A150 Identification of Bone Using an Alternate Light Source (ALS) in Terrestrial Pedestrian Searches

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Learning Overview: After attending this presentation, attendees will understand that conducting an additional nighttime search of an outdoor scene with an ALS is an effective way to find remains that may be missed during typical daylight searches.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by providing additional evidence that ALS is a valuable addition to the toolkit used in the search for human skeletal remains.

ALS has been shown to be an effective means of detecting bones and teeth in searches of terrestrial outdoor scenes.[1] This presentation describes preliminary results from the first two phases of a three-phase project aimed at testing existing recommendations for using ALS to detect human remains during pedestrian searches. Phase 1 assesses the light and filter combinations possible using the UltraLite™ ALS One, which is a compact and relatively inexpensive ALS kit that includes a four-setting light source (Ultraviolet, 400nm; low and high intensity Blue Merge Technology (BMT™), 450-480nm; Green, 525nm) and three pairs of filter glasses (yellow; amber; red). Dark amber glasses were also evaluated. All combinations were evaluated for use on non-human bone (fresh; sun-bleached; previously buried/soil-stained) and human bone (commercially prepared anatomical specimens; previously buried historic remains).

Specimens were photographed using a digital camera and commercially available lens filters and also subjectively evaluated by three people. High-intensity BMT™ paired with dark amber filter glasses provided the best visualization of fluorescence in bone with organic material present while simultaneously allowing sun-bleached bone, which had limited-to-no fluorescence, to be seen. It was not possible to identically capture what was observed visually using the selected camera filters, however, using the high BMT™, the most comparable camera filter (orange) to the dark amber glasses also produced the best visualizations.[1] These results are consistent with previous success using light in the 450nm range to identify human remains and the manufacturer's recommendation that BMT™ paired with an amber filter is suitable for the detection of most biological evidence.

Phase 2 simulates a scenario in which a day search fails to yield 100% of the remains suspected within a search area. Two test areas of 705 square meters each (23.5 meters by 30 meters) were selected in the semiarid hills of Pocatello, ID, where sagebrush, high desert grasses, and foxtails are the dominant vegetation. Search areas were bounded at one end by a fence marked with flagging tape at 3.5 meter intervals, the other end by reflective markers also placed at 3.5 meter intervals, and on either side by reflectors at 5 meter intervals as guides for bone mapping and search navigation.

A test sample of 35 elements including anatomical, sun-bleached, and stained bones and teeth was distributed in realistic patterns within each area. Remains were partially buried, hidden under sagebrush, obscured with grasses, and inserted into animal burrows with some elements placed in groupings that commonly occur in surface scatters (e.g., mandible and two incisors, two tarsals). Each element was photographed and mapped.

Three-person search teams of student volunteers evaluated each area during the day and at night, for a total of eight searches (four day/night pairs). For the same group of searchers, the average time needed for a day and night search were comparable (Group A: 35, 43 minutes; Group B: 60, 56 minutes, respectively). Between two and ten elements were missed by each group during each day search, however, most were found during each subsequent night search in the same area, resulting in final recovery of 33–35 items (94%–100%) in each search. These preliminary results support integration of ALS into outdoor pedestrian search procedures.

Additional searches are scheduled for Fall 2019 to investigate the effect of increased experience, changing seasonal vegetation, and larger search groups on these results. Phase 3 will evaluate revised search recommendations under more realistic conditions (e.g., no marked search boundaries, mixed search groups of osteologists, law enforcement/medicolegal professionals).

Reference(s):

1. Brown, T.B. and Christensen, A.M. 2018. Using an Alternate Light Source (ALS) to Search for Surface Deposited Skeletal Remains. *Forensic Anthropology*. 1(1): 68-73.

Alternate Light Source, Pedestrian Search, Forensic Anthropology

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