

FBI



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A community relations team of the Cincinnati, Ohio, Police Department on patrol



Exhumation: The Method Could Make the Difference

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Quite often, law enforcement officers are confronted with the problems of removing buried human skeletal remains. Recent news reports of searches for victims of mass murders and gangland-style slayings serve to underscore this point. It is imperative, therefore, that police personnel are alerted to the methodology that can be of critical importance in the

exhumation of human skeletons.

Techniques for the location and proper removal of human burials have been developed over a long period of time by those in the field of archeology—that branch of anthropology which deals with prehistoric or early historic cultures. The archeologist attempts to reconstruct events of the past by carefully excavating nonper-

ishable items from sites where humans have previously lived, and in the process, have altered their environment. He is trained not simply to remove artifacts, but to interpret the cultural facts that surrounded an earlier event for which there is no written record.

In working with police agencies over the years, the authors have noted that law enforcement officers are generally unaware of how much informa-

“[L]aw enforcement officers are generally unaware of how much information the careful excavation and removal of a skeleton can provide.”

tion the careful excavation and removal of a skeleton can provide. To illustrate, when a homicide occurs in a motel, police will insure no clue is overlooked. Photographs are taken, fingerprints are obtained, and an ex-

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"[A] wise practice [is] to photograph the excavation at various stages and include identification and direction markers."

tensive search of the room is conducted to locate even the most minute item which could conceivably help solve the murder. But, let's say that the motel owner is opening up a section of the motel that had been closed for the off-tourist season, and in one of the rooms, lying on the bed, is the skeleton of a human who had been killed some months before. Many police officers believe that if the body tissue has decayed, little or no information can be obtained and the mortician is then called to remove the skeleton. From the skeleton, a forensic anthropologist can determine whether the bones are animal or human. If human, he can determine the approximate age at death, sex, race, approximate stature, an estimation of length of time since death, and other peculiarities of the skeleton, such as healed fractures and pathologies that leave their mark on bone. But few attempts are made to reconstruct the events of the crime, and in many cases, the law enforcement officer does not know whom to seek for aid in his investigation. The investigator, faced with the problem of locating or removing a human burial, should definitely contact a forensic anthropologist or archaeologist (usually in the Department of Anthropology) at a State or local university.

Exposing The Grave

One can never dig in the ground and put the dirt back exactly as nature had put it there originally. (See fig. 1.) However, through careful excavation, the original grave can be located and outlined in most cases. The grave in figure 1 was dug over

200 years ago and was quite visible prior to excavation.

Once the outline of the grave has been determined, but before the grave is dug, a larger area around the grave should be cleared. Investigate the area carefully for any items that may have inadvertently fallen around the grave at the time it was dug.

Often, items are lost in the surrounding grass or undergrowth and overlooked in haste. During the excavation of the grave, proceed with great care. Make sure that professionals and bystanders do not throw any items into the excavation or into the dirt removed from the grave. One of the authors recently participated in the investigation of a Civil War grave that had been disturbed by grave robbers.

During the reexcavation of the disturbed grave, two cigarette butts were recovered which had been discarded in the grave by the artifact seekers. Possibly, latent fingerprints and other information could be obtained from such items.

Note in figure 1 the circular outline of the grave. The left edge (A) has been marked for only about a foot along the original pit edge, but the rest of the grave outline is easily seen (B). A second grave in the background has been outlined.

It is a wise practice to photograph the excavation at various stages and include identification and direction markers. The system used in figure 2 is one developed some years ago by the Smithsonian Institution. The first



Figure 1. Outline of a 200-year-old grave before being exposed by excavation.



Figure 2. Removal of dirt from the original grave pit reveals the burial place of an adult and child.



Figure 3. Leaving every bone in place while uncovering the skeleton allows for reconstruction of events surrounding the burial.

number or numbers is the alphabetical listing of the State (39 is South Dakota). The system was devised before Alaska and Hawaii were added, so they are 49 and 50, respectively. The next two letters (both capital let-

ters) indicate the county within the State (SL is Sully County), and the last number(s) indicates the site number. The F number is a feature number or a subdivision of the burial area, where there are multiple burials scat-

tered over a large area. Each burial is given a separate number. If two or more individuals are placed in a single grave, each is given a separate letter designation; i.e., B2C would indicate that in burial pit two, there were three separate individuals. In a multiple burial, the first individual to be exposed would be assigned letter A, the second B, and so forth. This may also aid in stratigraphic sequence or in determining which body was placed in the grave first and which was last. Under most conditions, the deepest burial was placed there first, and the most recent burial will be closest to the surface. In figure 2, both bodies were buried at the same time. An arrow or some indication of north should always be included, as well as the date and who did the excavation. In the illustration, a small, 4- by 6- inch menu board with removable letters was used. If something of this type is not available, the information can be written on a 3- by 5- inch or 4- by 6- inch card and placed so that it can be read from the photograph.

Excavating The Grave

With the outline of the grave determined, proceed to the removal of the dirt within the grave outline. (See fig. 2.) This is the material that had originally been removed. Under no condition should any bone or artifact be removed until the entire grave is exposed. The objective is to reconstruct the events surrounding the burial. Removing individual bones or associated artifacts would be similar to rearranging the furniture in a room where a homicide had been committed before the investigation proceeds. As the dirt is carefully removed by trowel and

“Under no condition should any bone or artifact be removed until the entire grave is exposed. The objective is to reconstruct the events surrounding the burial.”

paintbrush, the bones and any associated artifacts will be found in the position in which they were originally placed. In the case illustrated in figures 1 and 2, two individuals, an adult and child, were placed in the grave at the same time. Careful excavation reveals that these two individuals were wrapped in bison robes and buried during the summer, as revealed by the presence of fly pupae in close association with the bones.¹

Interpreting Events Surrounding The Burial

When the entire grave is exposed, any associated items can be related to the skeleton. The burial position and associations can then be interpreted. (See fig. 3.) Note that there is no skull associated with the skeleton in figure 3 (letter A). The skull is usually the first bone encountered when excavating a grave; if this had been removed before the rest of the skeleton had been exposed, we would then not have been certain of its original position. The illustration is from an early American Indian grave and is proof that they occasionally beheaded individuals. There was, in this case, no evidence that the grave had been disturbed since the original burial.

But we can carry this story further. Letter B in figure 3 indicates that the left foot had been removed. The bones of the skeleton are in anatomical order, indicating the body had been placed in the ground with the flesh on it. Letter C will further show that once the body had been placed in the grave, a decision was made to cut off the right leg at the knee and ankle and turn the lower leg upside down. Note that the right patella or

kneecap is still in anatomical order. This is positive proof that mutilation of some individuals occurred. If the bones of this skeleton had been removed before the entire grave was uncovered, little or none of the reconstruction of events surrounding this burial could have been made. Cut marks on the bones surrounding the right ankle and knee, the left foot, and the neck support this interpretation.

When exposing the bones be especially careful to note any colored stains on the bones. A greenish-blue stain is caused by copper oxides and could indicate jewelry or a copper-jacketed bullet. Red or rust-colored stains are caused by iron oxidation. Look carefully for all jewelry, belt buckles, and associated items in pockets. Even though the original item may have decayed, the evidence of its original location may be determined from the stain on the bones.

Removal Of Bones

Once the burial has been exposed completely, photographs and measurements should be taken. After the burial position, head direction, body orientation, and associated artifacts have been recorded, carefully remove the bones and place them in marked bags. Using a small paintbrush, remove as much dirt from the bones as possible at the time of recovery. Since the major bones of the human skeleton are large and long, grocery bags should be used as containers. Use several bags to sack a complete skeleton—one for the skull and mandible, one for the large bones, such as the femora and tibia, and one for the small bones, such as vertebrae,

ribs, etc. This will help reduce the possibility of the small bones being crushed or broken by the larger bones. By placing the bones of each hand and foot in separate bags, their subsequent identification will be facilitated. Mark containers with waterproof ink. If graves are in wet areas, or should it rain before the bones are finally packed for removal to the laboratory, allow wet or damp bones to dry for a few hours in shade before removal; damp bones are easily broken. Allow-

“Use several bags to sack a complete skeleton. . . . This will help reduce the possibility of the small bones being crushed or broken by the larger bones.”

ing bones to dry in sunlight, especially in midsummer, may cause longitudinal cracking. Keep every piece of bone. They will aid later in restoration and will increase the accuracy of subsequent analysis.

Transportation

Pack marked bags of bone carefully. If bags are packed in a carton or box, place the open end of the sacks at different ends of the box. If skeletal material is jarred out, it will then be easier to replace it in the proper sacks. Place the bones in small cartons with one or two burials to a carton. When moving a large series of bones, pack the bones in such a way that they will not shake out of bags or boxes and be lost or mixed. Never toss bones in the back of a car or truck without proper packing. Also, never pack rocks or heavy artifacts on top of bones.

Use Of Heavy Power Equipment

Any time one digs in the ground, evidence of a disturbance can be found if the excavation is performed carefully. Many times the law enforcement agent is faced with locating a grave within a large area. Various methods have been suggested.² After a body is buried for a period of time, decomposition of tissue forms various gases, such as hydrogen sulfide, hydrogen phosphide, methane, carbon dioxide, ammonia, and hydrogen. There are available today gas-sensing probes which, when inserted into the ground, give readings on the level of gases, especially methane, that aid in the determination of the presence or absence of a decomposing body.³

The usual backhoe, often used in the excavation of graves, is a very poor choice of equipment, and what information is available is likely to be destroyed. Use instead a backhoe with a *nontooth* bucket. (See fig. 4.) A careful operator can make a smooth cut, thus exposing disturbances in the soil. The use of a backhoe with a tooth blade or bucket, which is standard on most backhoes, does not leave a smooth excavation and thus should be avoided.

A much better piece of equipment that, if used properly, will allow the

Figure 4. A backhoe with a nontooth bucket leaves a smooth surface.



Figure 5. When heavy power equipment is used to locate graves, care should be taken to check carefully for soil color changes, grave outlines, and/or bones.

Figure 6. An elevating scraper is considered the best power equipment to use in locating burial places.



Figure 7. Dark circles in center outline a grave. Color change is due to water seeping deeper into the disturbed soil over the grave, while not penetrating as deeply in the undisturbed surrounding soil.



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maximum amount of information to be obtained is a scraper or pan. A number of variations of this power equipment are available. A pan pushed by a dozer, as shown in figure 5, is not as good, because the dozer disturbs the smooth pattern created by the pan. A better choice is the "Elevating Scraper," in which the power to pull the scraper is in front of the pan. (See fig. 6.) After the cutter bar on the pan has passed, the only marks left on the surface are from the tires on the pan. The authors have excavated hundreds of burials with the use of this method and have perfected the technique to locate buried bodies and not disturb the skeleton itself.

"Five or six observers are needed to work with the scraper unit."

Five or six observers are needed to work with the scraper unit. As the scraper makes its cut, the observers

should check carefully for indication of previous disturbance to the soil. Either a grave outline or a change in soil color should be checked before the pan is allowed to make a deeper cut. Burials can be located by:

1. The disturbance of previously undisturbed soil. In many cases, a clear line of demarcation between the lesser disturbed soil and the undisturbed surrounding soil can be seen. In addition, probing the area with a sharp, pointed instrument—an ice pick, screwdriver, or heavy wire, for example—will reveal the soil over the grave to be softer than the surrounding soil.

2. A color change where the topsoil has been redeposited at a lower depth when covering up the grave.

3. A color change due to wetness. (See fig. 7.) When a grave is dug, the soil is disturbed and

is not replaced as compactly as nature put it there originally. Water will seep deeper into the disturbed soil. In the illustration, the grave is the dark circular area in the center which was caused by water penetrating deeper into the disturbed soil. The light areas around the edge are caused by water not having penetrated as deeply in the undisturbed soil. In arid areas like the Plains and Southwest, the vegetation over a grave is sometimes more dense or lush because the disturbed soil over the grave is looser and moisture can seep deeper in this area.

Once the grave is located by the heavy power equipment, the techniques described earlier for the removal of the graves should be followed.

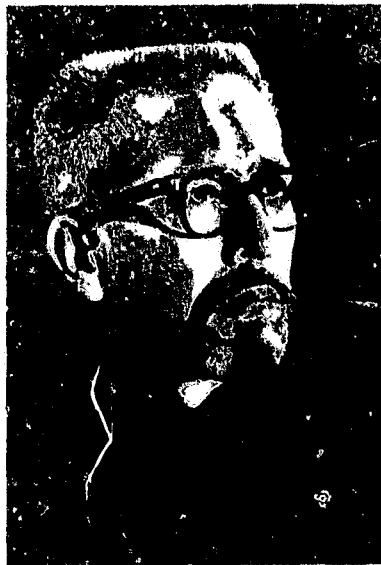
When locating more recently dug graves, even as much as 5 to 10 years earlier, the suggested area should be carefully viewed from many different angles, both early in the morning and late in the evening, using the sunlight to locate slight depressions (shadow) or elevations which in many cases cannot be seen in midday. In all cases, let nature help you as much as possible.

Investigative personnel can be assured that exhumation will result in the acquisition of optimal information, when sound archeological principles are applied.

Dr. Bass



Dr. Birkby

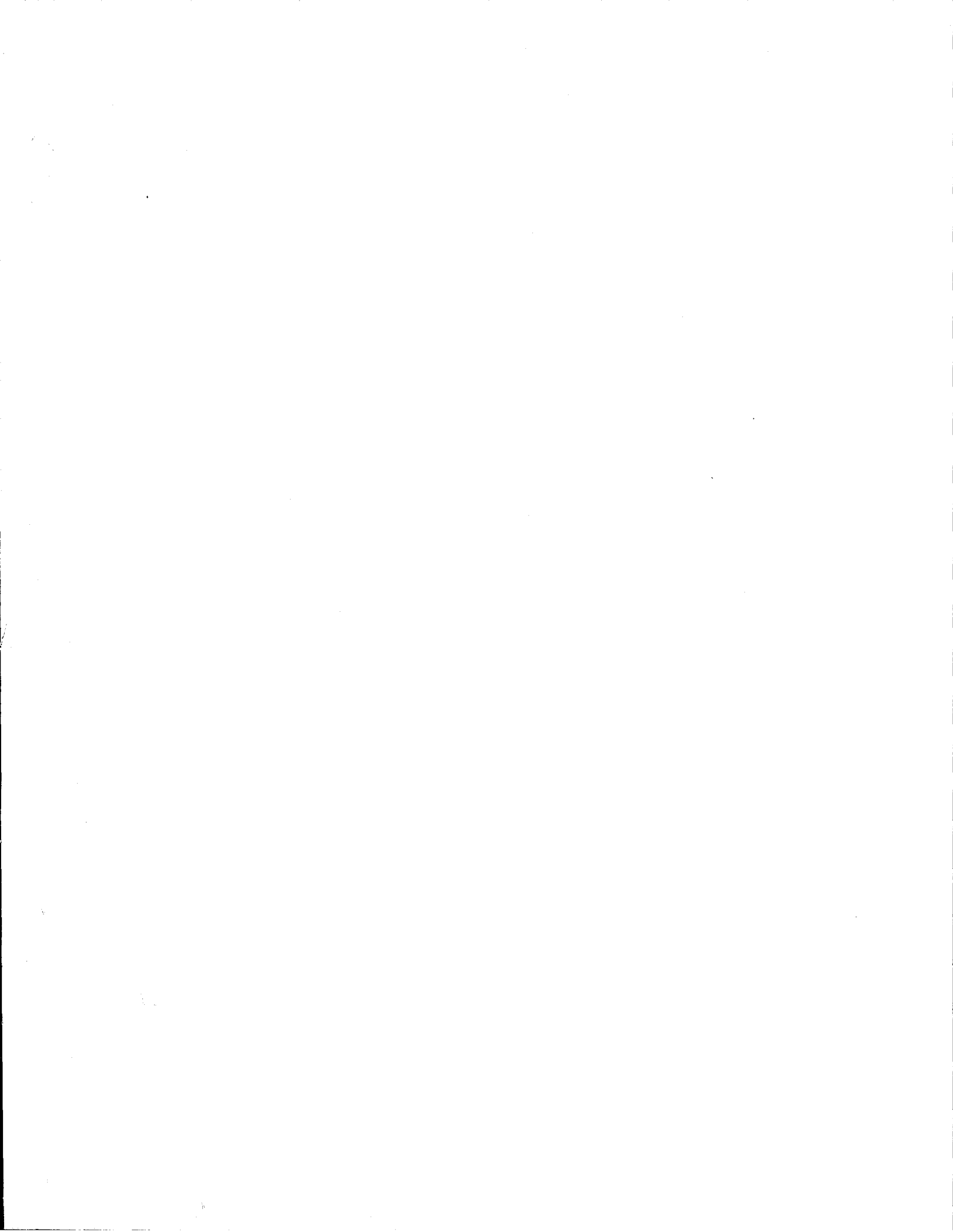


FOOTNOTES

¹ B. Stiles Gilbert and William M. Bass, "Seasonal Dating of Burials From the Presence of Fly Pupae," *American Antiquity*, Vol. 32, No. 4, pp. 514-535, October 1967.

² Masataka Imaizumi, "Locating Buried Bodies," *FBI Law Enforcement Bulletin*, Vol. 43, No. 8, pp. 2-5, August 1974.

³ *The Detection of Buried Bodies*, a study by Andermac Co., Yuba City, Calif.



END