns around and between plant parts, we wondered if placing the plants on a white background (that did not it-

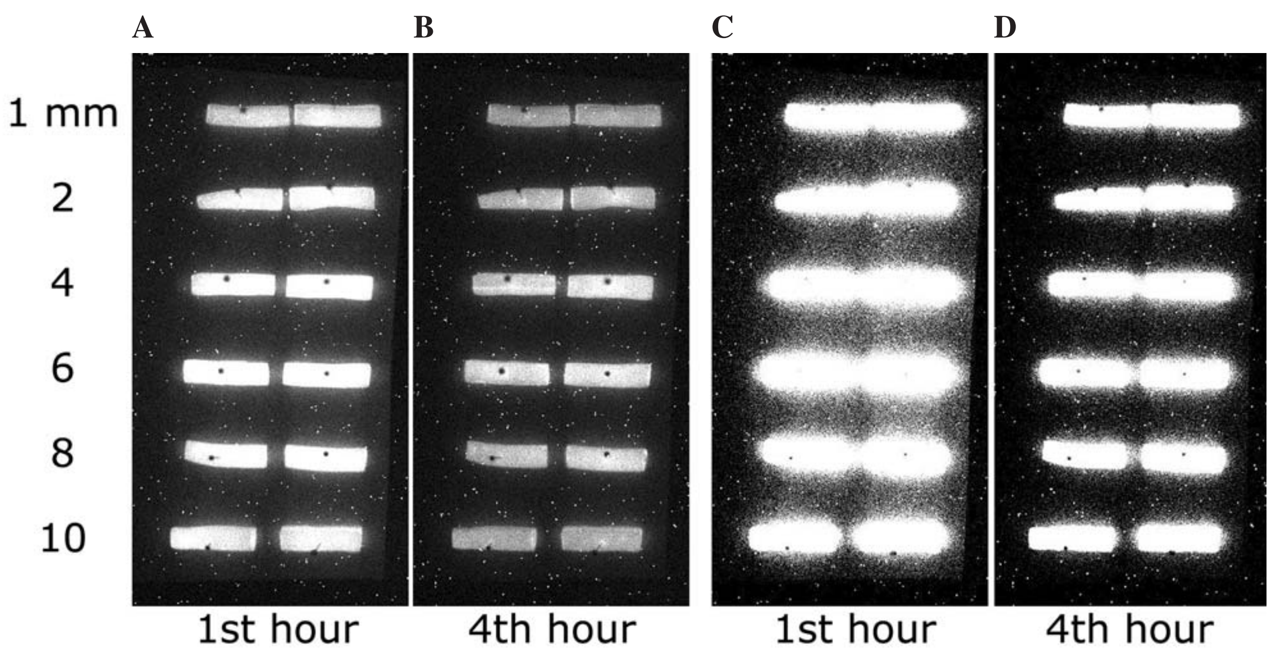

FIG. 2. One-hour biophoton images of string bean sections on nonfluorescing white paper. Distances between bean sections indicated in millimeters. **A.** First hour in total darkness scaled as a normal photograph. **B.** Fourth hour in total darkness with gray scale the same as **A**. **C.** Image of **A** with gray scale stretched in software to enhance the area between bean sections. **D.** Image of **B** scaled the same as **C**.

self fluoresce and glow in the dark) could enhance the ability to detect light patterns around the plants and potentially between them. We found that because the white background reflected and scattered light emitted from the plant parts, we were able to see more emission around the edges and between plant parts. This is similar to energy workers who often report that they see human auras more readily when people are near white walls.

The images shown in this Photoessay were taken using a Princeton Instruments (Trenton, NJ) VersArray1300B camera cryogenically cooled to −100°C and mounted on top of a light-tight chamber. Long exposure images of the plant parts are taken using a standard 50-mm Nikon (Melville, NY) lens at F/1.2 with the objects at the nearest possible focus position.[1,6]

The left-side image of the first page of this photoessay shows a 2-hour biophoton image of geranium leaves with the gray scale scaled as a photograph. The leaves on the left side of the image are on nonfluorescing white paper to enhance the light around and between the leaves, those on the right side of the image are on black paper. The white paper reflects and scatters the biophotons emitted from the leaves so we can more easily see what is in the areas around and between the leaves. The image in the middle was enhanced in software by stretching the gray scale. This enables us to see the areas between and around the leaves more clearly. This scaling shows that more light can be seen in the areas between and around the leaves on the white paper than those on the black paper. The image on the right is an enlargement of the lower left quadrant of the middle image. Close inspection of this image shows a "halo-like" pattern around the leaves (i.e., an "aura"). Furthermore there is noticeably more light between adjacent leaves than around leaf edges without an adjacent leaf and this signal is stronger when leaves are closer together.

Figure 1 shows 1-hour biophoton images of string beans taken on white paper (A,B) and black paper (C,D). Figure 1A on white paper is noticeably hazier around the beans than 1C on black paper. Both images have gray scales covering the entire range of the image as you would scale a photograph. The differences become more striking when comparing the software-enhanced gray scales of Figure 1B on white paper and 1D on black paper. Although it is obvious that there is light between the beans even on the black paper, it is much easier to see light between the beans on the white paper.

Figures 2A,B show two images from an experiment we performed studying effects of distance between plant parts. Sections of string beans were pinned in place a known distance apart in millimeters on nonfluorescing paper and a series of 1-hour biophoton images were taken. As expected, the bean sections were brighter in the first hour than in the fourth hour. When the gray scales are enhanced as shown in Figures 2C,D the amount of light between the sections falls off with their separation and as a function of time. It can be seen that the closer the cut pieces of beans are, the brighter the "aura" between them.

These images, and thousands of others recorded in our laboratory, reveal not only that plants "glow in the dark" but that the patterns of light emitted by the plants extend beyond them, creating "aura-like" structures similar to those reported by energy healers and sensitives. Moreover, the complexity of the patterns imaged between the plant parts suggests that there is potential "resonance" if not "communication" between the plants, as predicted by contemporary biophoton theory. Although the sensitive equipment required for recording biophoton imaging in total darkness is somewhat expensive ($30,000–$40,000), the potential applications to areas of research—basic and applied—in complementary and alternative medicine are sufficiently extensive and promising to justify continued development and future support.

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REFERENCES

1. Creath K, Schwartz GE. Biophoton images of plants: Revealing the light within. J Altern Complement Med 2004;10:23–26.
2. Hideg E. On the spontaneous ultraweak light-emission of plants. J Photochem Photobiol: B 1993;18 (2–3):239–244.
3. Salin ML, Bridges SM. Chemiluminescence in wounded root tissue: Evidence for peroxidase involvement. Plant Physiol 1981;67:43–46.
4. Van Wijk R. Bio-photons and bio-communication. J Sci Explo 2001;15:183–197.
5. Popp FA. About the coherence of biophotons. In: Sassaroli E, Srivastava Y Swain J, et al., eds. Macroscopic Quantum Coherence. River Edge, NJ: World Scientific, 1999.
6. Creath K, Schwartz GE. Biophoton interaction in biological systems: Evidence of photonic info-energy transfer? In: Roychoudhuri C, Creath K, Kraklauer AF, eds. The Nature of Light: What is a Photon? vol. 5866 Bellingham, WA: SPIE 2005: 338–347.

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