A66 Use of an Alternate Light Source (ALS) to Locate Surface-Deposited Skeletal Remains

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Learning Overview: After attending this presentation, attendees will be aware of a new method for searching for skeletonized human remains.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by introducing a method that can improve the quantity of bones and teeth recovered in cases of surface-deposited skeletal remains.

Searches for skeletal remains can be complicated by taphonomic processes that result in the disarticulation, fragmentation, and redistribution of remains. The consequence is often an incomplete recovery, with small bones, fragments, and teeth especially susceptible to being overlooked during a search. This study tests whether supplementing a traditional line search with a second search using an ALS, performed after dark, will result in the recovery of additional skeletal remains.

Forty-eight *Sus scrofa* bones and teeth, all measuring less than 4cm, were distributed and mapped within a ~21m x 11m search area. The search area had moderate surface debris, including leaves, grass, and sticks. Volunteer, inexperienced searchers were divided into 13 two-member teams and three search types. Four teams conducted a traditional daytime pedestrian line search only. Four teams performed a nighttime search only, using an ALS with a 450nm wavelength head and orange filter goggles. Five teams conducted a daytime line search followed by a nighttime ALS search. All finds were marked by the teams with pin flags. No time limit was imposed on the search (search teams determined when the search was complete), but the search time was recorded.

Teams conducting traditional daytime line searches located an average of 19 (40%) of the specimens, the ALS-only search teams located an average of 33 (69%) of the specimens, and the combined search resulted in an average of 37.4 (78%) of the specimens being located. When an ALS was used (in combination with a daytime search or alone), the number of specimens located was significantly greater compared to a traditional daytime line search only ($p < 0.001$). Given that the searchers in this test were volunteers inexperienced in searching for skeletal remains, it is expected that those trained in evidence searches and/or identifying skeletal remains are likely to have higher recovery rates, but the relative differences between search team types is a significant finding. There was no significant difference in the time teams spent on daytime-only versus ALS-only searches ($p=0.32$), and the combination of the two search types approximately doubled the total search time. For ALS and combined searches, there was a slight positive correlation between search time and specimens located ($R^2=0.3997$ and 0.0480, respectively); for daytime searches there was an inverse association between search time and specimens located ($R^2=0.6747$).

For an ALS search to be effective in locating a bone or tooth, the skeletal specimen must be in the path of the light source and must retain fluorescent properties. This approach, therefore, would not be effective for locating buried remains or those obscured by significant surface debris, nor is it appropriate for locating severely burned remains or other remains significantly lacking in collagen. Searches conducted at night may involve environmental and security-related hazards, so time and safety considerations should be weighed against the benefits of locating additional remains.

The technique is easy to use, even by untrained personnel, and ALS devices are relatively affordable. Results of this study indicate that search approaches involving an ALS (either alone or in combination with a daytime line search) located significantly more remains than a daytime line search alone. It is recommended that traditional line searches be supplemented with an ALS search when possible, which is likely to increase the quantity of skeletal remains located.

Forensic Anthropology, Alternate Light Source (ALS), Search and Recovery