

Forensic Mapping and Scene Reconstruction Report

(Amended January 2007)



Incident No.: 05-R-71-CASO

Location: Avery's Auto Salvage Facility
Town of Gibson
Manitowoc County, Wisconsin

Prepared By:

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December 13, 2006

Wisconsin State Patrol Academy – Technical Reconstruction Unit

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FORWARD

At the request of the Calumet County Sheriff's Department, the objective herein is to provide two-dimensional and three-dimensional diagrams and renderings of an incident located at or near the Avery Salvage Yard in the Town of Gibson, Manitowoc County, Wisconsin. Much of the information utilized for this process is based on work completed by the author or other members of the Wisconsin State Patrol. However, detailed information concerning items of evidentiary value and/or forensic interpretation of that evidence is beyond the scope of this author's assignment in this matter. For this reason, outside assistance was given by the requesting agency in providing specific requests for diagramming and modeling services.

Additionally, as will be discussed in this *Forensic Mapping and Scene Reconstruction Report*, the identification of items presented in some computer generated images falls outside of the author's arena of expertise. For this reason, the author worked under the direct supervision of persons having this expertise, with the intention of creating models to that person's stated specifications. As an example, this narrative will discuss bone fragments located by law enforcement investigators at the scene. With the immediate assistance of Forensic Anthropologist Dr. Leslie Eisenberg, skeletal models were generated with the intention of illustrating which bones are represented by the fragments. Although the images shown herein are those generated by the author, they are at the request and direct guidance of Dr. Eisenberg. The narrative portion of this report concerning this was therefore written jointly by the author and the Forensic Anthropologist.

Furthermore, some images herein depict the locations of specific evidentiary items. As an example, items in and near the Steven Avery garage are identified and referenced through the use of leaders and arrows. As was stated previously, the author was not involved in the interpretation and/or analysis of specific pieces of evidence. However, under the direction of those who were, the items have been illustrated in the given diagrams and models. It was the primary purpose and objective of the author to provide demonstrative model exhibits to illustrate pertinent locations, terrain, and physical layout of the incident scene.

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INFORMATION REVIEWED FOR REPORT PREPARATION

- ***Printed Material(s) and Police Reports***

In completing the previously offered objectives, numerous police reports and published references were consulted. These items of information that were reviewed include the following:

1. Geodimeter Total Station forensic mapping data as documented by the Wisconsin State Patrol during the dates of November 5-11, 2005.
2. Measurements of the following items recorded by the author:
 - A. Steven Avery residence on November 12, 2005.
 - B. Steven Avery bed (headboard and footboard), gun rack, and book case on December 7, 2006.
3. Photographs:
 - A. Aerial photograph of the incident scene taken by the Wisconsin Department of Transportation.
 - B. Digital aerial photographs (with photo logs) taken of the incident scene by pilot Trooper Dennis McConnell.
 - C. Incident scene photographs (with photo logs) taken by Trooper James Reese.
 - D. Incident scene photographs (with photo logs) taken by Trooper Lewis Judge.
 - E. Digital incident scene and object photographs (with photo logs) taken by the author.
 - F. Select photographs provided by the Calumet County Sheriff's Department depicting various aspects of the incident scene for forensic diagramming purposes.
4. Narrative Reports:
 - A. Narrative report of Wisconsin State Patrol Trooper James Reese.
 - B. Narrative report of Wisconsin State Patrol Trooper Duane Meyers.
 - C. Narrative report of Wisconsin State Patrol Trooper Todd Weinberger.
 - D. Select narrative reports provided by the Calumet County Sheriff's Department concerning various aspects of the evidence collection process at the incident scene.

- ***Computer Software/Data***

The following computer software programs were utilized or consulted.

1. Geodimeter Survey Program Version 5.0c – Total Station data acquisition software.
2. CAiCE Visual Transportation – professional drawing software.
3. Crash Zone™ Version 8.1 – professional drawing software.
4. Forensic3D Suite – professional modeling software consisting of the following components:
 - A. Rhinoceros Version 3.0 SR5B

- B. Flamingo Versions 1.1 SR5 and 2.0 Beta
- C. Easysite for Rhinoceros Version 1.2.1.0
- D. Façade for Rhino Version 1.0.0.0
- E. Bongo Version 1.0.1.0

- 5. Microsoft Word 2003 – word processing software.
- 6. Microsoft Streets & Trips 2005 – mapping software.

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FORENSIC MAPPING

• *Forensic Mapping – Introduction*

On November 5, 2005, the Wisconsin State Patrol responded to a request from local law enforcement officials to provide forensic mapping assistance at the Avery Salvage Yard near Mishicot, Wisconsin. Forensic mapping refers to the collection of evidentiary measurements, generally with the use of electronic surveying equipment, with the ultimate goal of generating scaled scene diagrams and/or models. Throughout the next seven days, detailed electronic measurements were recorded from the following locations both on and adjacent to the Avery property:

1. Steven Avery Residence, Garage, (including interior) and Yard
2. Janda / Dassey Residence, Garage, Shed, and Yard
3. All Avery Auto Salvage Business Buildings (including interior of main pole building)
4. Other Residences on Avery Property and Contiguous Yards.
5. Entire Avery Salvage Yard, Including Outlines of Vehicle Rows and Scrap Areas
6. Private “Hunting Camp” Located Across Quarry from Steven Avery Residence
7. Portions of Quarry Adjoining Avery Salvage Yard

• *Geodimeter 610 Total Station*

In collecting scene data, two Geodimeter 610 Total Stations were utilized (see Figure 1 at right). These devices are electronic instruments composed of theodolites (angle measuring systems), EDMs (Electronic Distance Measuring Systems), data collectors, and prisms. All data is stored electronically, and later downloaded for transfer to professional diagramming and/or modeling software packages. These instruments allow for measurements to be taken in three dimensions, thereby mapping terrain, roadways, and items of evidentiary value with a high degree of accuracy.

While in operation, notes were recorded concerning station location, station coordinates, and figure (object) descriptions. These informational documents, along with the printed measurements, will be attached to this narrative in the appendix. During the course of the forensic mapping procedure(s), the total stations were operated by several officers, including the author, Trooper Jason Schwarz, Trooper Lewis Judge, and Trooper Todd Weinberger. It is noted that Trooper James Reese was also assigned to assist the reconstruction team(s), and did so with photography.



Fig. 1

- ***Forensic Mapping Timeline***

Trooper Jason Schwarz was charged with maintaining a timeline to reference which locations were forensically mapped during the course of the project.

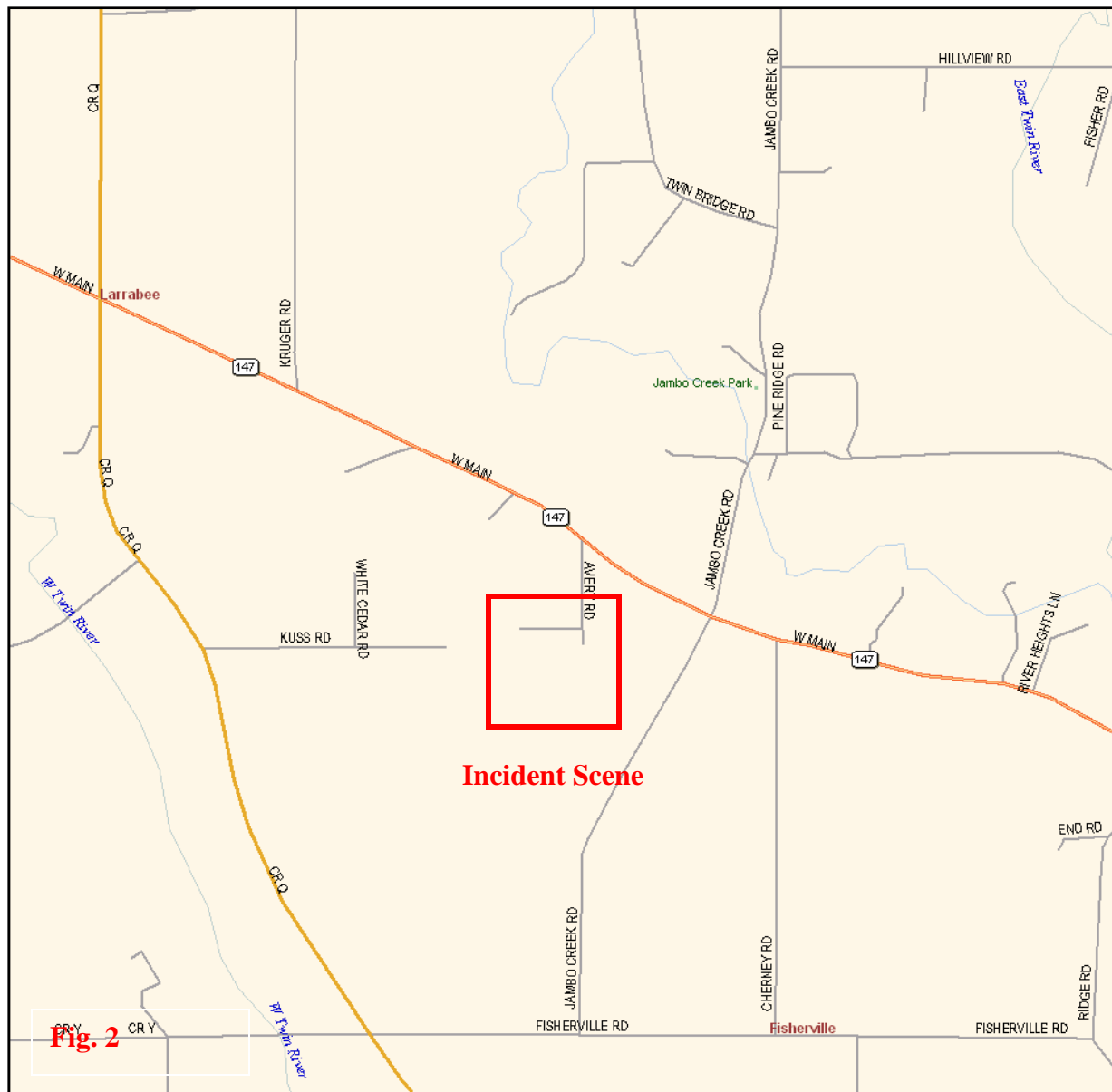
Forensic Mapping and Measurement Log

<i>Date</i>	<i>Apx. Time</i>	<i>Personnel</i>	<i>Survey / Measurement Content</i>
November 5, 2005	4:21 pm	Troopers Austin and Schwarz	Southeast Quadrant of Salvage Yard
November 6, 2005	8:00 am	Trooper Austin and Schwarz	Steven Avery / Janda – Dassey Residences
November 6, 2005	4:30 pm	Troopers Austin and Schwarz	Southeast Quadrant of Salvage Yard
November 7, 2005	7:00 am	Troopers Austin and Schwarz	Salvage Yard
November 7, 2005	12:30 pm	Troopers Austin and Schwarz	Steven Avery Residence
November 7, 2005	3:00 pm	Troopers Austin and Schwarz	Cul-de-sac at End of Kuss Road
November 8, 2005	7:00 am	Troopers Austin and Schwarz	North Central Area of Salvage Yard
November 8, 2005	3:00 pm	Troopers Austin and Schwarz	Salvage Yard
November 9, 2005	9:00 am	Troopers Judge and Schwarz	Avery Business Buildings and Residences
November 9, 2005	2:00 pm	Troopers Austin, Judge and Schwarz	Avery Business Buildings and Residences
November 10, 2005	8:00 am	Troopers Austin, Judge, Schwarz	Steven Avery / Janda – Dassey Residences
November 10, 2005	12:00 pm	Troopers Judge, Meyers, and Weinberger	Judge and Weinberger: “Hunting Camp” and Quarry Meyers: Assisted Wisconsin DOT with GPS
November 11, 2005	8:00 am	Troopers Judge and Austin	Avery Business Buildings and Residences
November 11, 2005	2:00 pm	Trooper Austin, Judge, and Schwarz	“Hunting Camp” and Quarry
November 11, 2005	10:25 pm	Troopers Austin, Judge, and Schwarz	Steven Avery Garage Interior
November 12, 2005	8:00 a.m.	Trooper Austin	Steven Avery Residence Interior
November 15, 2006	8:00 a.m.	Trooper Austin	Scanning of RAV4 with FBI
December 7, 2006	3:50 a.m.	Trooper Austin	Avery Bed, Gun Rack, and Shelf
January 11, 2007	10:45 a.m.	Trooper Austin	RAV-4 Key

SCENE DESCRIPTION

- **Location**

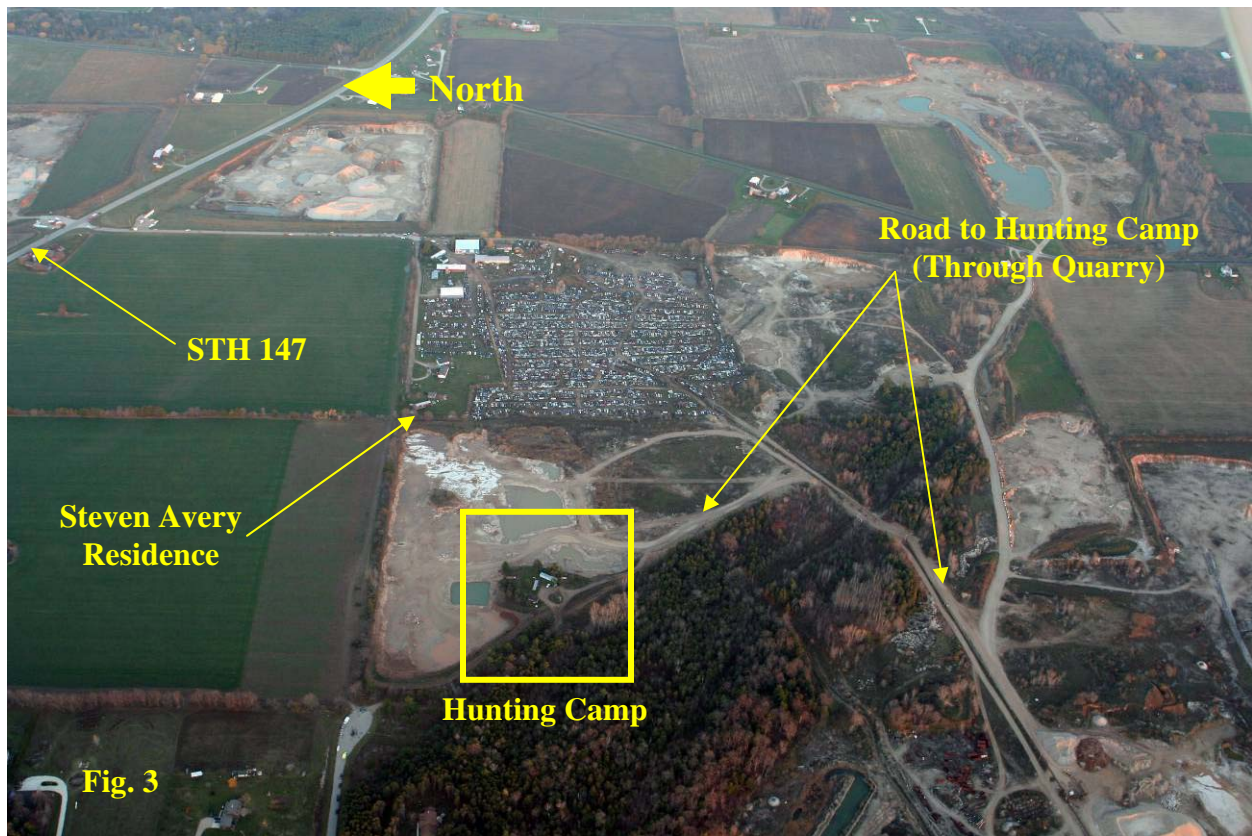
The location of the incident is at or near Avery's Auto Salvage, located off of Avery Road in the Town of Gibson, Manitowoc County, Wisconsin (Figure 2). As will be presented in later discussions, the area encompasses a salvage yard, buildings utilized for the salvage business, private residences, quarries, and private properties adjoining the salvage facility.



- **Scene Orientation**

The Avery Auto Salvage facility is located south of STH 147, with surrounding farm fields and active quarries. The facility is accessed by turning onto Avery Road from the highway, whereupon the road leads to the business and several private residences. Gravel driveways continue southward and westward, leading into the salvage yard and toward additional residences, respectively. In turning to the west from the juncture, the gravel drive would pass the private residence of Barbara Janda and Brenden Dassey before ending at the private residence of Steven Avery.

Across the active quarry to the west from the Steven Avery residence is a private “hunting camp” owned by an unrelated individual. This property can be accessed by either traversing a road/trail through a second quarry to the south, or by turning southward down a trail from Kuss Road (see map on previous page). In the aerial photo below (Figure 3), which was taken by pilot Trooper Dennis McConnell, the Avery property can be viewed in its entirety along with the surrounding quarries. It should be noted that in the image, north is to the reader’s left. The hunting camp is also visible, as is the road leading up to it through the quarry.



TWO-DIMENSIONAL SCENE DIAGRAMMING

- *CADZone Software*

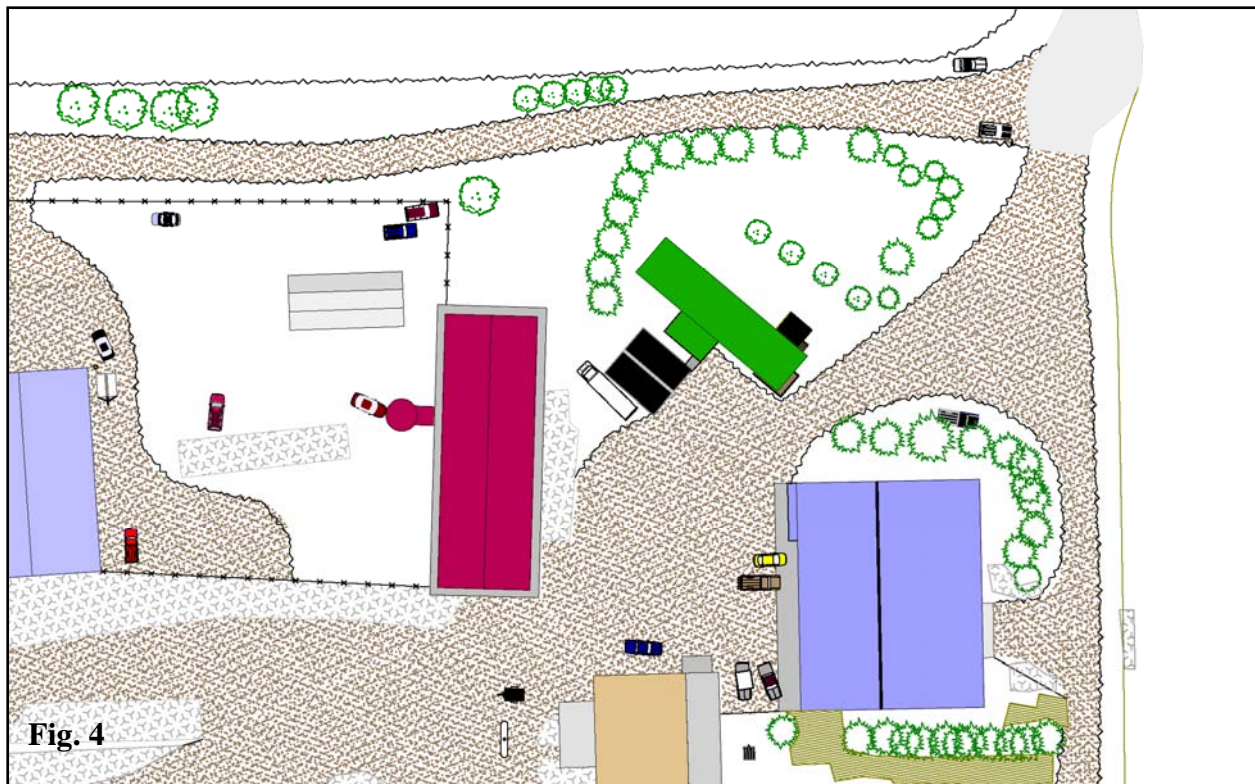
To create scaled scene diagrams of the incident location(s), the total station measurement data was imported into CADZone professional drawing software. With the assistance of Trooper Jason Schwarz, the raw information was utilized to create two-dimensional diagrams of the Avery Salvage Yard, as well as the exterior portions of both the Steven Avery residence and the Janda / Dassey residence. Furthermore, forensic mapping completed at a private “hunting camp” located directly across an active quarry from the Steven Avery residence was also used for diagram generation.

Due to the extensive nature of the mapping project, many areas of the scene were denoted using an outlined hatch pattern. In particular, areas wherein vehicles or scrap metal were being stored are shown in the diagrams as a gray outline filled with a particular pattern.

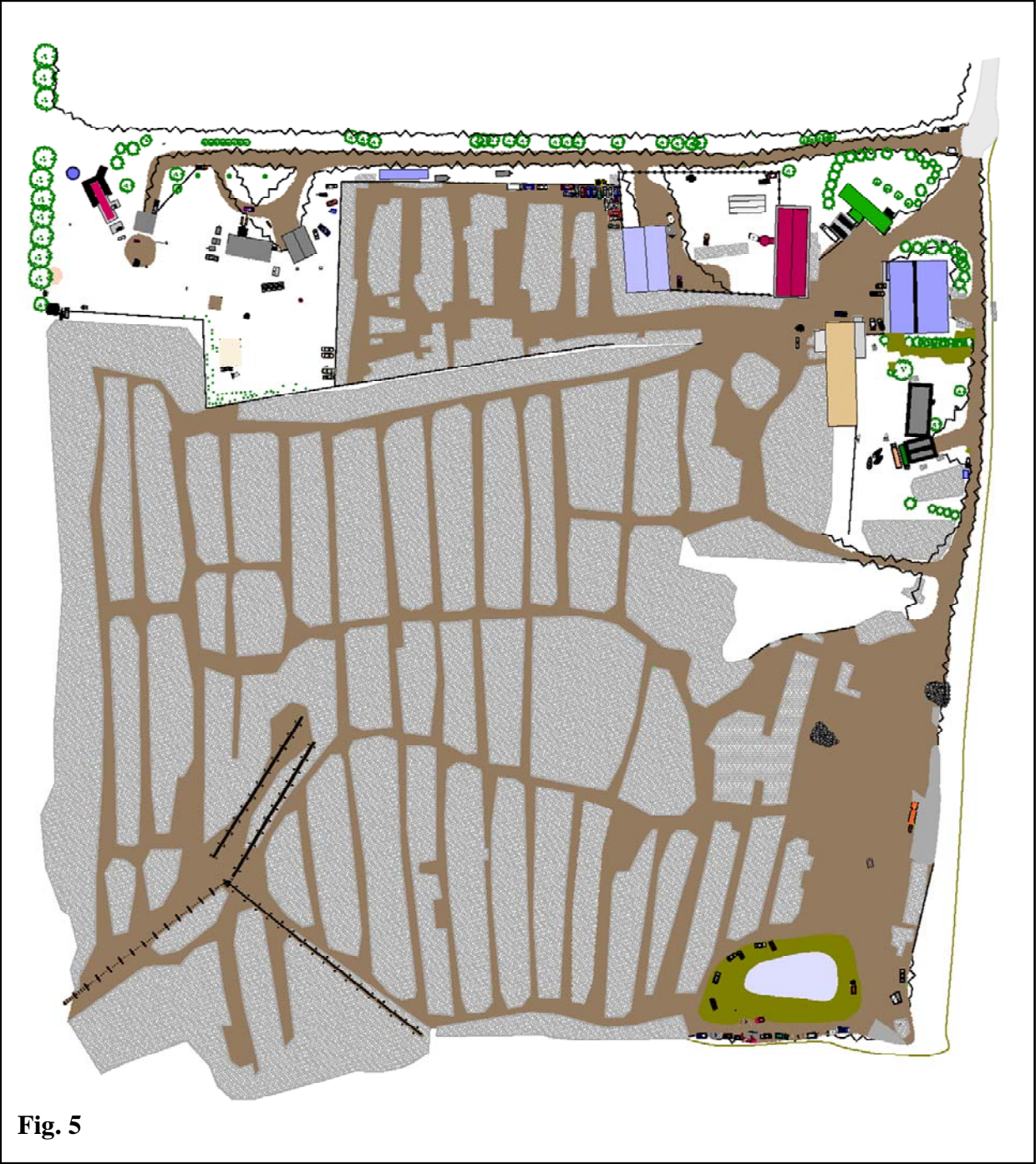
- *Scene Examples*

The following Figures (4 through 7) offer various overviews of the incident scene.

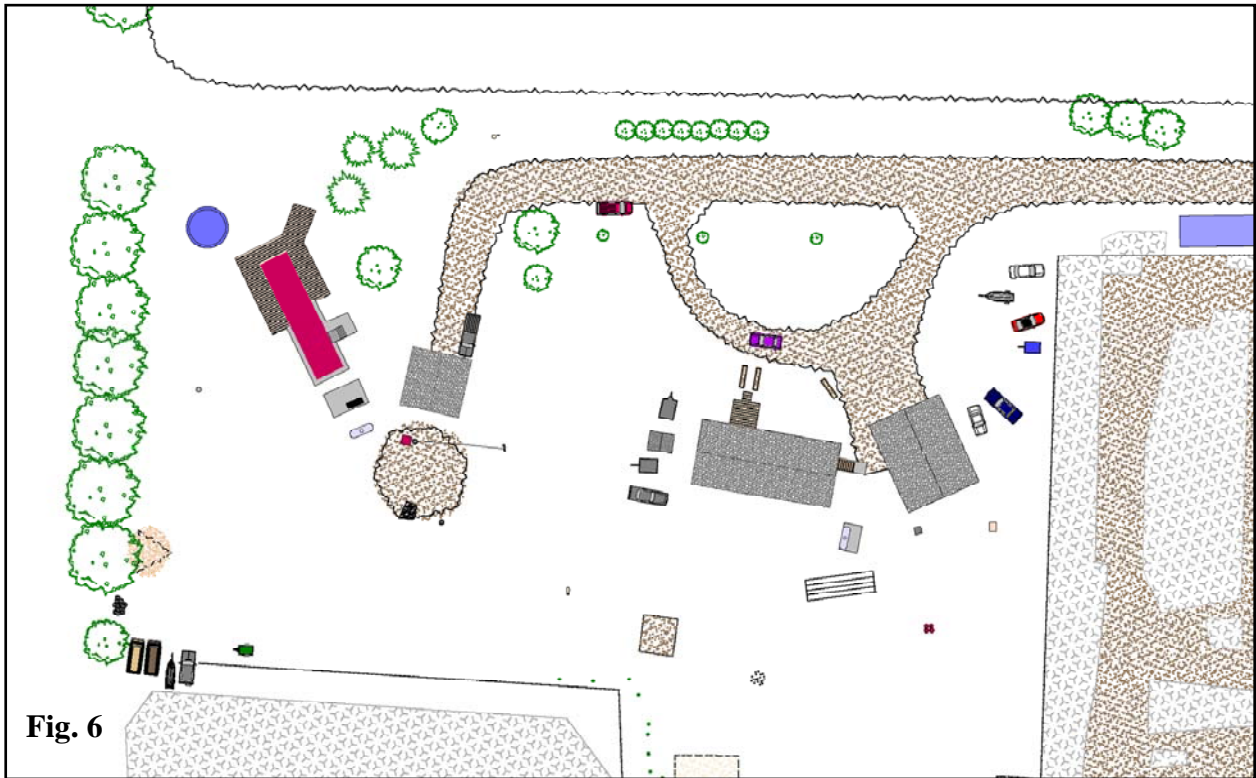
Avery Salvage Yard Business Offices:



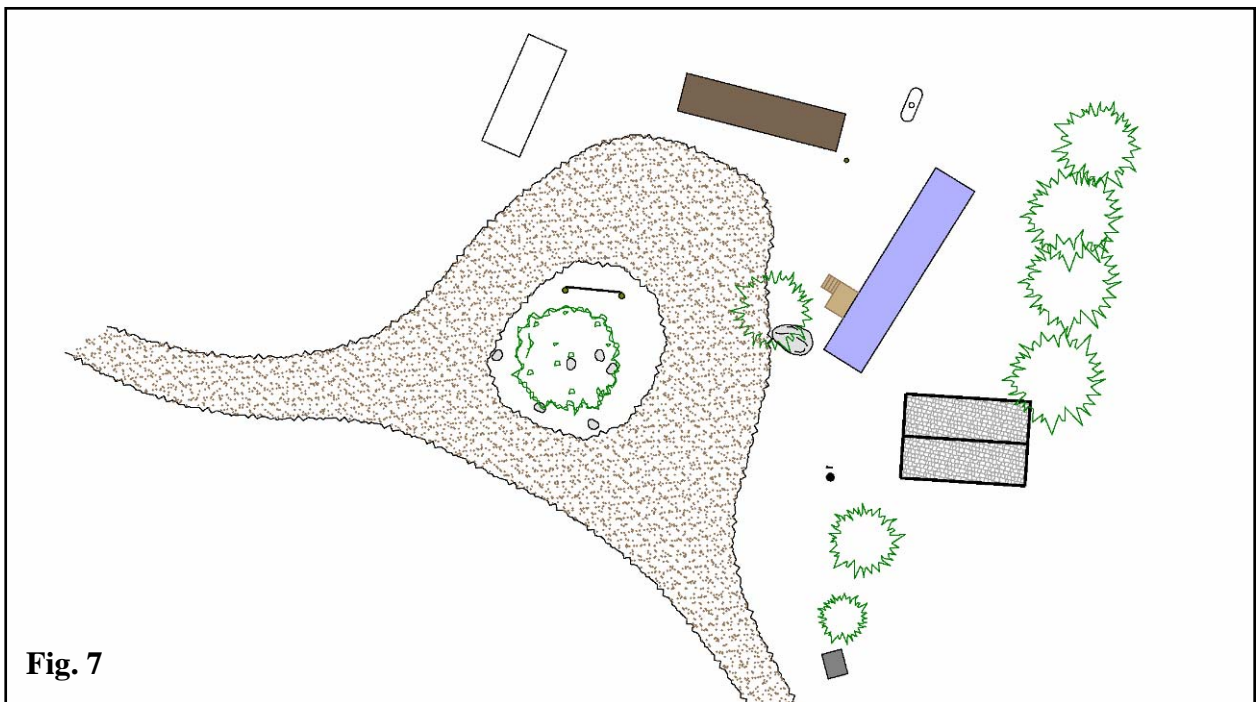
Avery Salvage Yard Overview:



Steven Avery and Janda – Dassey Residences:



“Hunting Camp:”



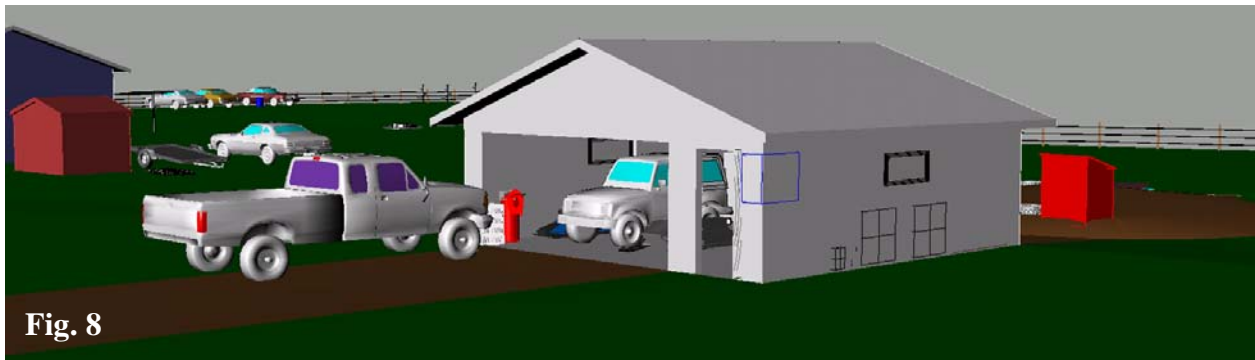
THREE-DIMENSIONAL SCENE MODELING

- *Forensic3D Software Suite*

Following the generation of two-dimensional diagrams, the total station forensic mapping data was brought into the Forensic3D Suite. This is a software package made up of the Rhinoceros Computer-Aided Drawing (CAD) engine, Flamingo Raytracing engine, Bongo animation engine and plug-ins from CAD Easy. Rhinoceros, which is commonly used in the professional marine industry for watercraft design, allows the user to create three-dimensional models through NURBS (Non-Uniform Rational B-Splines). These mathematical representations of three-dimensional figures allow for accurate reproductions of measured surfaces.

The Forensic 3D Suite also provides the ability for texture mapping, which is a process wherein photographs or other electronic images can be applied to three dimensional mesh surfaces. As such, photo-realistic models can be generated with textures for vehicle paint, building siding, wood, and the like (Figures 8 and 9 below). For this project, textures generated from scene photographs were used on the Avery garage exterior, Avery residence exterior, bathroom floor, bathroom sink, mattresses, and back bedroom floor. Other textures were assigned through the author's personal library to be demonstrative of the surfaces represented.

Pre-Texture Mapping:



Post-Texture Mapping:



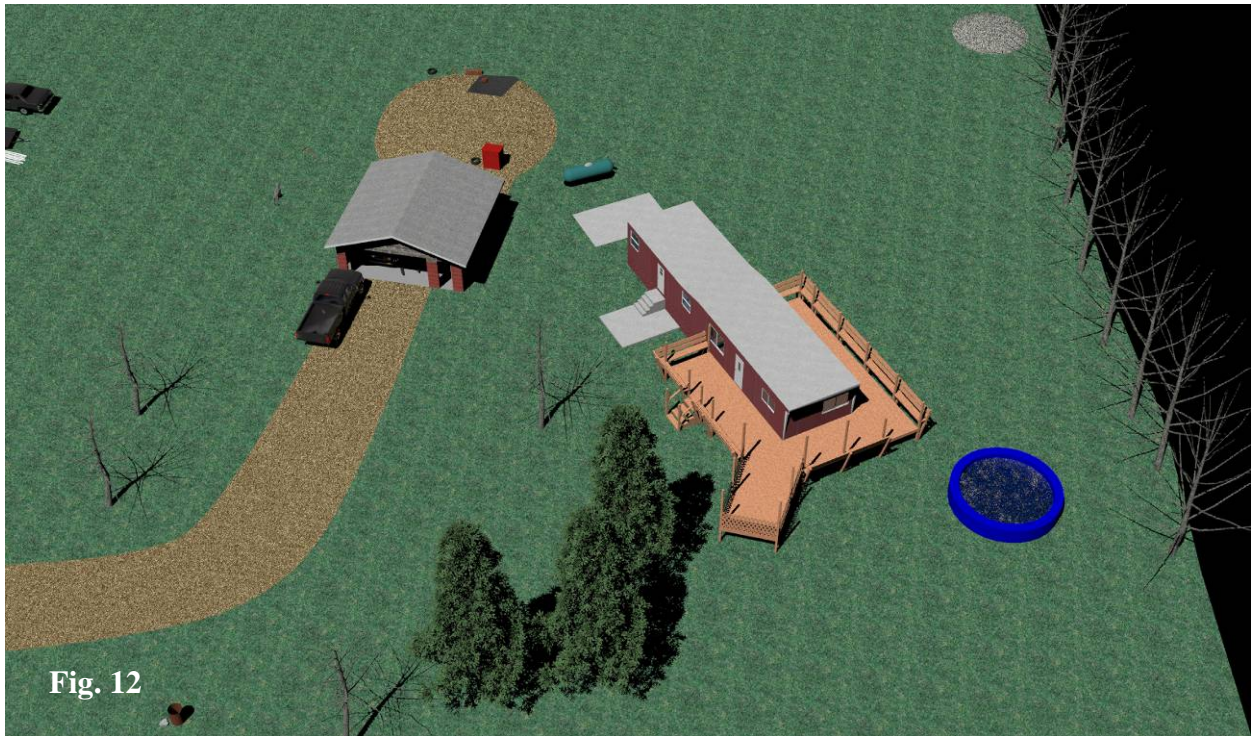
- *Scene Examples*

The following series of Figures (10 through 15) illustrate various renderings of scene models generated in the manner previously detailed. Where appropriate, buildings and prominent features have been labeled.

Scene Overview:



Steven Avery Residence:



Janda / Dassey Residence:



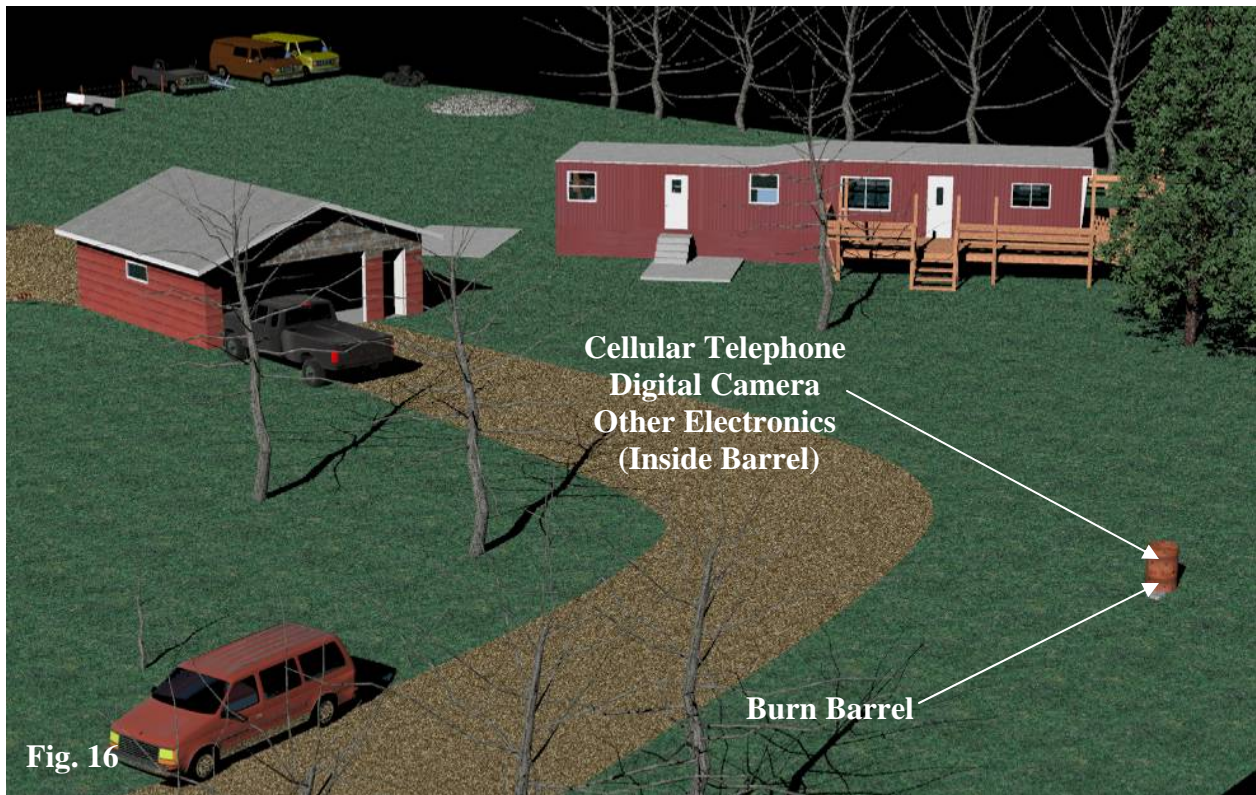
EXTERIOR MODEL and DIAGRAM DETAILS

In creating the previously described scene models, it is possible to essentially move around in the virtual environment. As such, additional model images were rendered to document relevant items as noted by law enforcement investigators. While the author was not involved in the interpretation and/or processing of evidence, information was obtained through narrative reports and directions received from Calumet County Sheriff's Department as well as the Wisconsin Division of Criminal Investigation. All renderings were either at official request or similarly approved prior to presentation.

- ***Burn Barrel – North of Steven Avery Residence***

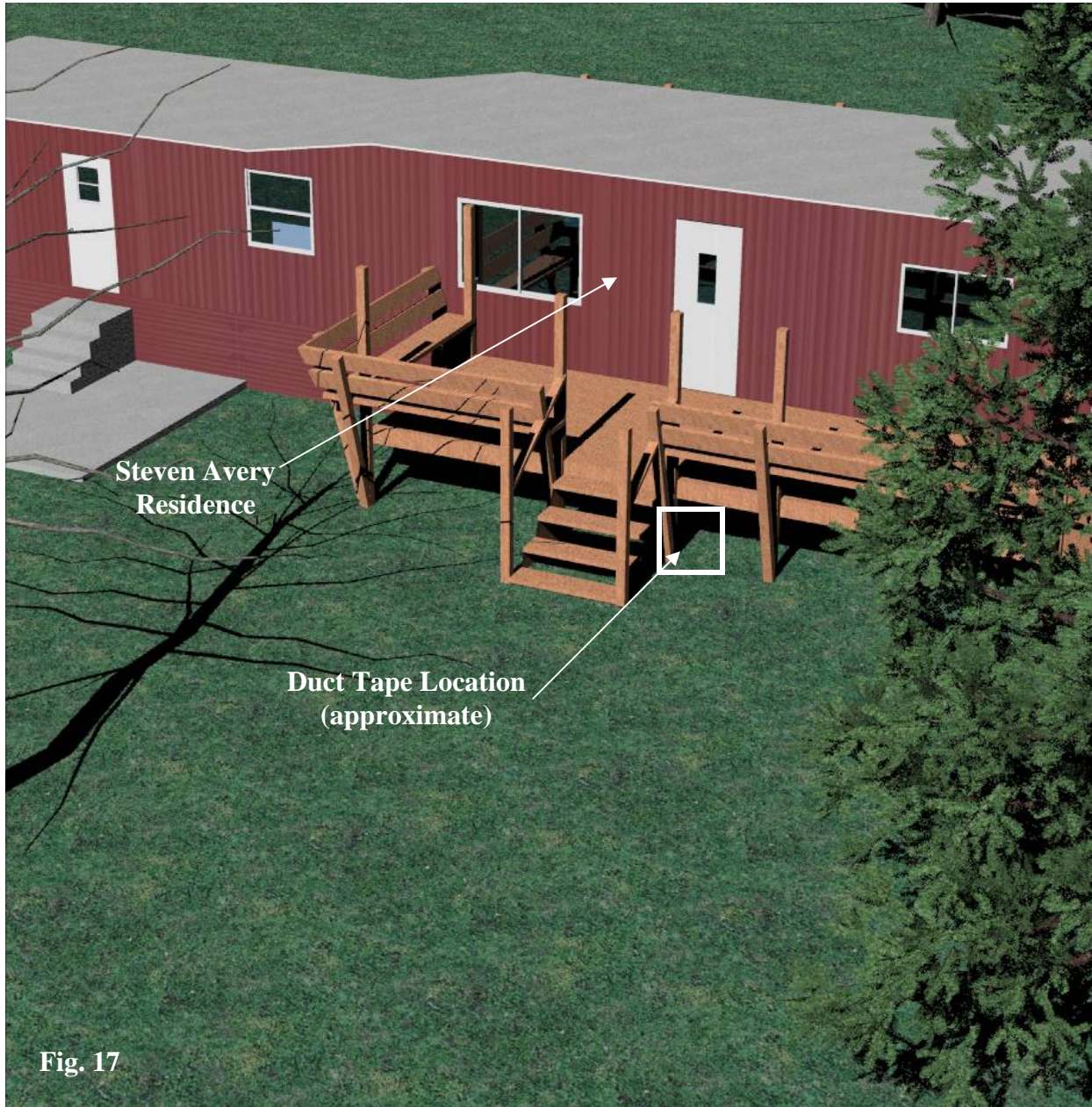
According to investigative reports provided by the Calumet County Sheriff's Department, items were located in the burn barrel positioned to the north of the Steven Avery residence (see Figure 16 below). The items therein were burnt and in several pieces. These identifiable items included the following:

1. Cellular Telephone
2. Digital Camera
3. Other Electronics



- ***Deck Area – Steven Avery Residence***

Narrative reports offer that a strip of duct tape was recovered from the ground immediately adjacent to a post supporting the deck surrounding the northerly portion of the Steven Avery residence. This item was not measured by the author, and therefore its placement is offered as an approximation based on photographs (see Figure 17 below).



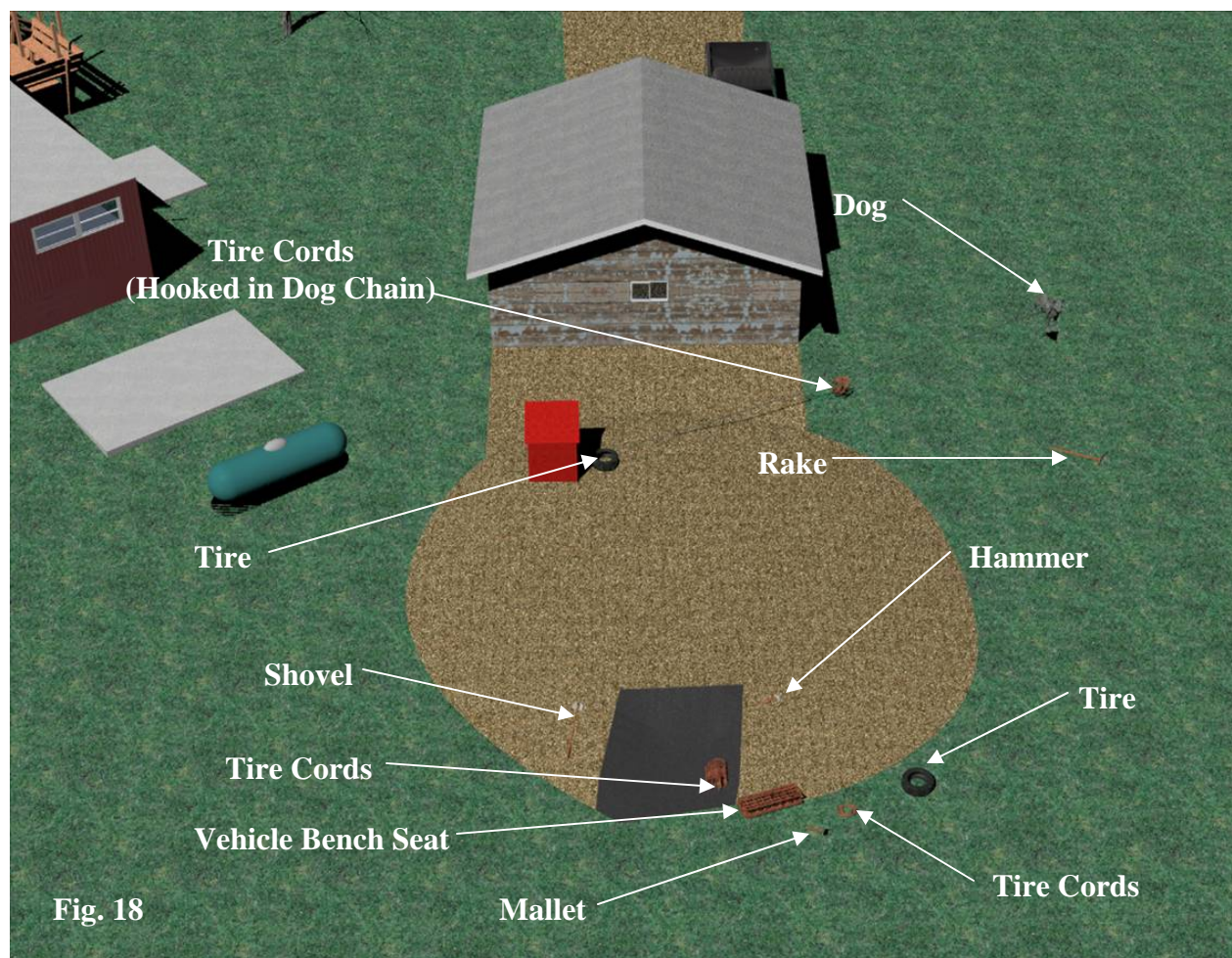
- ***Burn Area Behind Steven Avery Garage***

Items Located in and Near Burn Area

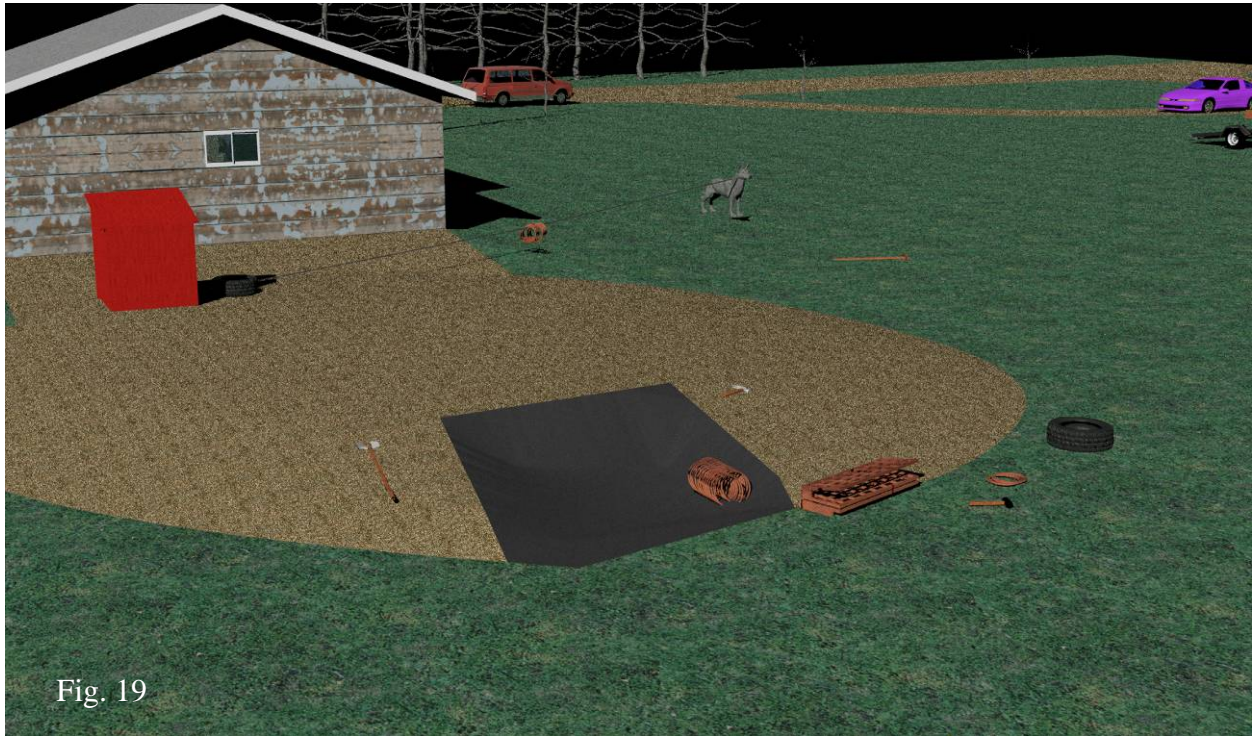
According to information obtained through narrative reports and from the author's original scene survey, several items were located in and adjacent to the burn area behind the Steven Avery garage (see Figure 18 below). These identified items include the following:

- | | |
|-----------------------|--------------------------|
| 1. Vehicle Bench Seat | 6. Rake |
| 2. Tire Cords | 7. Dog Chain |
| 3. Shovel | 8. Dog (German Shepherd) |
| 4. Mallet | 9. Tire |
| 5. Hammer | 10. Bone Fragments |

It is noted that of the above items, the vehicle bench seat, mallet, tire cords (immediate burn area) and rake were not measured by the author. Their placement is to be deemed as being approximate, and is based on photographs taken by Wisconsin State Patrol Trooper Reese. In addition, references to bone fragments are not shown below, but will be addressed under the later *Skeletal Models* topic discussion.



The following alternative views of the burn area behind the described garage are also offered (Figures 19 and 20):



Dog Chain

During the forensic mapping of the area behind the Steven Avery garage, the author stretched out the dog chain attached to a weight by the dog house. The intention was to determine how far from the structure and to what area(s) the animal was able to access. From its anchor point, the chain would have allowed the dog to traverse a circular path having a diameter of approximately 40 feet (see Figure 21 below). It is recognized that certain obstructions such as the garage, propane tank, terrain, and the dog house would have prevented the animal from reaching the full depicted circle.

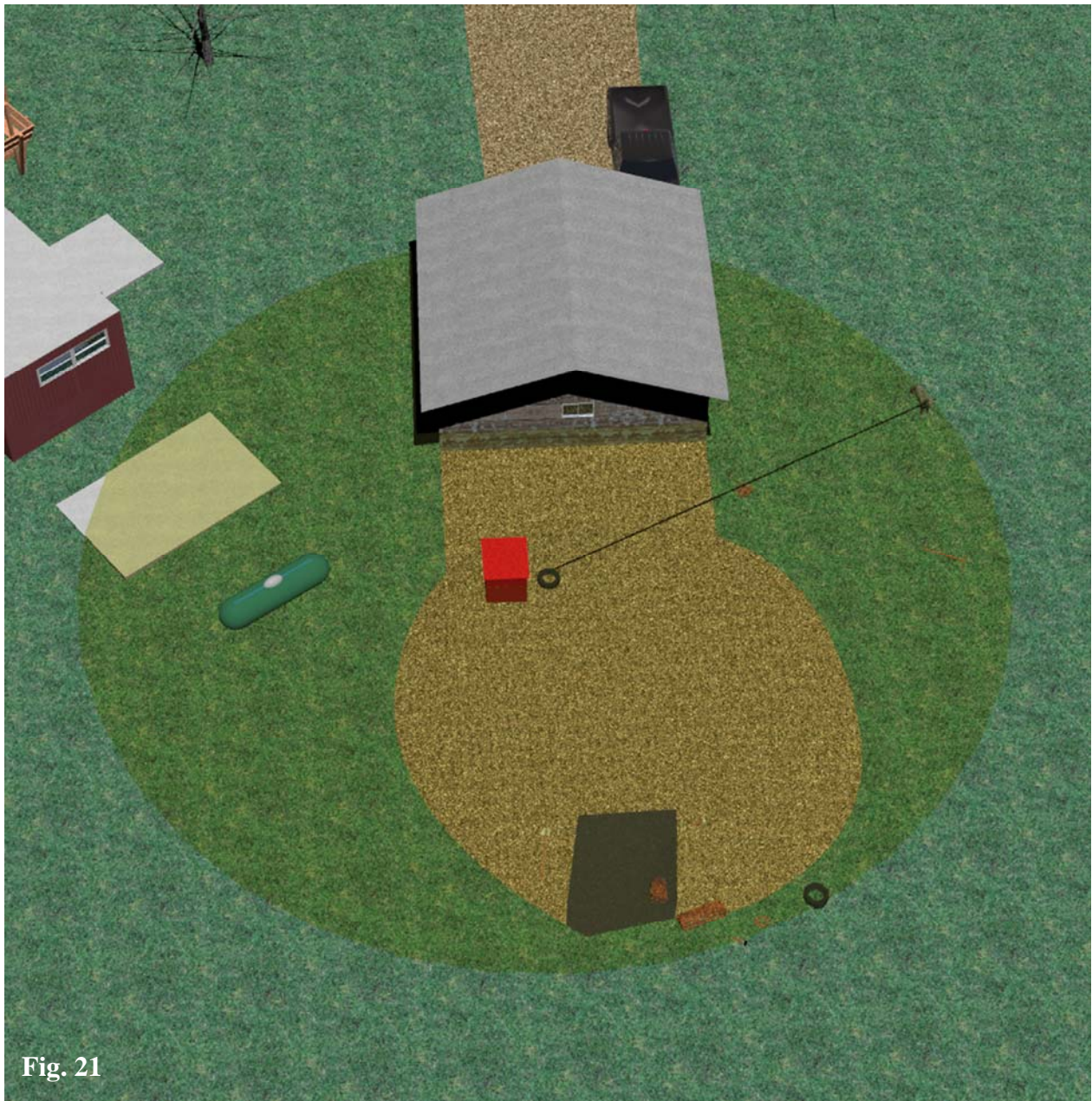
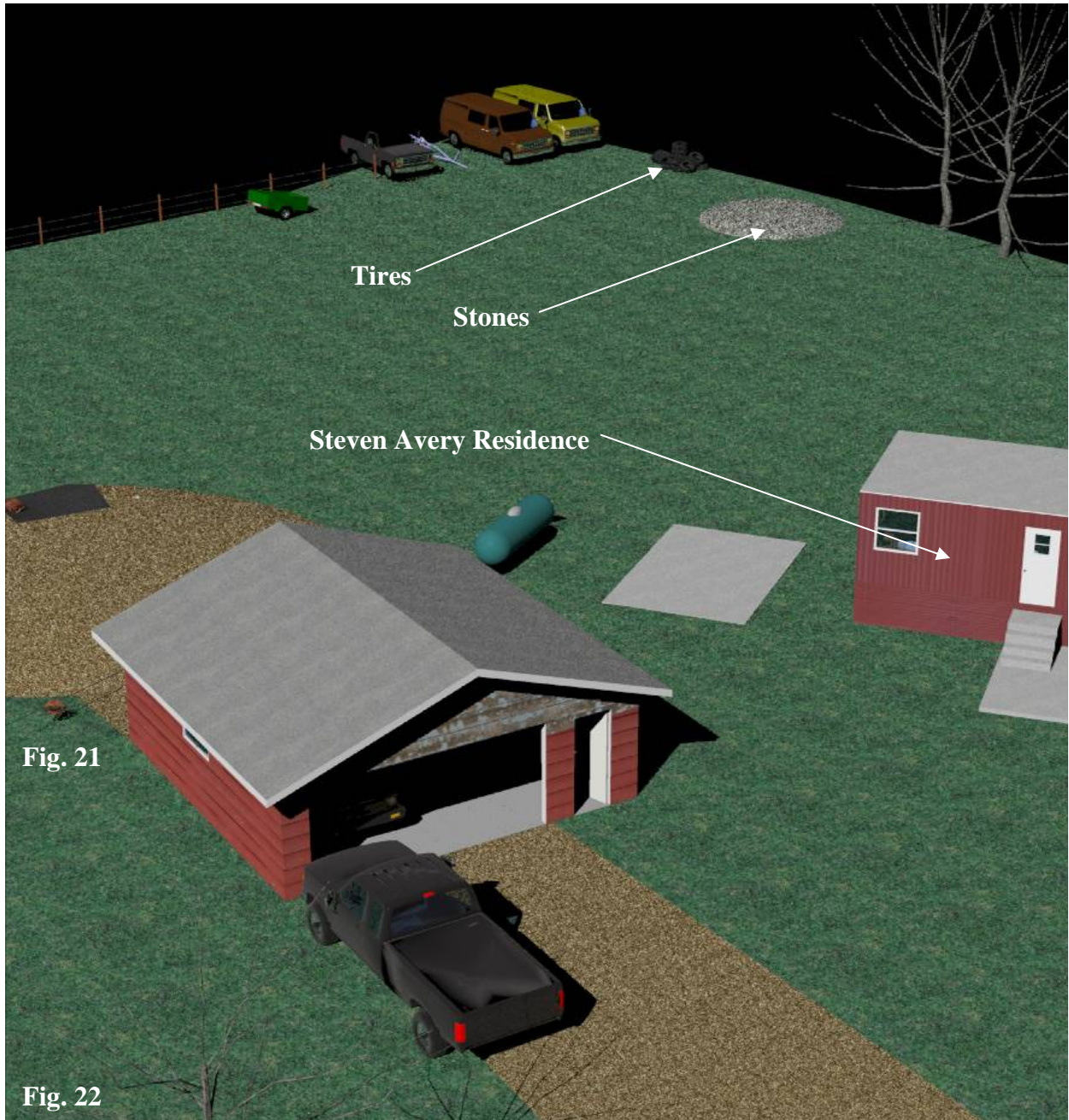


Fig. 21

- *Southwest Corner of Steven Avery Yard*

At the southwest corner of the Steven Avery yard, the Wisconsin State Patrol forensic mapping team, including the author, documented a pile of gravel and a nearby grouping of tires. The location of these items is depicted in the below model image (Figure 22).



- ***Burn Barrel(s) Behind Janda / Dassey Residence***

Four burn barrels positioned behind the Janda / Dassey residence were subsequently mapped for location (Figure 23). According to reports provided by the Calumet County Sheriff's Department, bone fragments were located in one of these containers.



- *Dodge Caravan*

According to narrative reports, the Dodge Caravan positioned adjacent to the driveway approaching the Steven Avery residence had indirect involvement in this incident. This vehicle was in place during the forensic mapping, and was located accordingly. It is detailed in the below model image (Figure 24).

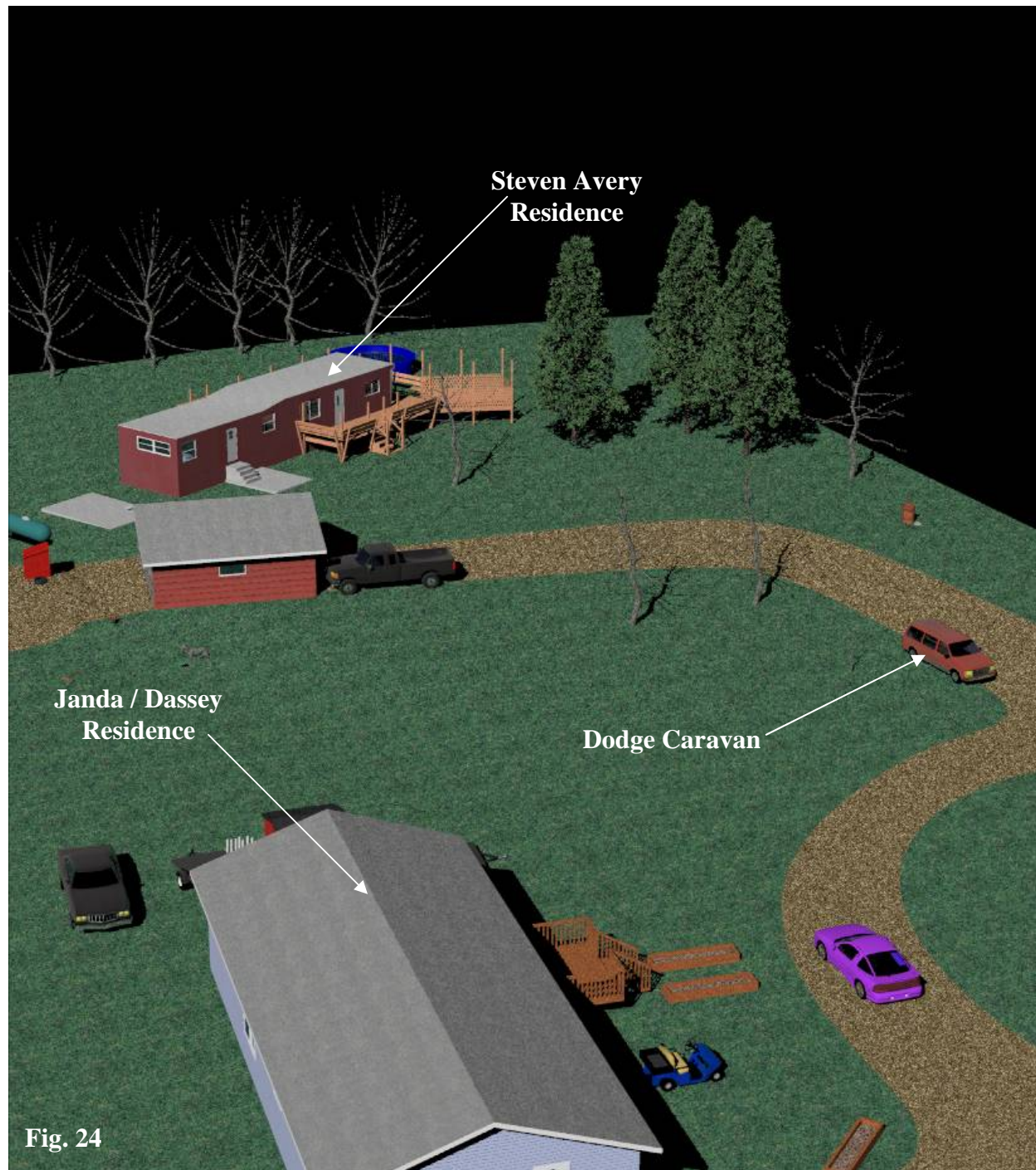


Fig. 24

- ***Vehicle Storage Area in North-Central Region of Salvage Yard***

License plates assigned to the Teresa Halbach RAV-4 were found by a law enforcement search team in a station wagon located immediately next to a fence in the north-central region of the salvage yard. It is noted that the author was nearby when this discovery was made. Forensic mapping personnel from the State Patrol, with authorization from the State Crime Laboratory, began to mark the location of this vehicle and those surrounding it shortly thereafter. The position of the station wagon is south of the road/driveway leading from the primary Avery business building to the Steven Avery and Janda / Dassey residences (Figures 25 and 26).

This area was not modeled using the Forensic3D software package, however it was diagrammed using CADZone for scaled visual reference and noted in aerial imagery.

Wisconsin State Patrol pilot Trooper Dennis McConnell aerial photograph:



CADZone 2-D Diagram:

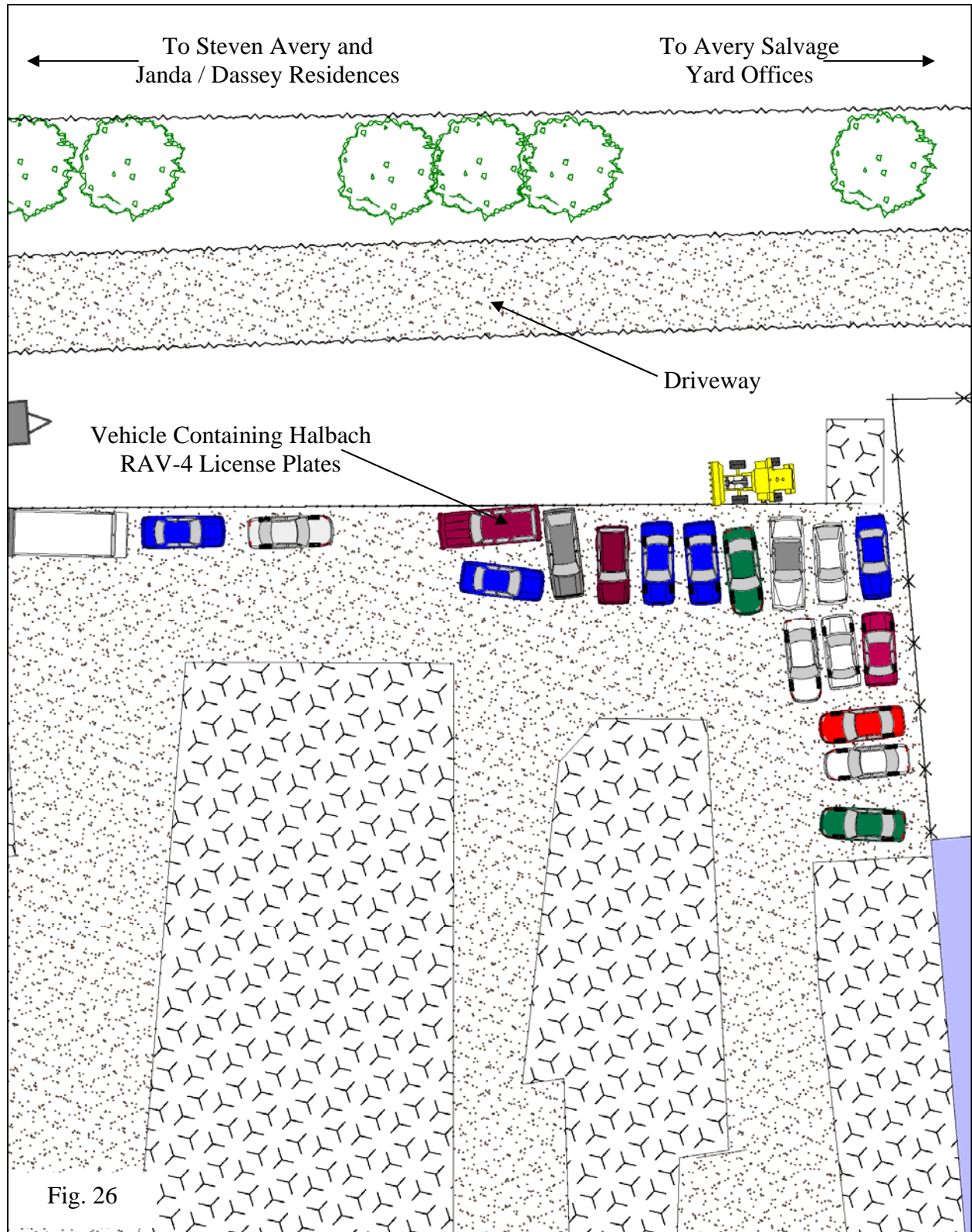


Fig. 26

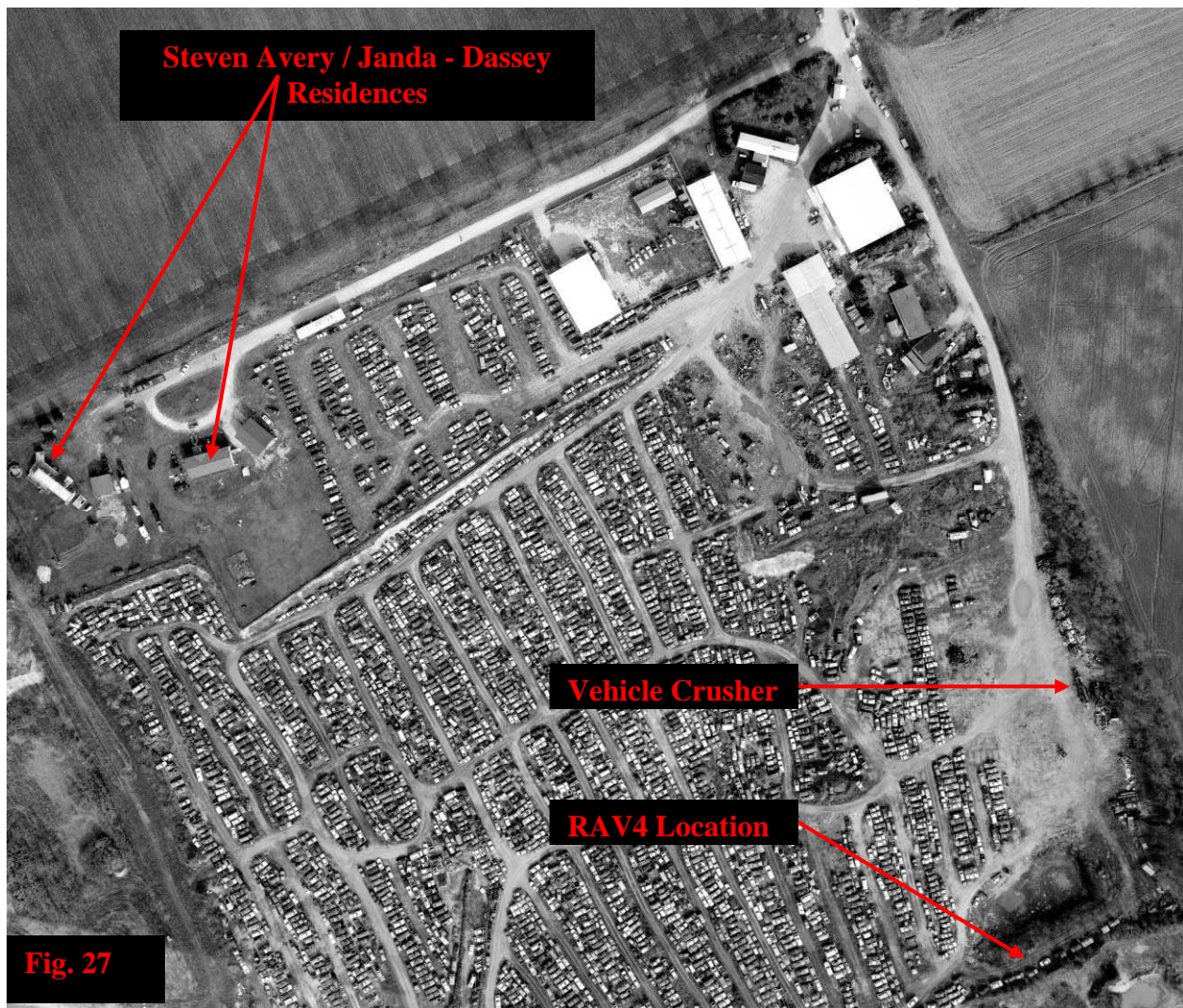
- ***Vehicle Storage Area in South-Eastern Region of Salvage Yard***

In the far southeast corner of the Avery Salvage Yard, the following items were specifically located during the forensic mapping process (Figures 27 through 30):

1. Teresa Halbach RAV-4
2. Vehicle Crusher

As was in the previous subtopic discussion, this area was not modeled in three dimensions. Rather, it was documented using CADZone diagramming software. In the aerial images below and following, it is noted that the vehicle was removed prior to the photographic flights. However, the general locations of the RAV-4 and vehicle crusher have been noted by the author.

Wisconsin Department of Transportation Aerial Photograph:



Wisconsin Department of Transportation Aerial Photograph:



Fig. 28

Wisconsin State Patrol Pilot Trooper Dennis McConnell aerial photograph:



Fig. 29

CADZone 2-D Diagram:

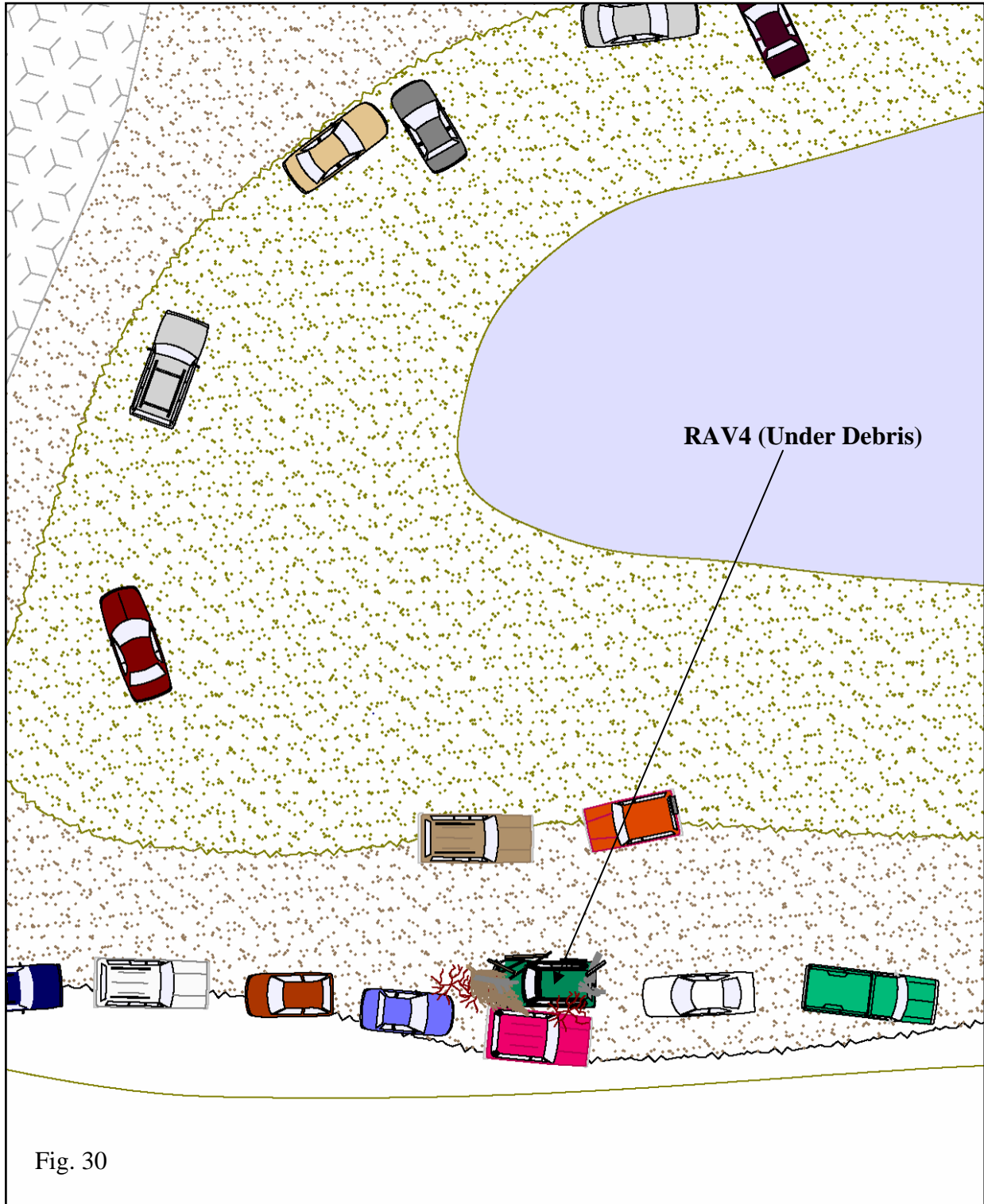


Fig. 30

STEVEN AVERY RESIDENCE INTERIOR MODEL DETAILS

As with the exterior models, it is also possible to detail the interiors of select buildings. In particular, the Avery residence and garage were measured to such degree that scaled representations can be made. In this section, the interior portions of the residence will be discussed and presented. It is noted that at the request of investigation personnel, due to the approaching expiration of the November 2005 search warrant, the northernmost areas of the residence were not detailed. As such, although the walls are present in their proper positions, the kitchen, dining area, and northern section of the living room do not have furniture placement (Figure 31).

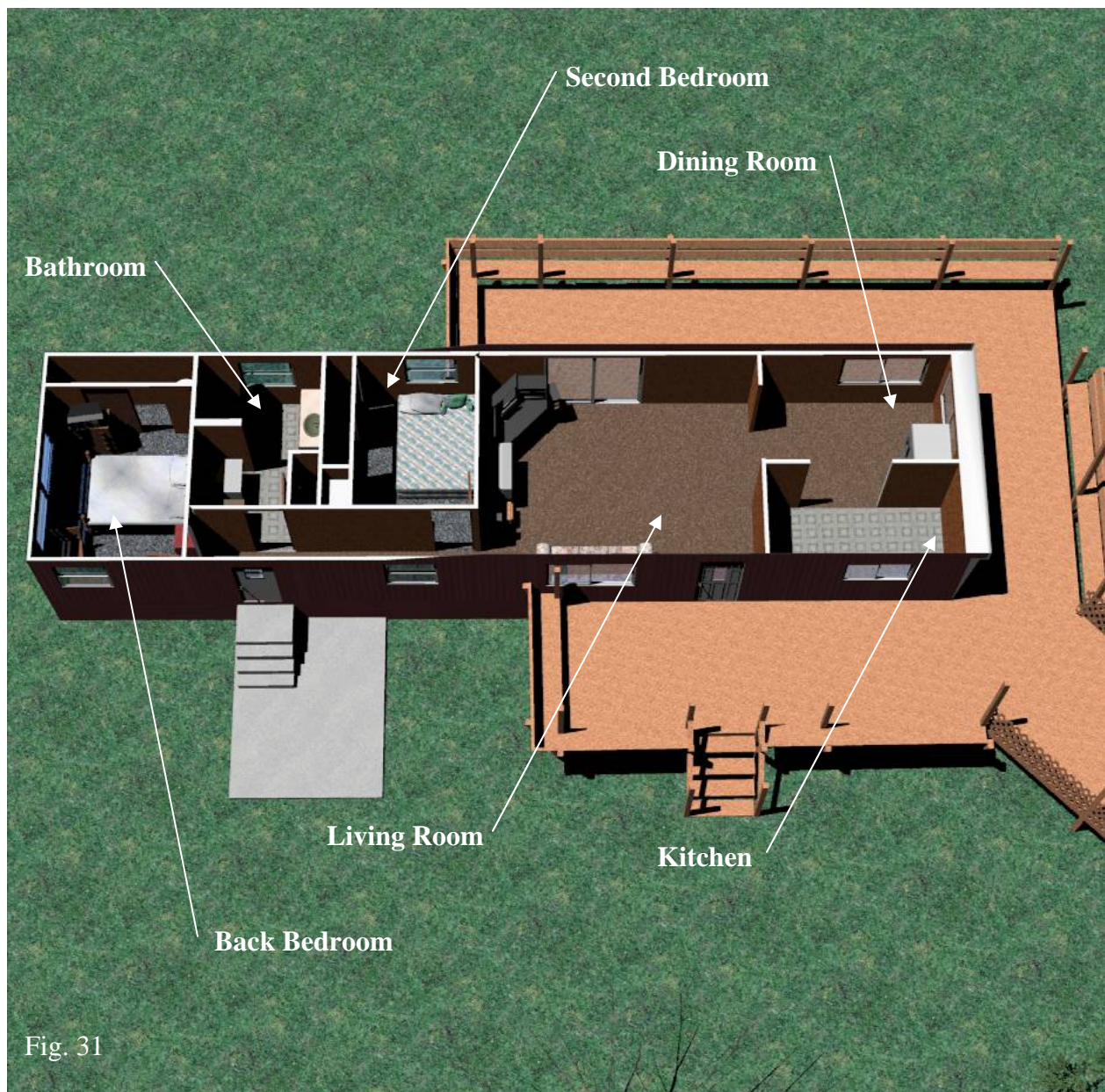


Fig. 31

- ***Back Bedroom***

Firearms

According to narrative reports, two rifles were removed from a gun rack located on the back bedroom's north wall. These rifles were removed prior to the author's measuring of the scene. Therefore, their placement is approximate and based on photographic evidence (Figure 32).

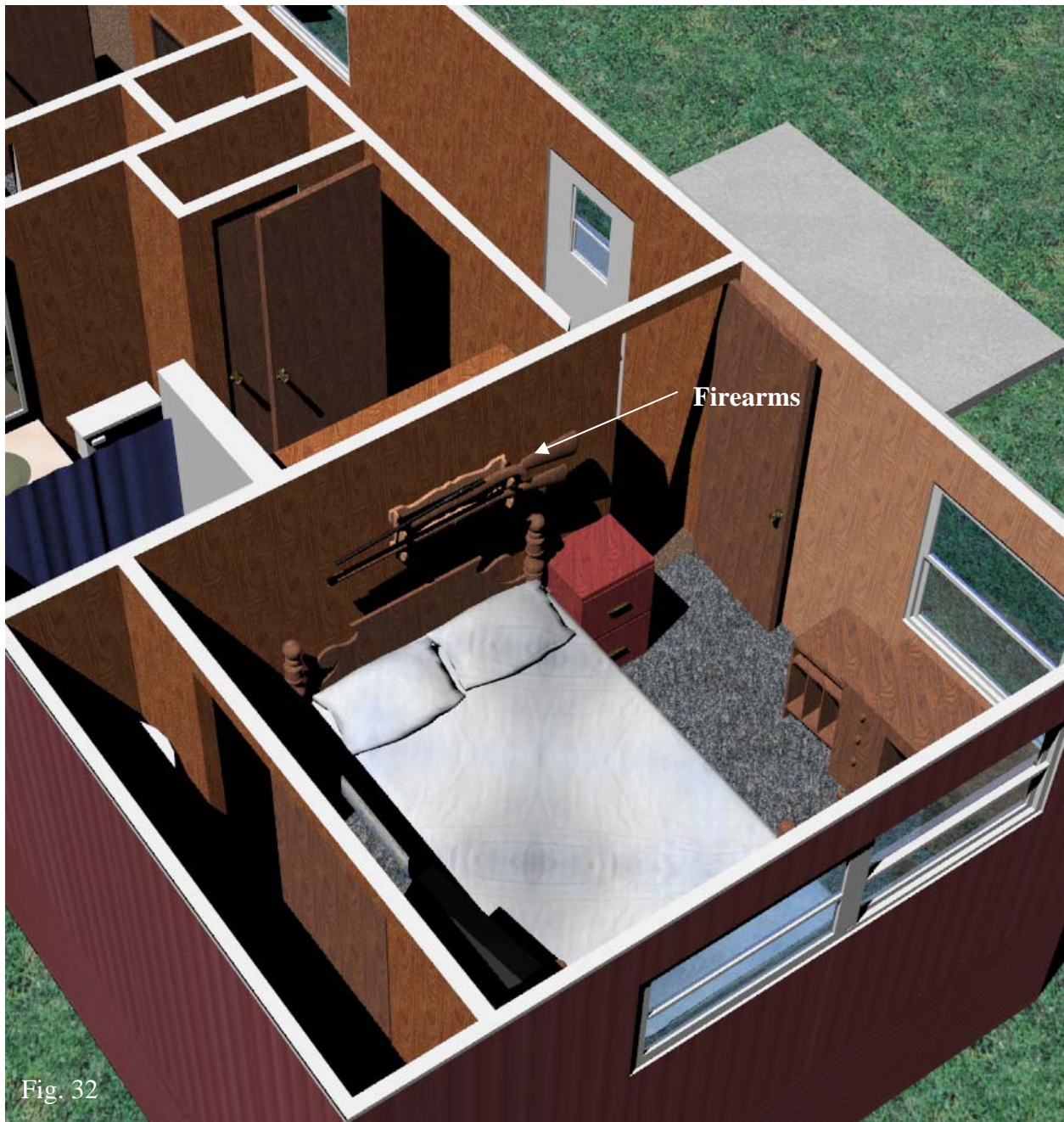


Fig. 32

Desk

Information from law enforcement officials indicates that .22 caliber cartridges were located in a desk positioned in the southeastern corner of the back bedroom. The location of this desk is illustrated in the below model (Figure 33):



Nightstand

Items seized from the nightstand include the following:

1. Handcuffs
2. Leg Irons

This piece of furniture was positioned on the north bedroom wall, immediately adjacent to the bed (Fig. 34).

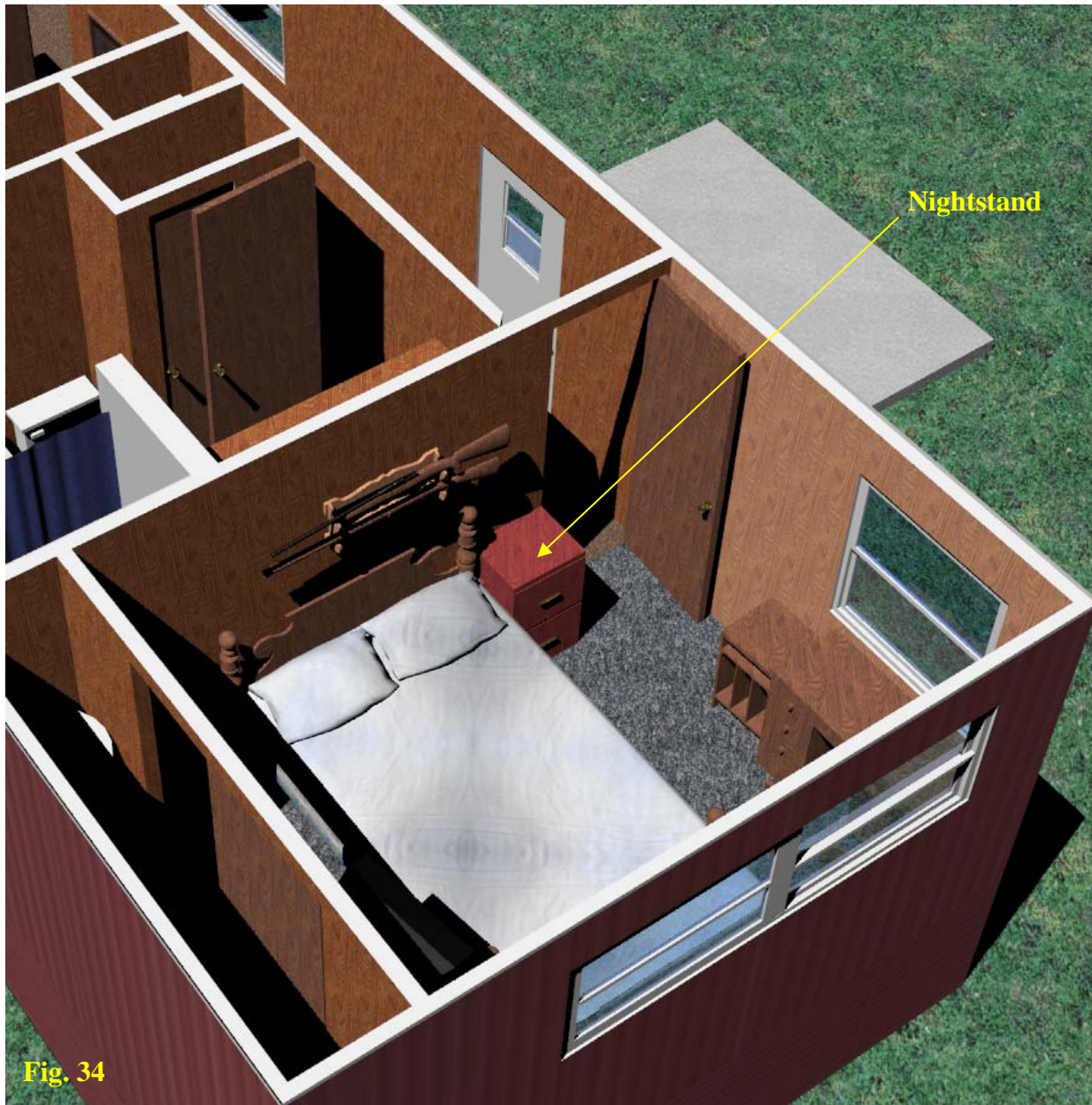


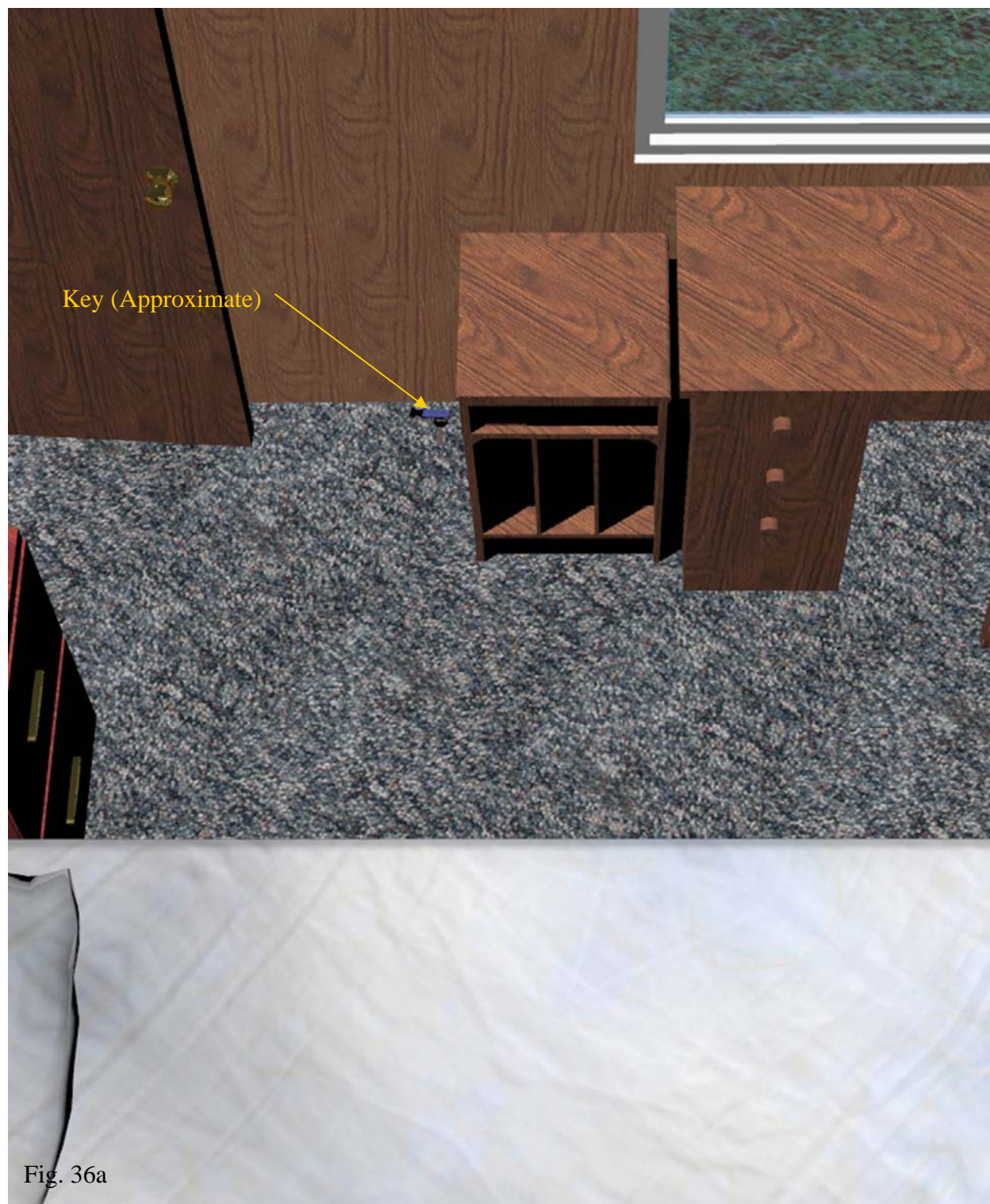
Fig. 34

Bookcase

A bookcase next to the desk on the east bedroom wall was noted by both the author and investigators (Figure 35).



During their search of the bedroom, law enforcement officials located a key on the floor near the back of the bookcase. It was also noted that the back panel on this particular piece of furniture was damaged. (Figure 36a).



A close-up view of the key area was also generated as follows (Figure 36b):



- ***Bathroom***

Evidentiary swabs were collected from areas of the bathroom by investigators. In addition, reports and photographs offer that bleach was located on a shelf above the dryer (Figure 37).



Fig. 37

- *Second Bedroom*

Information presented to the author by the Calumet County Sheriff's Department indicates that duct tape was found in the second bedroom. The item(s) was on the dresser, near the room's south wall (Figure 38).



Fig 38

- *Living Room*

Couch

During the author's examination of the living room, it was noted that swatches of fabric had been removed from the couch. This piece of furniture was positioned against the east wall, to the south of the main entrance door (Figure 39). It is again stated that not all furniture items in the living room were located due to time constraints and the direction of investigative personnel.



Computer Desk

The following items were collected from the computer desk situated in the southwest corner of the living room (Fig. 40):

1. Computer
2. "Auto Trader" Magazine
3. Handwritten Note
4. Sale Sign with Writing on Back
5. Bill of Sale



Fig. 40

STEVEN AVERY GARAGE MODEL DETAILS

After investigators had completed the processing of the Steven Avery garage, the interior and locations of prominent items were forensically mapped using one of the two Geodimeter Total Stations. As such, the larger items were documented, including a Suzuki Samurai sport utility vehicle, snowmobiles, a John Deere tractor, air compressors, a welder, a freezer, and other such pieces (Figure 41). For the visualization purposes, the roof and portions of the north wall have been removed.



Fig. 41

During this time, it was noted that investigators had marked certain locations on the garage's concrete floor with either white chalk or yellow paint crayon. These areas, which were circular outlines, were also measured (Figures 42 and 43).

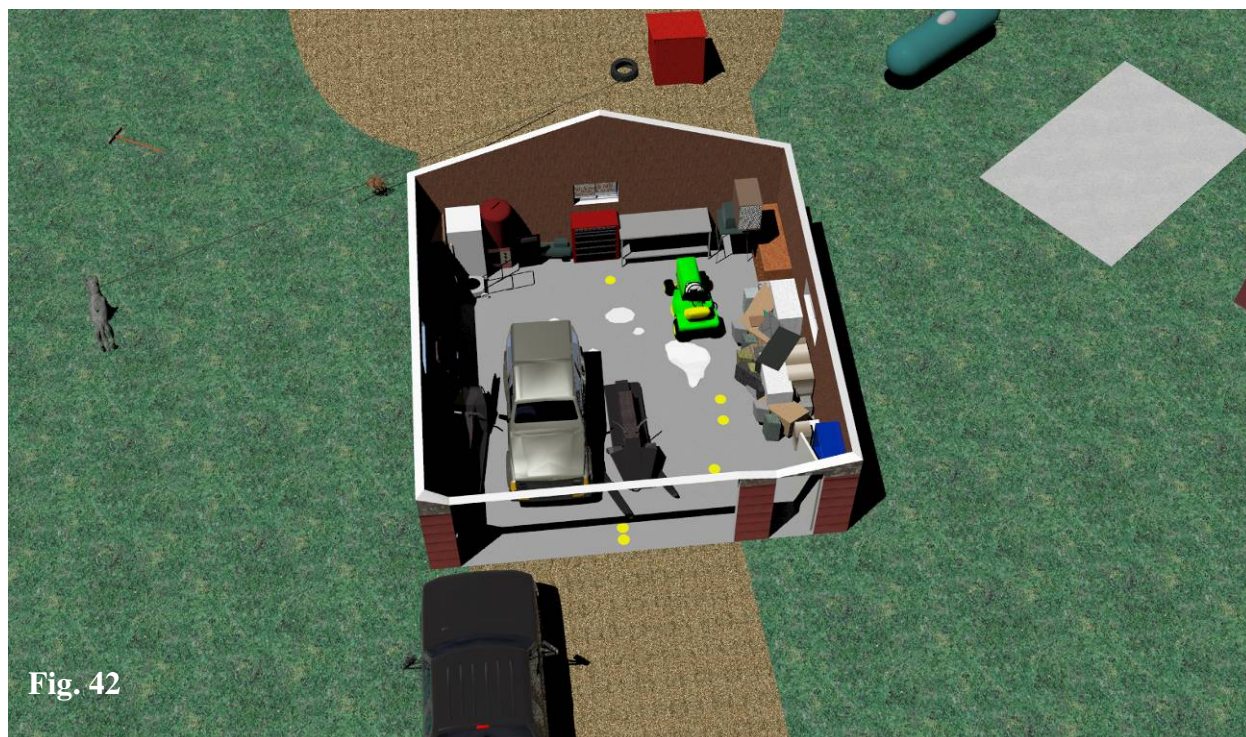


Fig. 42

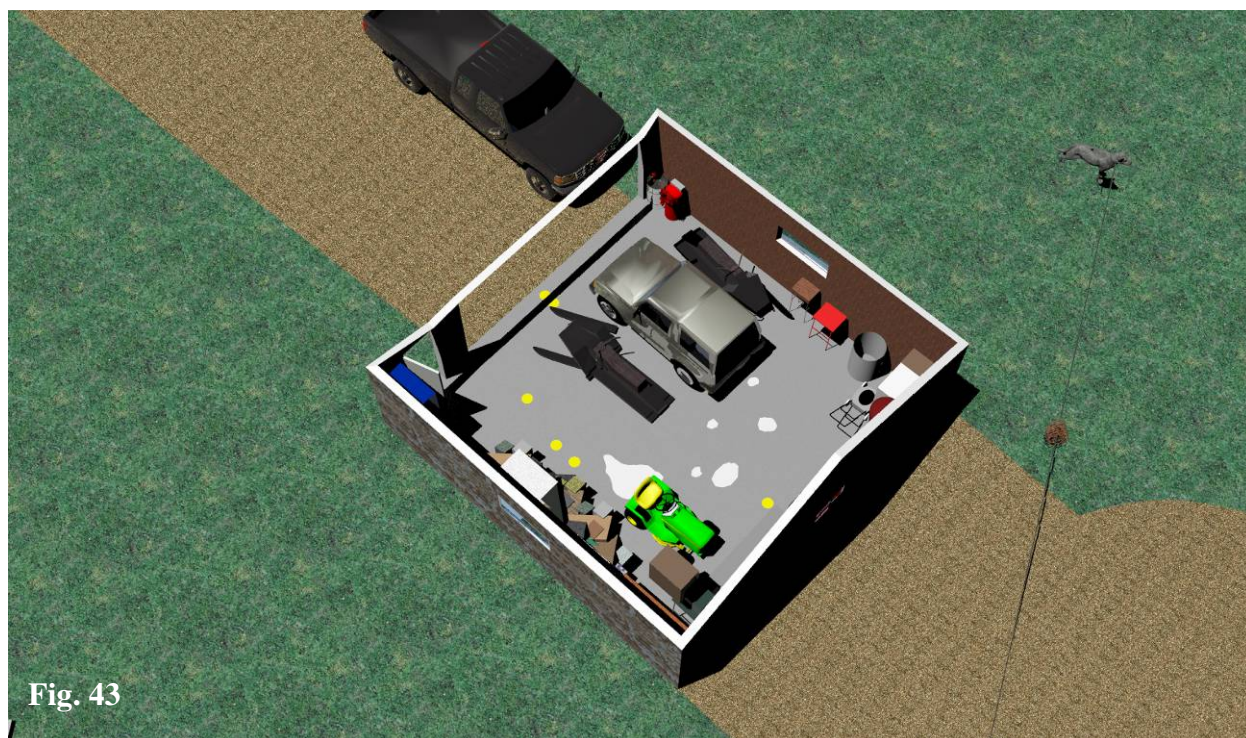


Fig. 43

Observations were also made of marks on a roof truss directly above one of the white chalk outlines on the floor. These marks were suggestive of an item having been hung from the truss. To provide a visualization of this notation, the rearmost trusses were mapped with the total station, and subsequently placed in the garage model. The location wherein the described marks were observed was shaded blue to make that particular area differ from the remainder of the truss(es) (Figure 44).

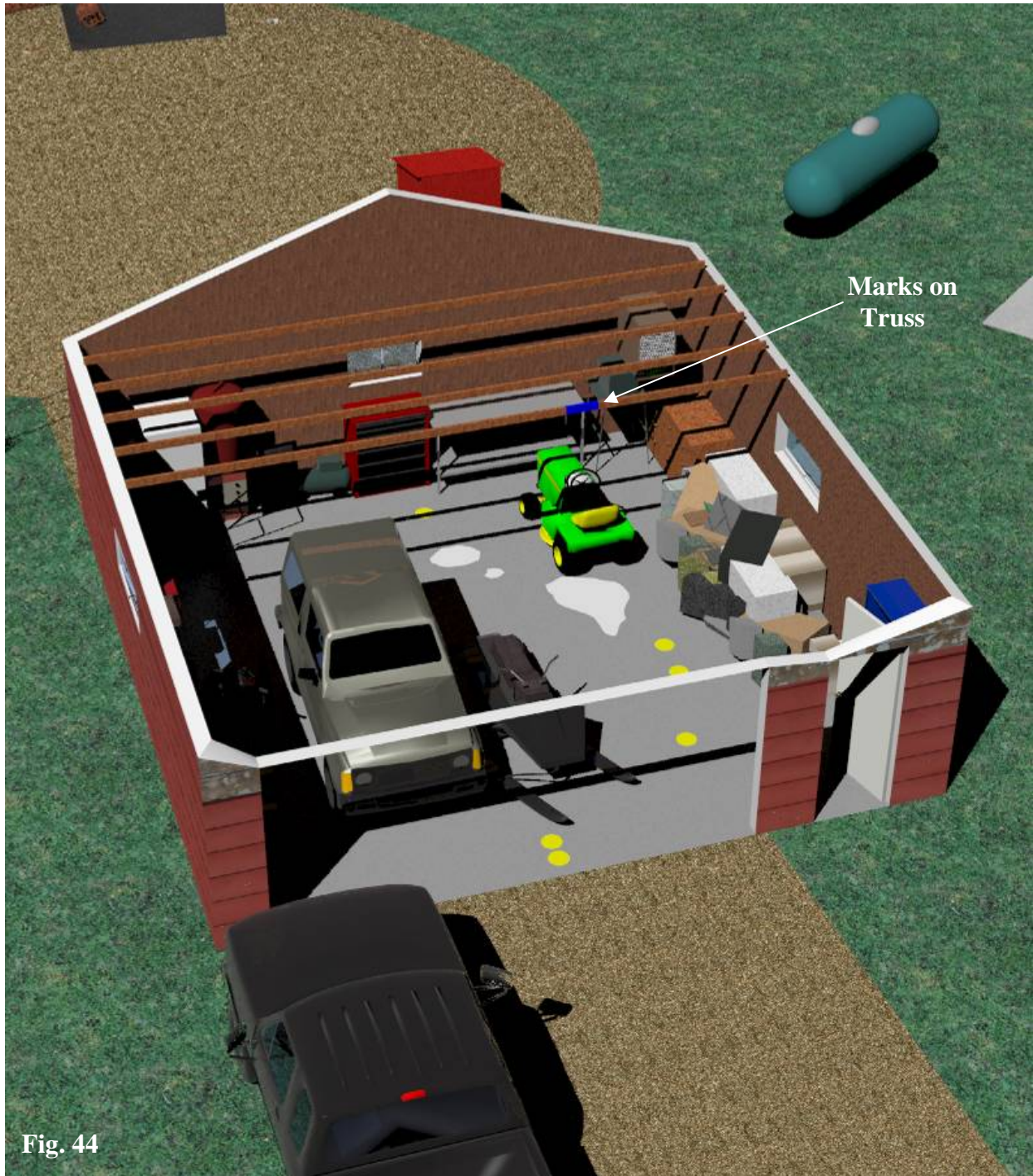


Fig. 44

Reports submitted to the author by the Calumet County Sheriff's Department offer that investigators returned to the Steven Avery garage in March of 2006. During this time, additional evidence was recovered. In the narrative written by Sheriff's Investigator Steier, measurements were documented concerning the following items (Figure 45):

1. Black Jack Creeper (shown below)
2. Clean Strip Paint Thinner (shown below)
3. Six (6) Chalked Areas on Cement Floor (previously measured with total station)
4. Two (2) Yellow Circles on Cement Floor (previously measured with total station)



Other items were collected during this March 2006 search, including those listed below. It is noted that while numerous property items were collected, it is only those with documented measurements that were considered by the author for diagramming purposes. In the following model, the seized items are denoted by the evidence marker number assigned in the narrative report (Figure 46). Note that the Samurai and one snowmobile have been removed and that the workbench and air compressor have been given a level of transparency in order to view evidence markers under them.

- | | |
|-----------------------------------|-----------------------------------|
| 1. Marker 9 – Bullet Fragment | 9. Marker 25 – Brass Shell Casing |
| 2. Marker 10 – Brass Shell Casing | 10. Marker 1A – Yardstick |
| 3. Marker 11 – Brass Shell Casing | 11. Marker 24A – Control Swab |
| 4. Marker 17 – Unknown Substance | 12. Marker 24B – Control Swab |
| 5. Marker 18A – Dried Red Stain | 13. Marker 24C – Dried Stain Swab |
| 6. Marker 19 – Silver Box Cutter | 14. Marker 24D – Red Stain Swab |
| 7. Marker 20 – Yellow Gloves | 15. Marker 24E – Dried Stain Swab |
| 8. Marker 23A – Bullet Fragment | |



Fig 46

THREE-DIMENSIONAL VEHICLE MODELING

At the request of the author, Specialist Carl Adrian from the Structural Design Unit of the Federal Bureau of Investigation in Quantico, Virginia was contacted to perform an interior scan of the Halbach RAV-4. On November 15, 2006, using specialized equipment such as a Faro Arm and a Faro Laser Scanner, specialists were able to generate a series of point clouds depicting given aspects of the vehicle. As of this writing, the FBI is currently processing this data with the intention of forwarding the completed model. It is the intention of the author to use that model to prepare renderings of the vehicle depicting identified areas of evidentiary value.

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SKELETAL MODELS

The following section is based on the examination analysis and report of Forensic Anthropologist Dr. Leslie Eisenberg, PhD., and evidence catalogs provided by the Calumet County Sheriff's Department. The stated purpose is to graphically illustrate the human bones that could be identified anthropologically by the various fragments located by investigators. It is noted that in nearly every situation, only fragmentary pieces were found. Textual references in the following section were a joint effort on the part of the author and Dr. Eisenberg.

- **Introduction – Three Dimensional Skeletal Models**

During the course of this investigation, law enforcement officials located fragmentary pieces of human and non-human bone in several locations both on and off of the Avery property and those areas contiguous to it. Narrative reports indicate that those items were turned over to Forensic Anthropologist Dr. Leslie Eisenberg for sorting, identification, and analysis. Many fragments were determined to be of human origin, with some being diagnostic. In other words, some of the fragments found by investigators were identifiable as being from specific human bones.

For this portion of the author's work, the intention is to graphically illustrate the identifiable bones represented by the diagnostic fragments through three-dimensional models. It is again stated that in most situations, only one or more fragments of a particular bone were found by scene investigators and later identified by Dr. Eisenberg. However, for demonstrative purposes, in order to illustrate where the particular bone is located, the entire bone is highlighted in the three-dimensional model(s). This should not be interpreted so as to state that the entire bone is in the possession of law enforcement personnel, but rather that only fragments of the highlighted bones were recovered.



Fig 47

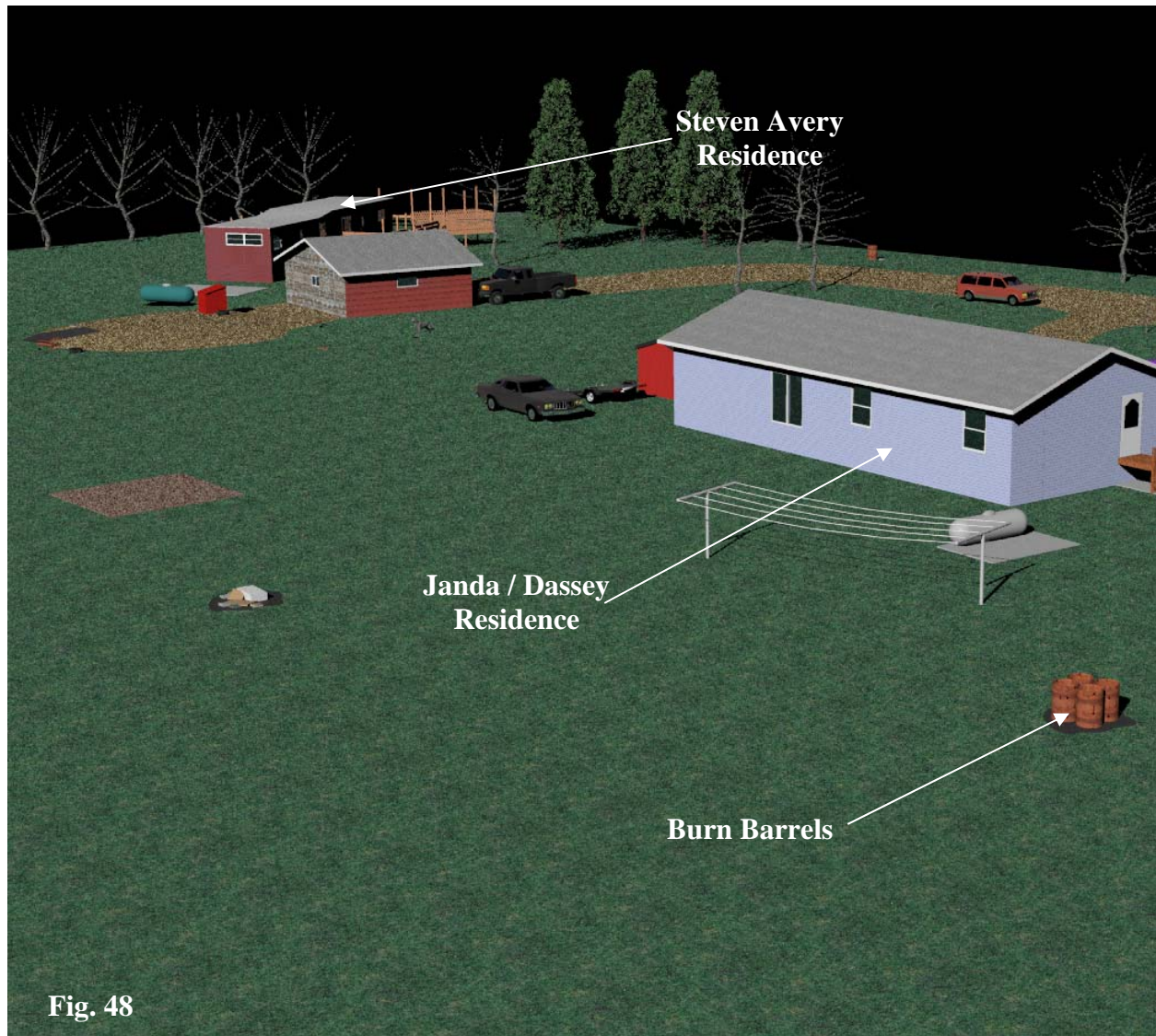
In creating the described models, anatomically correct and articulated skeletal models were obtained from the Structural Design Unit of the Federal Bureau of Investigation in Quantico, Virginia (see Figure 47 at above right). These models were subsequently textured in the Forensic3D software package, and ultimately rendered accordingly. To illustrate the bones represented by found fragments, the particular area was highlighted in blue. For segments of the complete bone that were identified such as shafts, head epiphysis, facets, and the like, individual sections were colored. The intention here is not to offer interpretation or analysis, but rather to provide a graphical representation of the bones identified through the fragmentary pieces.

To illustrate the represented fragments, the author personally met with Dr. Eisenberg at the Dane County Coroner's office in Madison, Wisconsin on December 1, 2006. Here, using the skeletal models provided by the Federal Bureau of Investigation, the Forensic Anthropologist identified the represented bones to the author for diagramming purposes. Furthermore, when specific or general portions of the bones were identified, Dr. Eisenberg presented her findings through description and professional reference. All of the following skeletal images were submitted to the Forensic Anthropologist and subsequently approved. It should again be stated that the author does not have expertise in bone identification, and that the prepared models were generated under the supervision of Dr. Eisenberg. Any incident scene graphics presented under this section were completed by the author.

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- *Burn Barrel(s)*

The first series of bone fragments discussed herein will concern those located by investigators in the area of four burn barrels behind the Janda / Dassey residence (Figure 48).

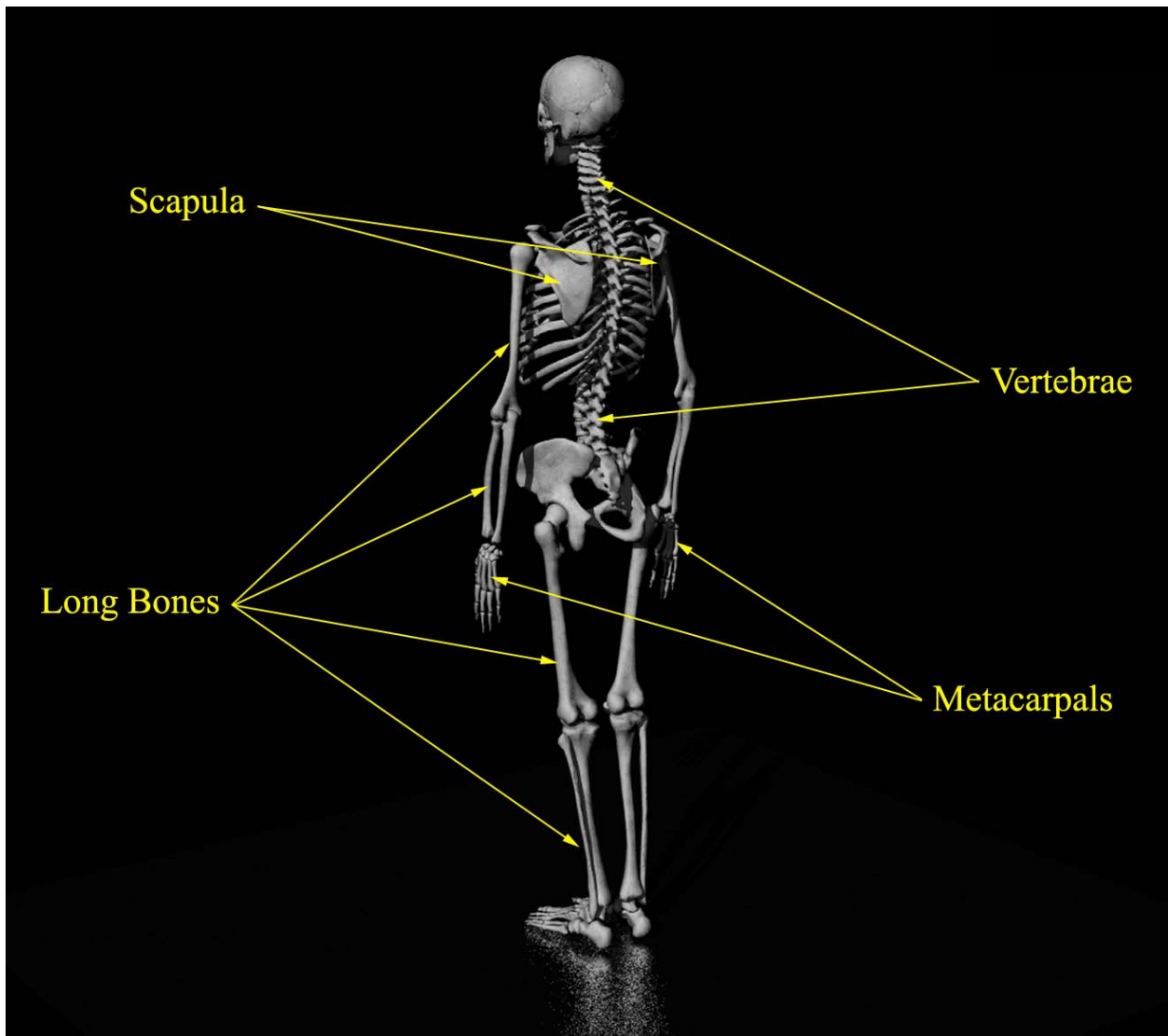


Evidence Tag Number 7964

Evidence Tag 7964, which consisted of items located in one of the four burn barrels found behind the Janda residence, represented the following bones:

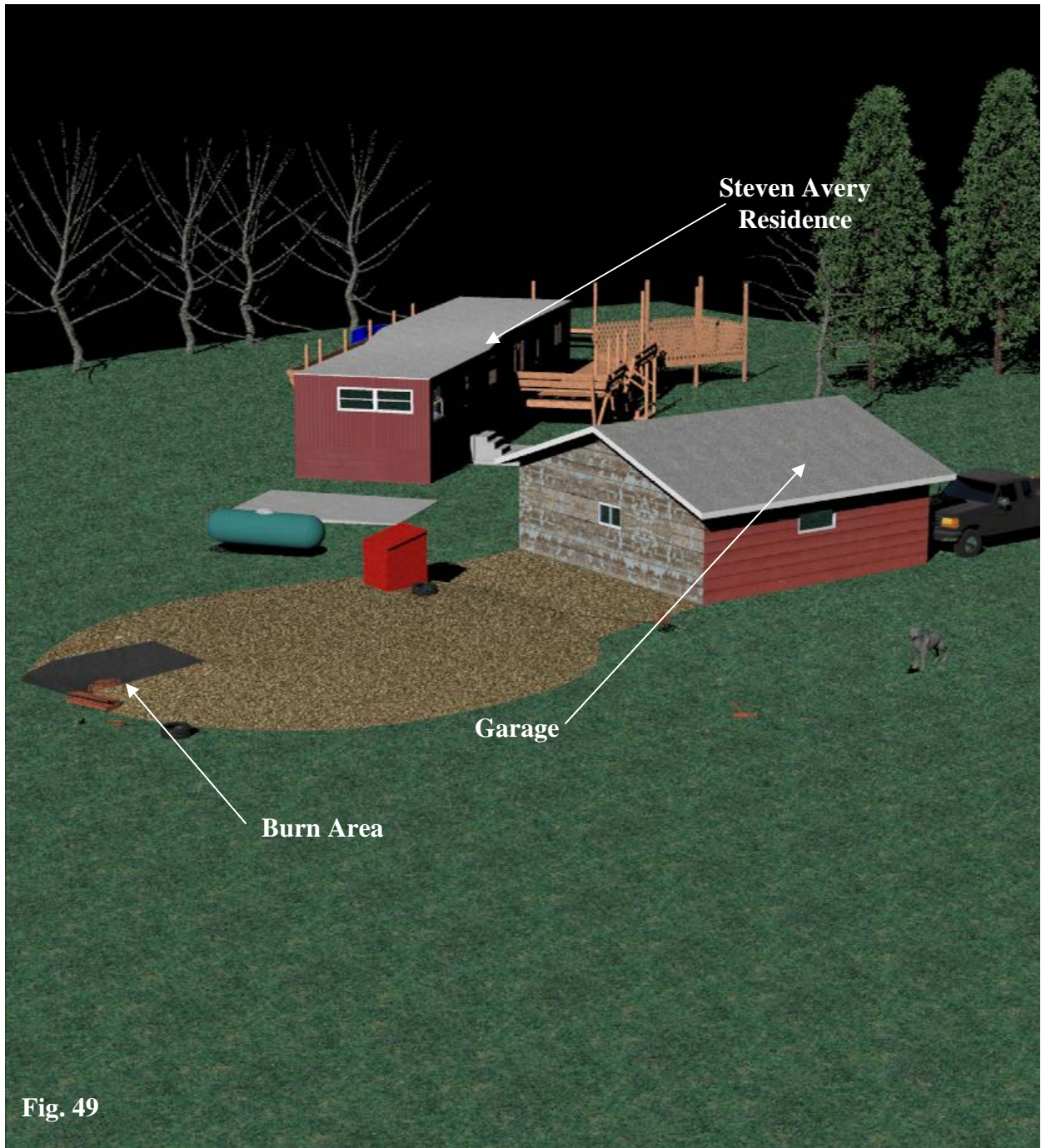
1. Long Bone Shaft Fragments
2. A Possible Metacarpal Fragment
3. Vertebral Fragments
4. A Scapula Fragment

In her narrative reports, Dr. Eisenberg indicates that one of the possible human long bone fragments exhibits cut marks. As identifications of such a nature fall outside of this author's expertise, the reports prepared by the Forensic Anthropologist should be referenced for bone condition.



- *Burn Area Behind Avery Garage*

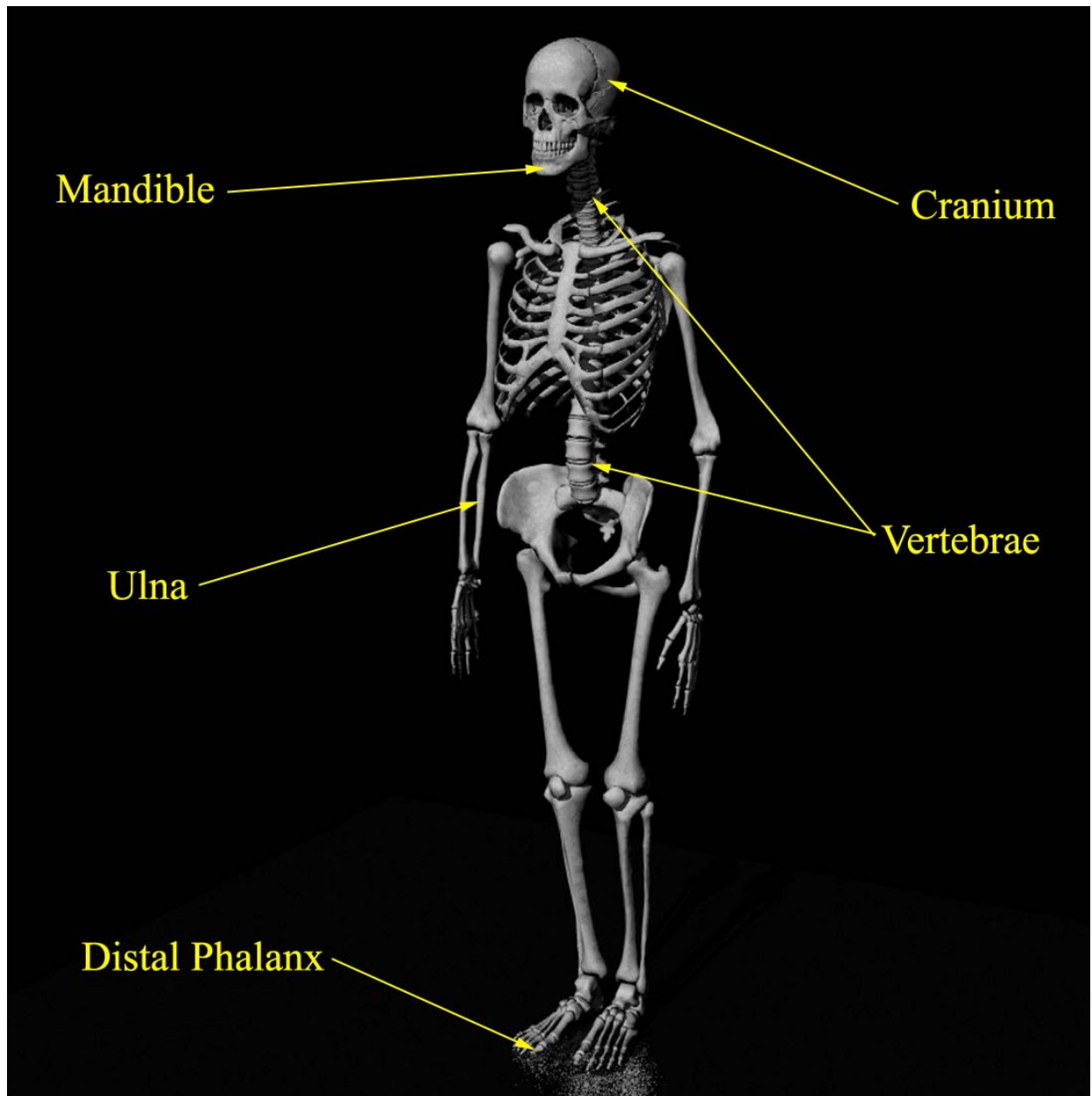
The second series of bone fragments that will be addressed will be in reference to those located in and surrounding the burn area behind the garage immediately adjacent to the Steven Avery residence (see Figure 49 below).



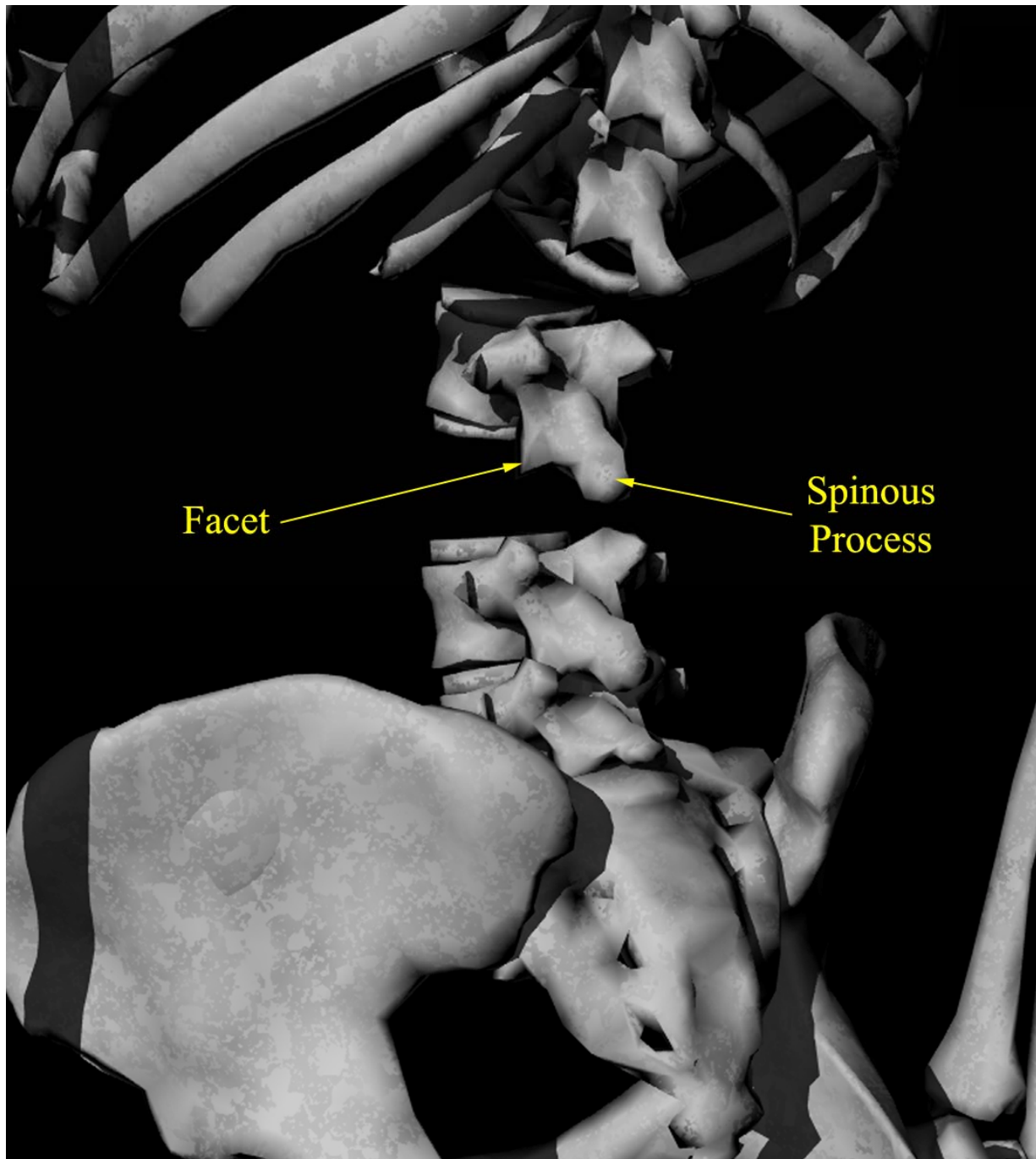
Evidence Tag Number 6197

Evidence Tag 6197, which was collected from the burn area behind the Avery garage, consisted of fragments representing the following bones:

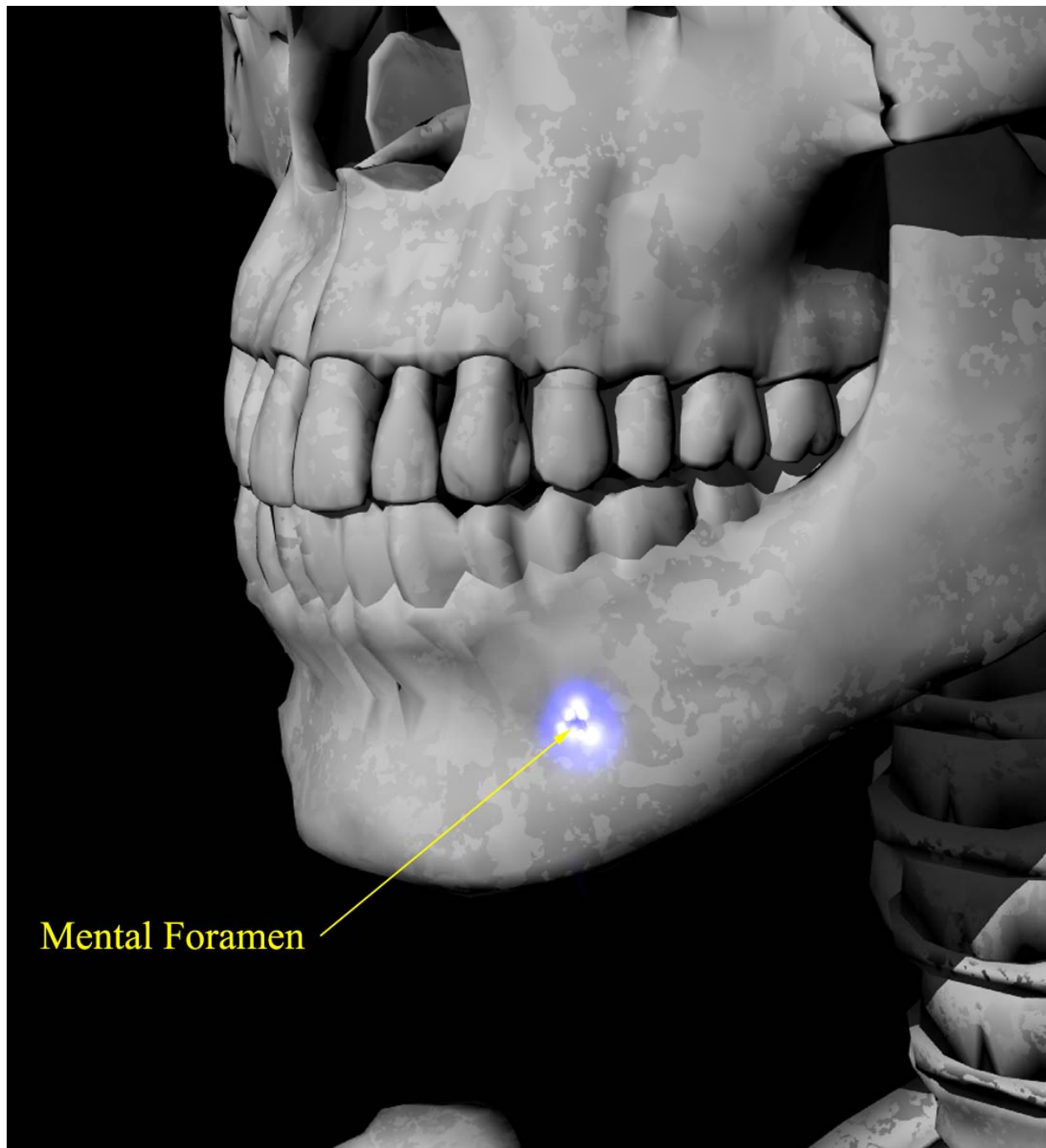
1. Distal Phalanx
2. Proximal Ulna Fragment
3. Mandible Fragment
4. Vertebral Fragments (Eight)
5. Cranial Fragments (Three)



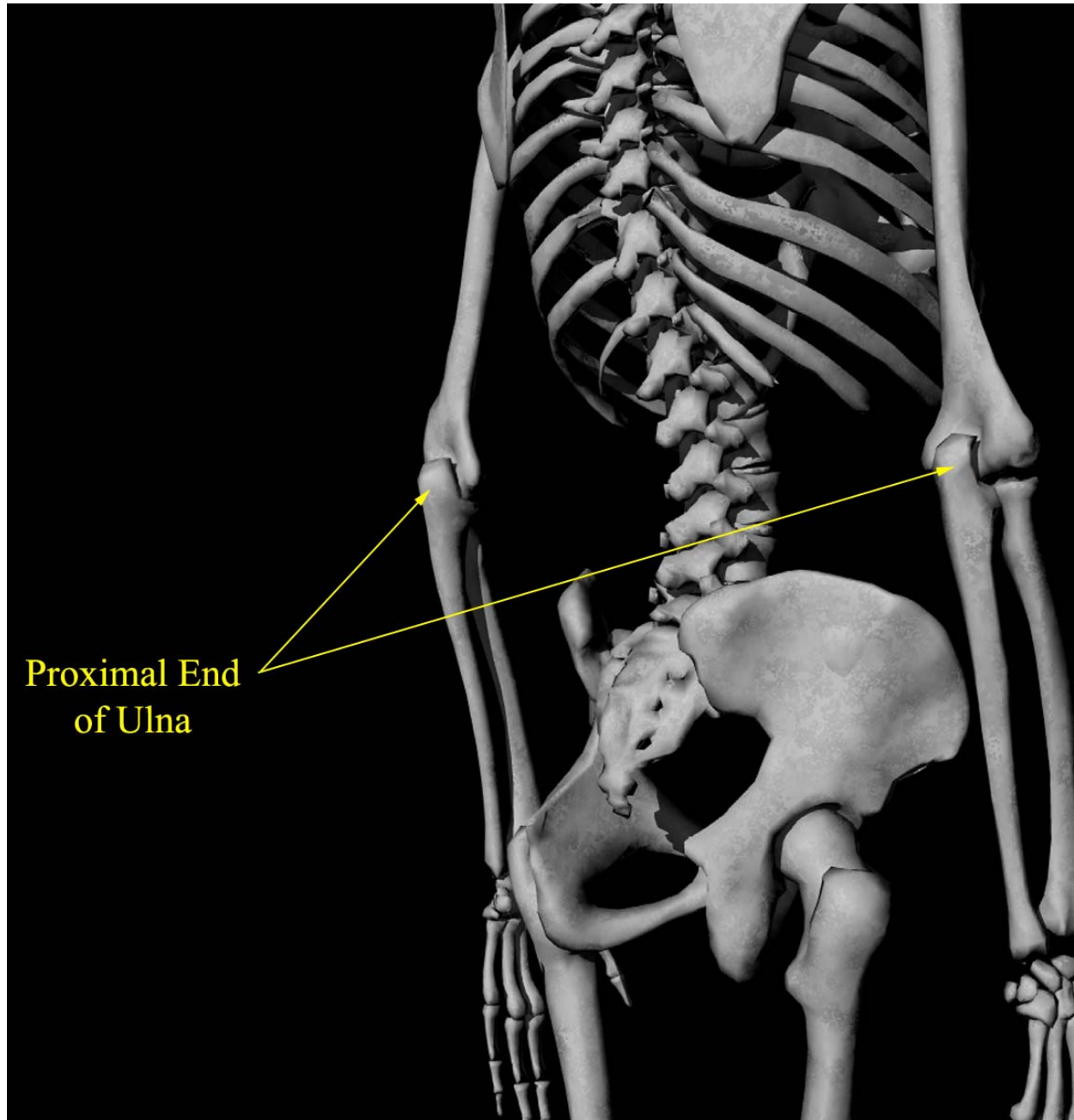
Further examination of the bone fragments located under Evidence Tag number 6197, Forensic Anthropologist Dr. Eisenberg noted that of the eight vertebral fragments, most of these were facets. One fragment was identifiable as being a spinous process. These vertebral parts are shown in the model below using an example vertebra. It is not known from where along the spinal column these fragments come. In the model below, surrounding vertebrae have been removed for a better visualization of the individual cited areas.



In addition, the portion of the mandible can be identified due to the presence of a Mental Foramen. These small openings in the jaw allow for the passage of a blood vessel, and are located near the forward part of the bone, on either side of the chin. Because the bone fragment found under this evidence tag number had this anatomical landmark, the skeletal location can be determined. However, it is unknown from which side of the mandible the fragment originated. For demonstration purposes only, the model shown below illustrates the location of the Mental Foramen on the left side of the mandible. The Foramen on the right side on the mandible is similarly located.



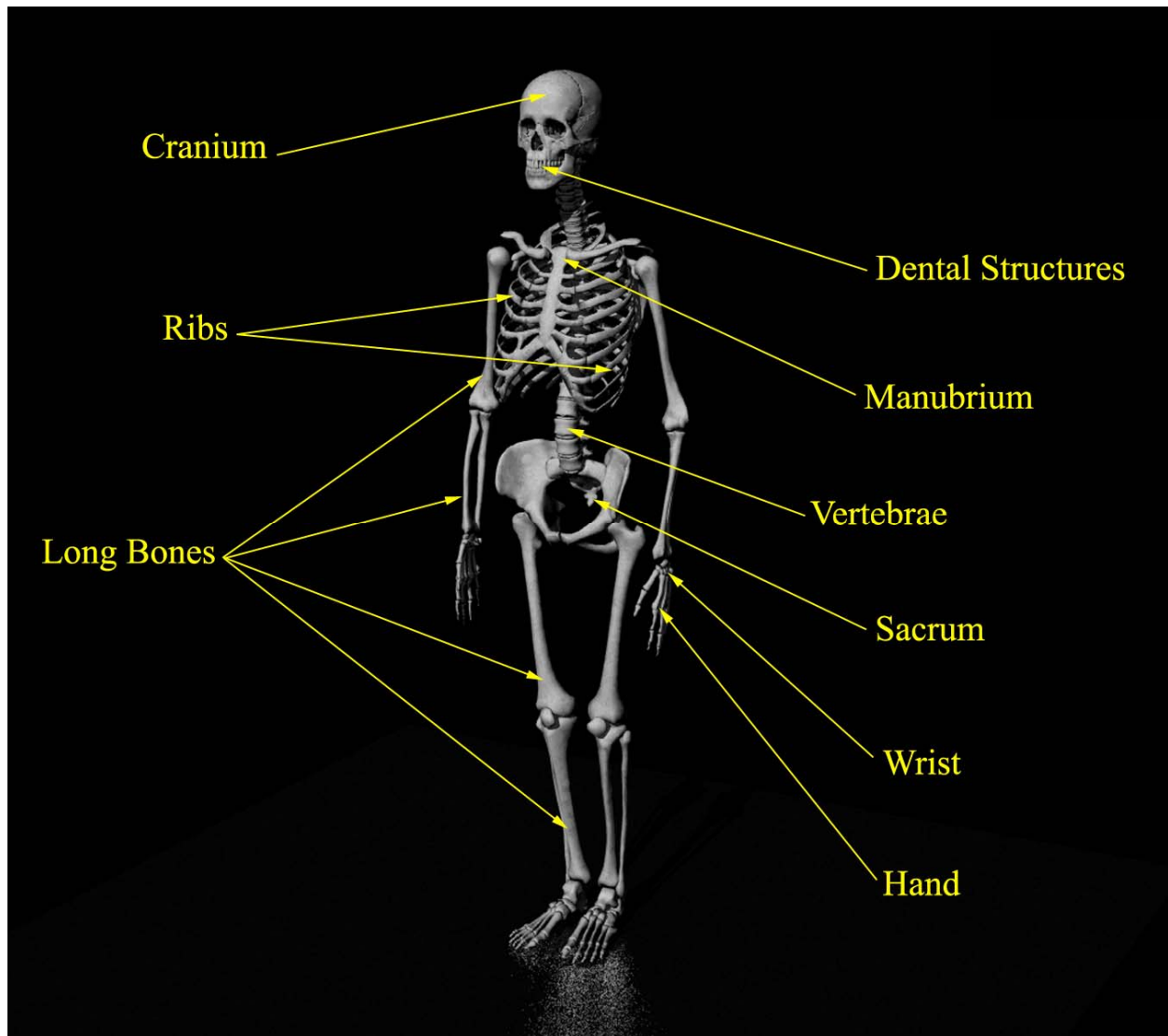
In terms of the Ulna fragment, Dr. Eisenberg has identified this piece as being from the proximal end which is at the top of the bone near the elbow. As was in the previous case, it is not possible to discern which side of the body (right arm or left arm) this fragment came from. The model below was created to illustrate the portion of bone identified:



Evidence Tag Number 7924

Evidence Tag 7924, which was collected from the burn area behind the Avery garage, consisted of fragments representing the following bones:

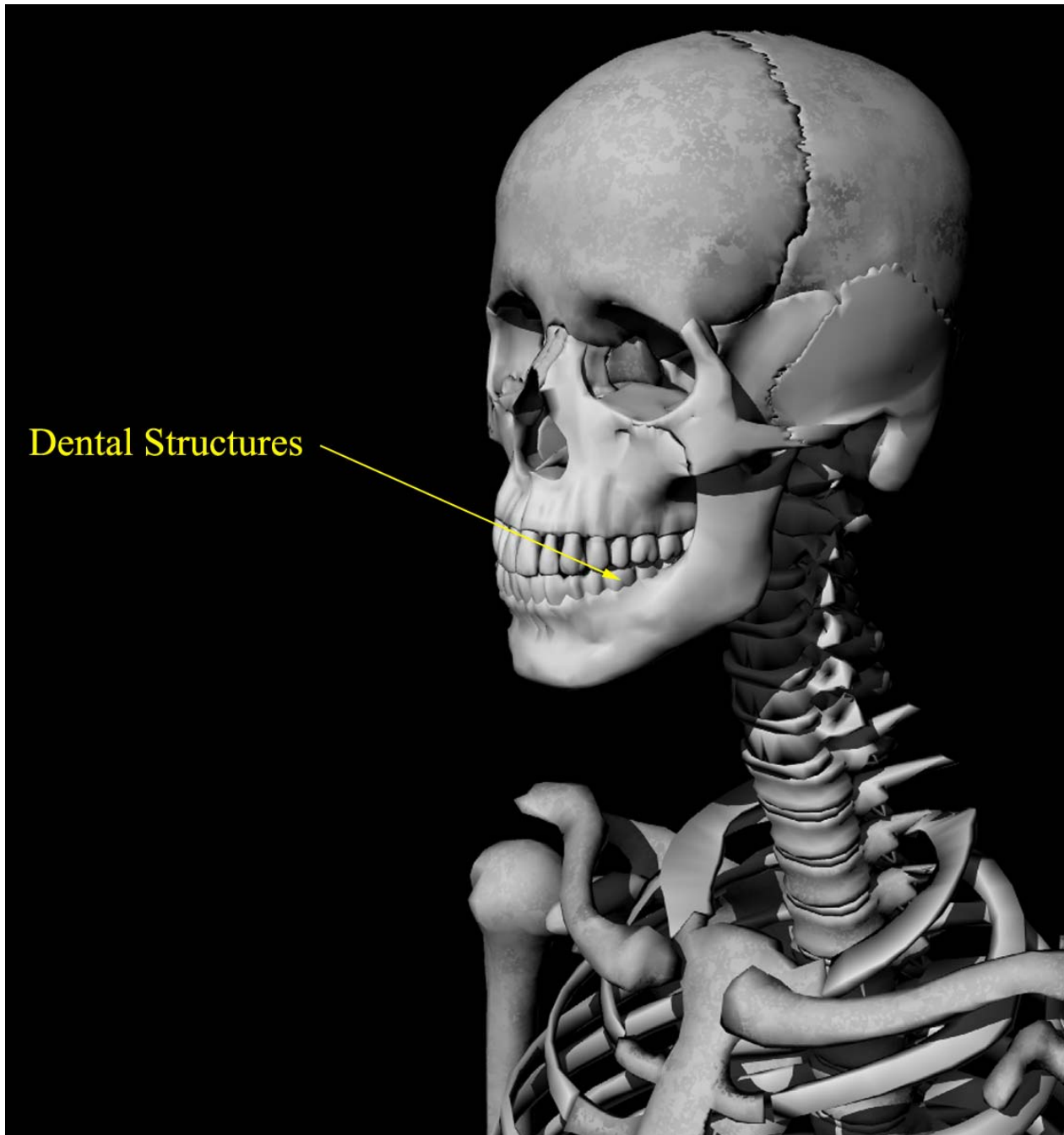
1. Cranial Fragments
2. Dental Structures (may include tooth root, which is not shown below)
3. Manubrium Fragments
4. Vertebral Fragments
5. Sacrum Fragments
6. Rib Fragments
7. Long Bone Fragments
8. Hand and Wrist Bone Fragments



Evidence Tag Number 7925

Evidence Tag 7925, which was collected from the burn area behind the Avery garage, consisted of fragments representing the following bones:

1. Dental Structures (may include tooth roots, which are not shown below)

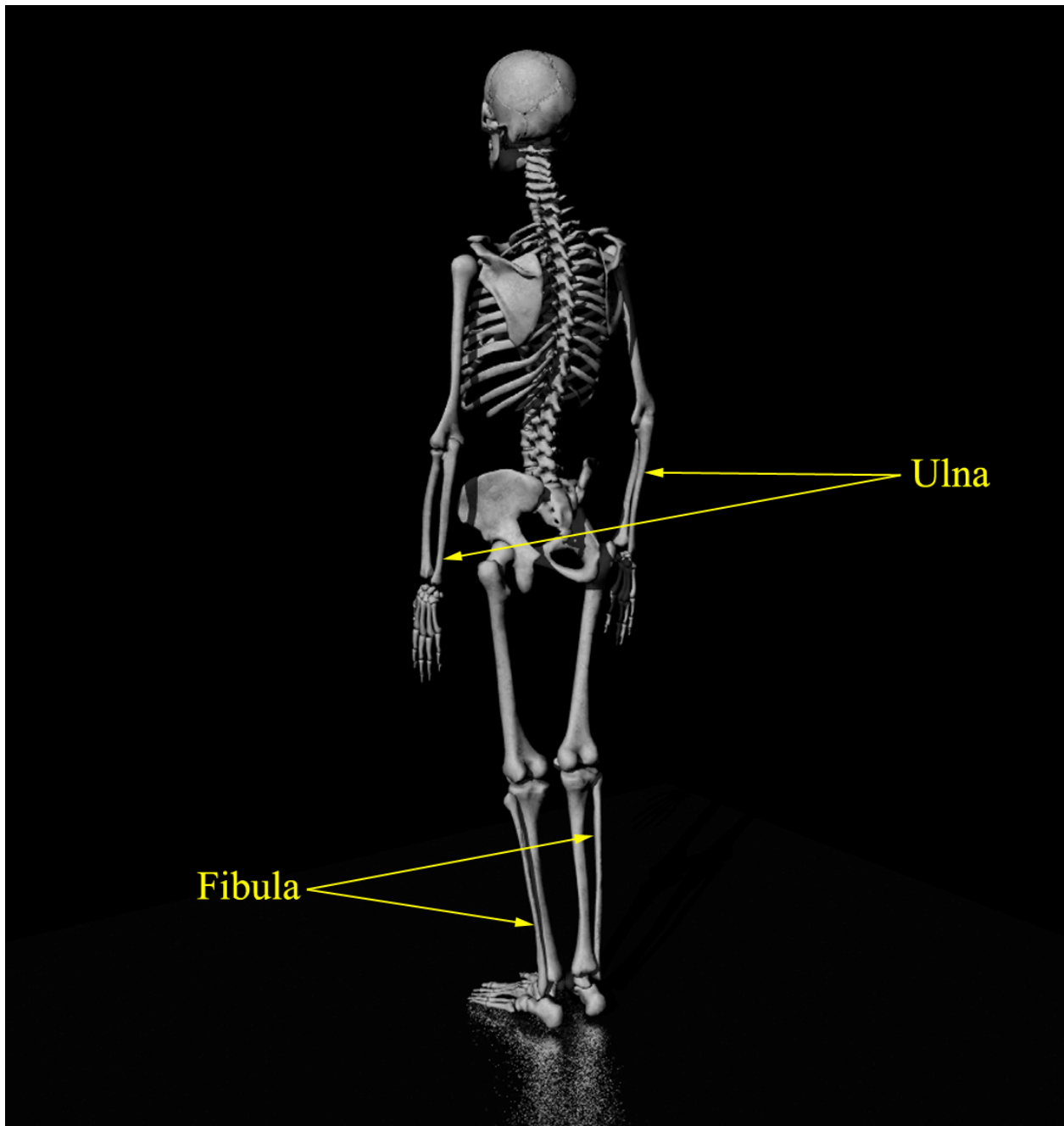


Evidence Tag Number 7926

Evidence Tag 7926, which was collected from the burn area behind the Avery garage, consisted of fragments representing the following bones:

1. Possible Ulna or Fibula Fragment

Records indicate that this fragment also had soft tissue present and was subsequently transferred to the FBI Laboratory in November of 2005 for deoxyribonucleic acid (DNA) analysis.

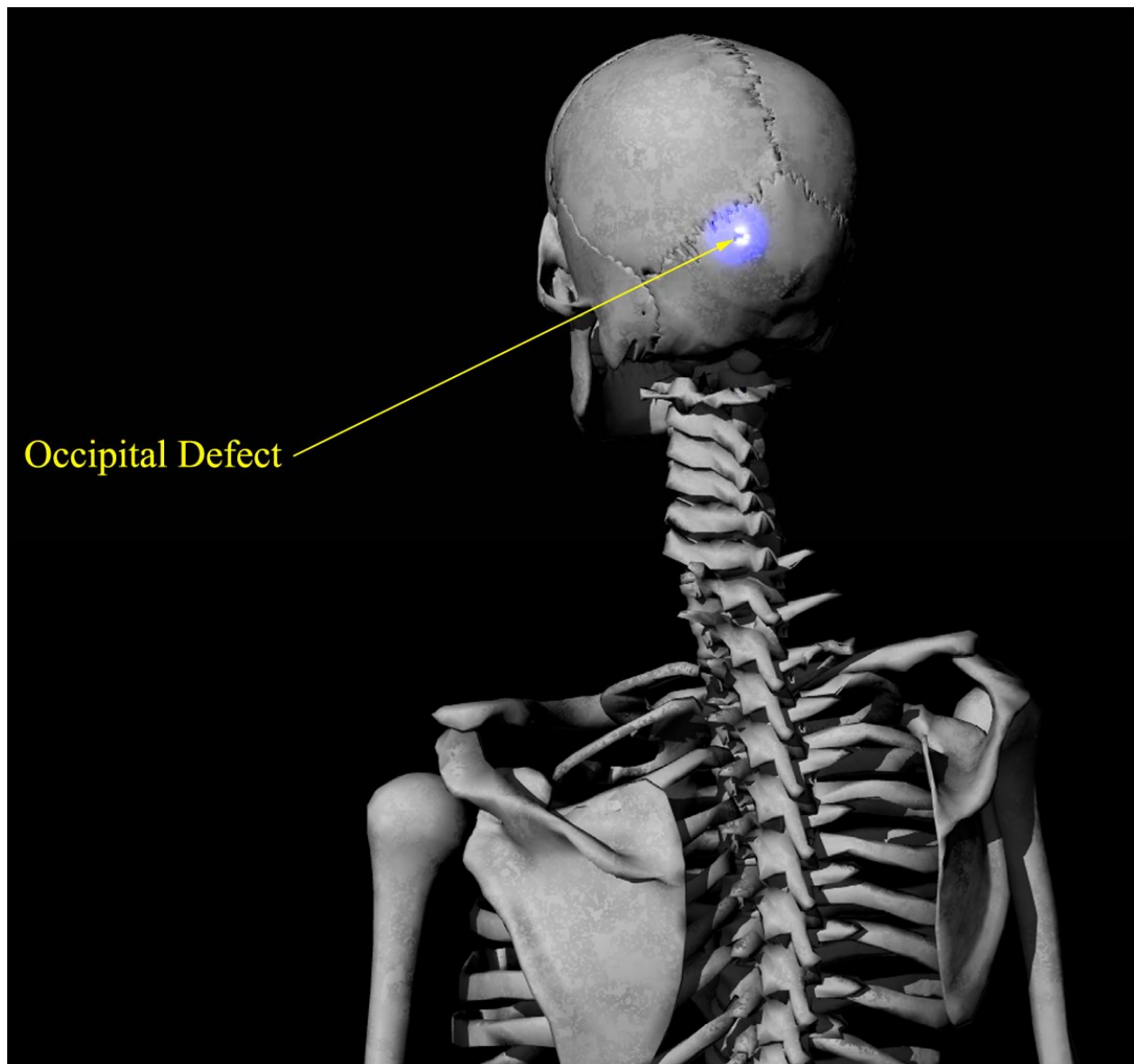


Evidence Tag Number 7936

Evidence Tag 7936 consisted of fragments representing the following bones:

1. Cranial Fragment (Probable Occipital)

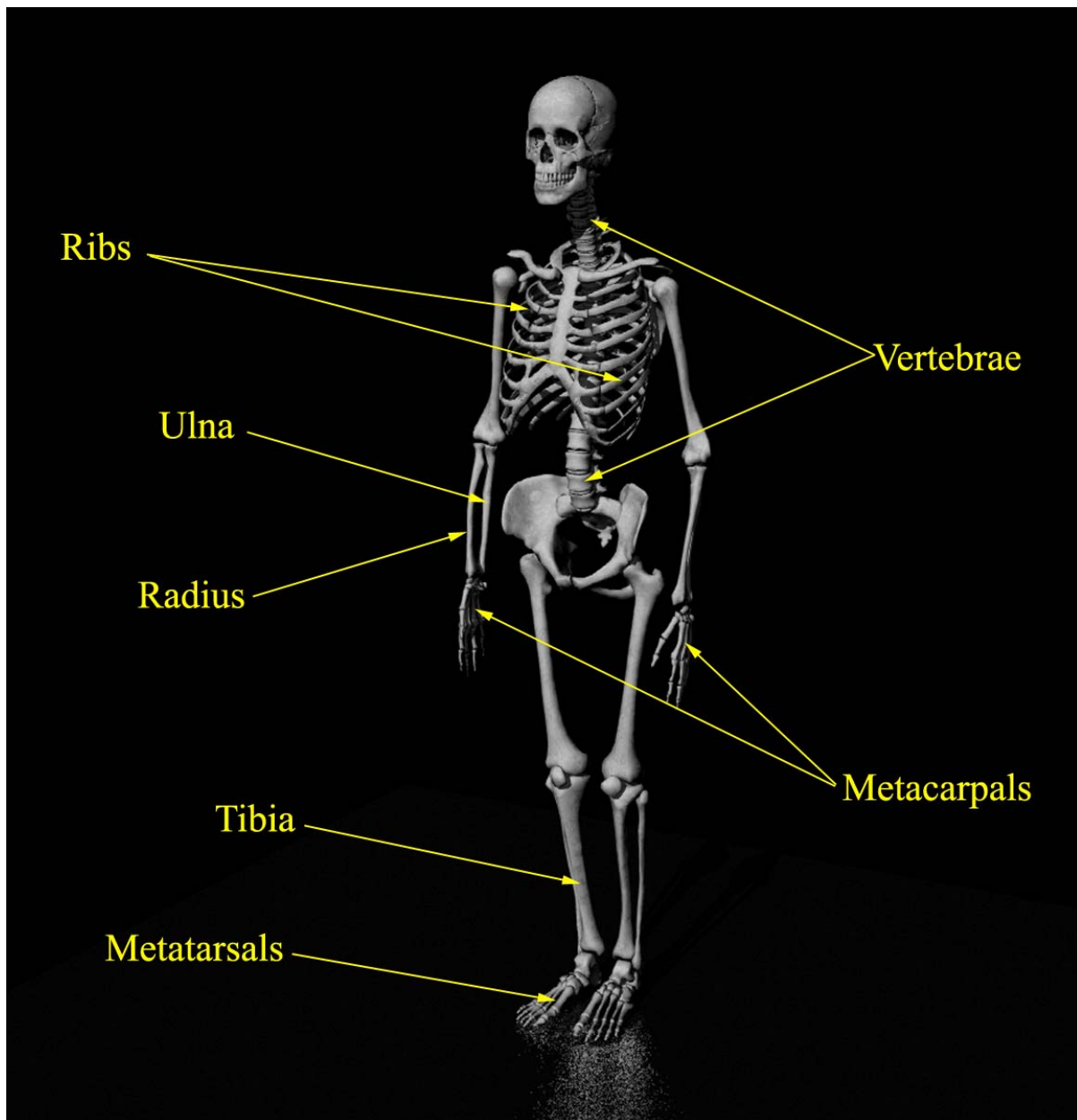
According to reports, this probable Occipital fragment had a defect that was noted by Dr. Eisenberg. The analysis of this defect falls outside of this author's expertise, and therefore is only discussed here with the intention of showing its approximate location on the complete skull model. Based on the analysis completed by the Forensic Anthropologist, it is believed that the defect noted on the possible Occipital bone fragment was located as is illustrated below. The narrative reports of Dr. Eisenberg should be consulted for an analysis of this particular evidentiary item.



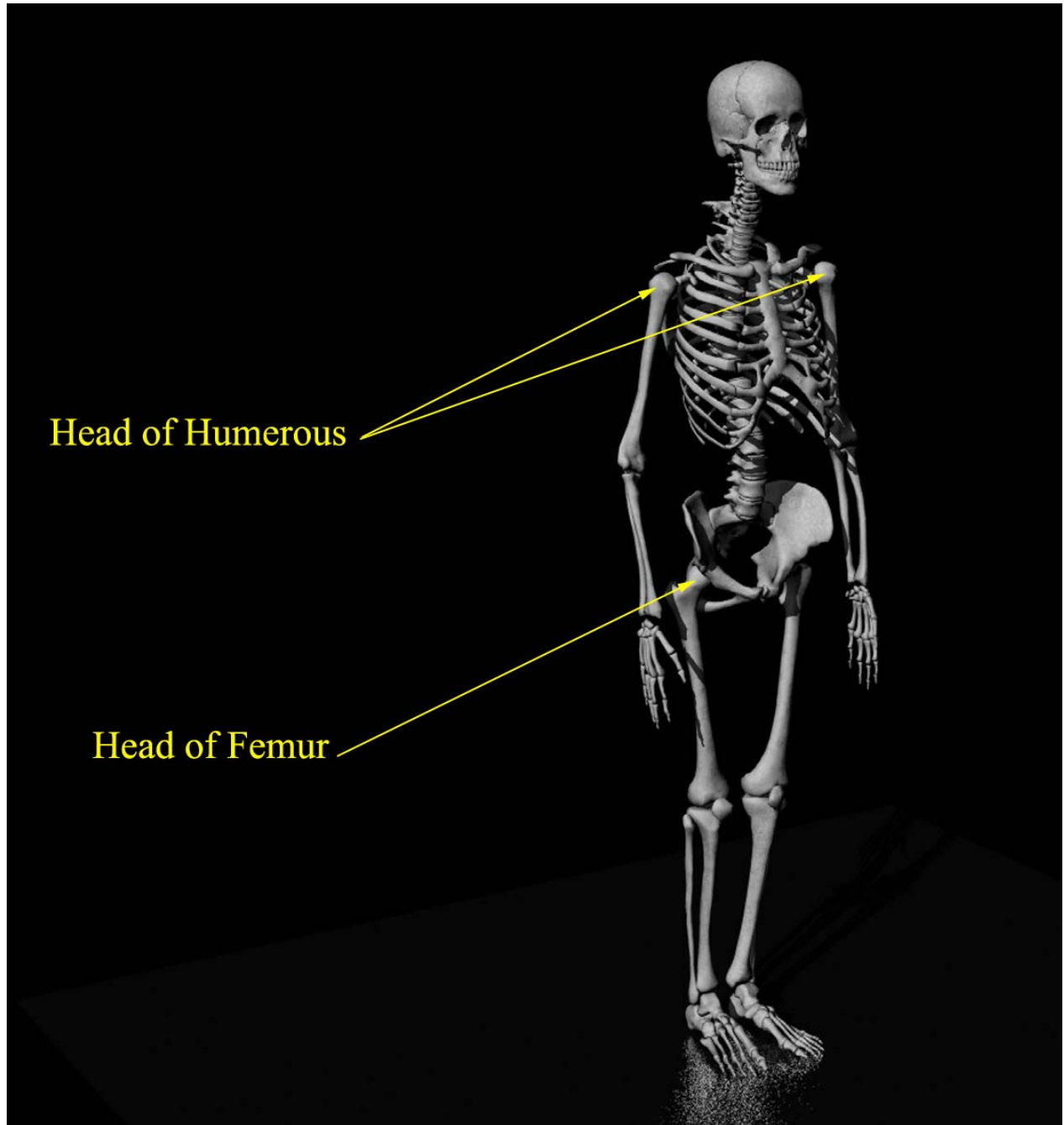
Evidence Tag Number 7944

Evidence Tag 7944 consisted of fragments representing the following bones:

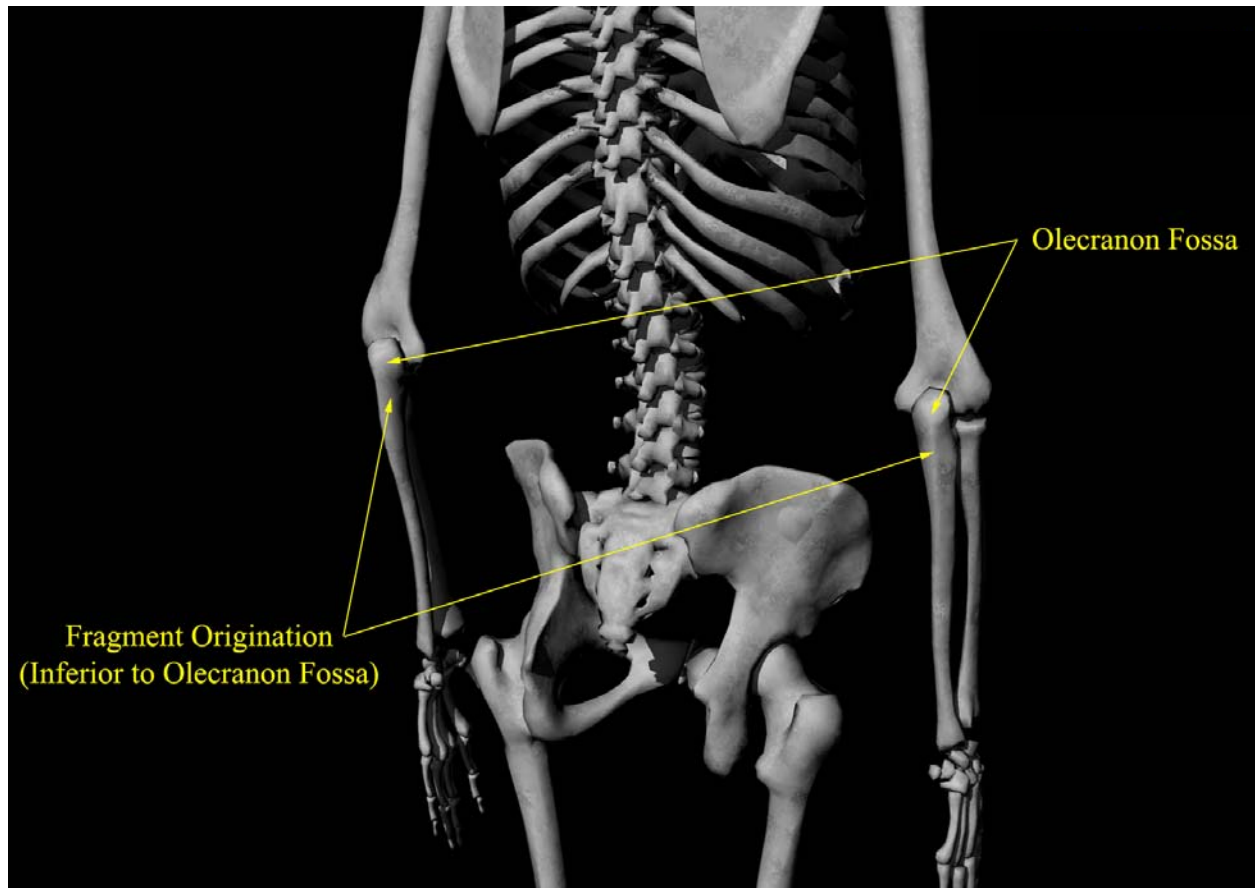
1. Tibia Fragments
2. Vertebral Fragments
3. Rib Fragments
4. Ulna or Radius Fragments
5. Metacarpal or Metatarsal Fragment
6. Long Bone Head Fragments From Humerus or Femur (shown on following page)



In this evidence catalog number, it has been stated that long bone head fragments from either the Humerus or Femur were identified. In particular, two fragments were found to match and subsequently fitted together. However, it is not possible to state from which long bone the fragments came. The model below has been prepared to illustrate the location of these bones, and, more specifically, which portions are considered to be “heads.”



As was stated previously, the Ulna was represented by bone fragments documented under this evidence number. One fragment in particular was identified as being from a location just inferior to the Olecranon Fossa. In other words, the fragment was near the top of the bone, just below the elbow joint. It is noted, however, that it cannot be stated which side the fragment (right or left) comes from. The image below offers possible locations for the fragment on the Ulna inferior to the Olecranon Fossa.

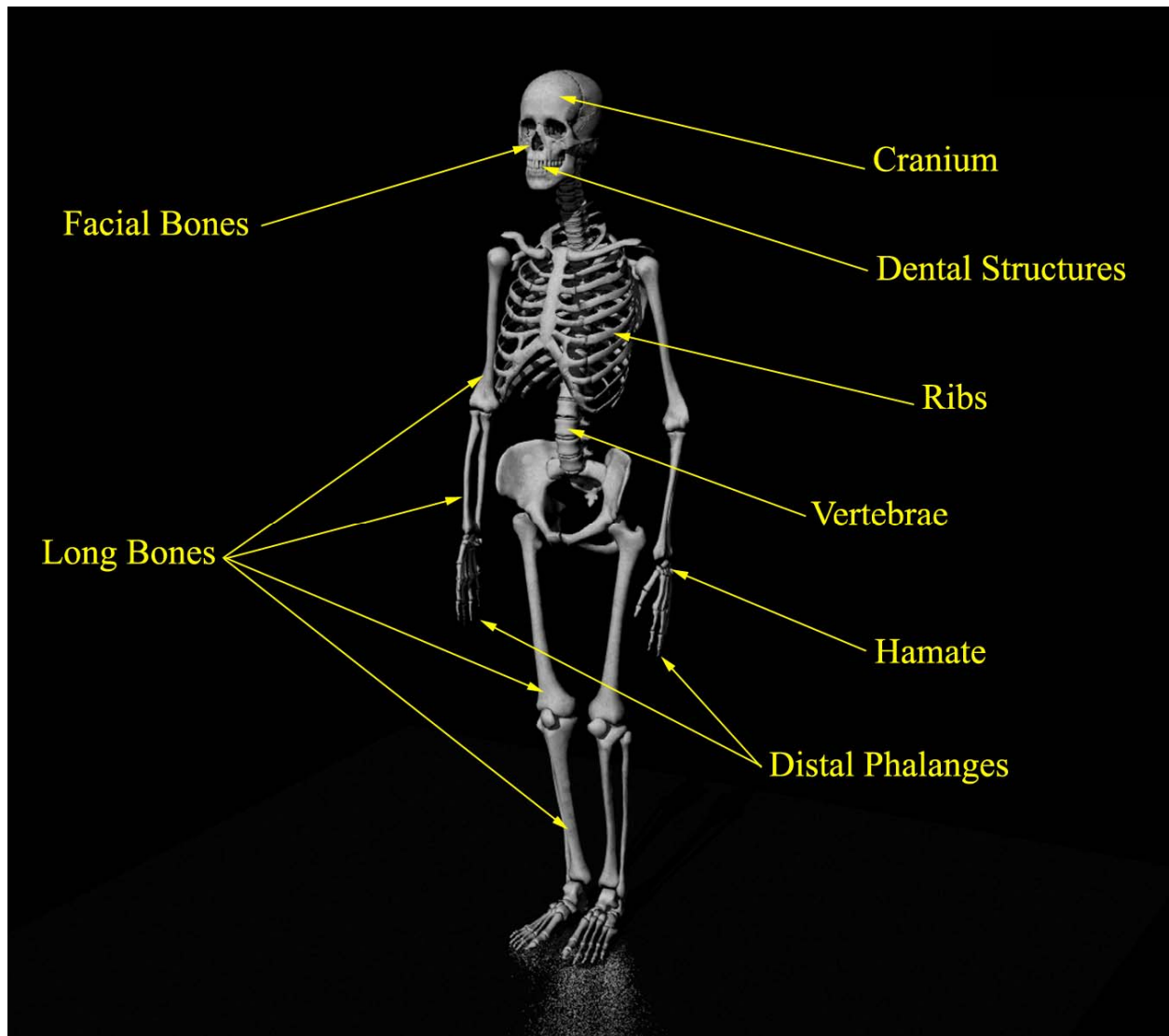


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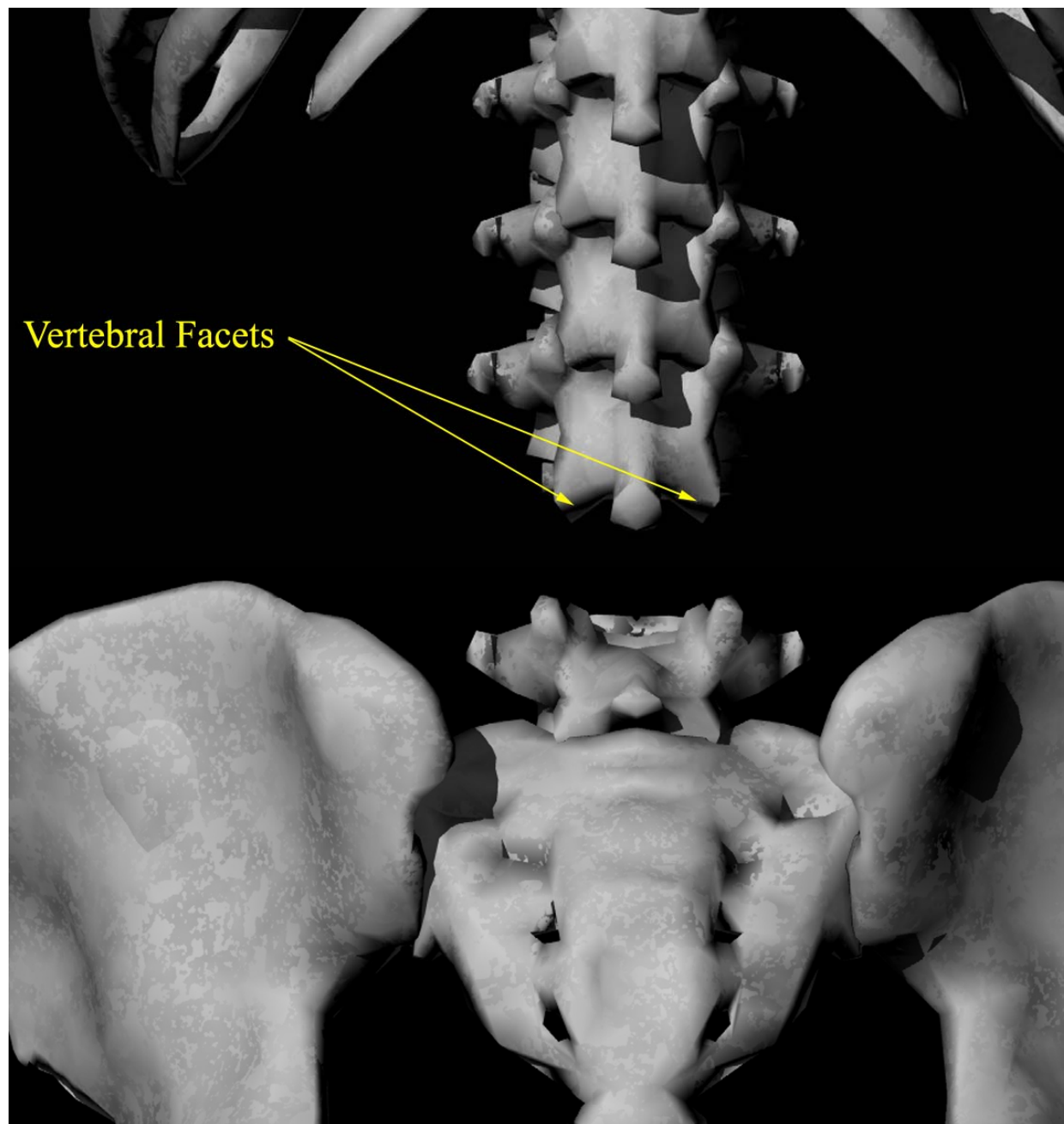
Evidence Tag Number 8118

Evidence Tag 8118, which consists of items collected from the burn area behind the Avery garage, consisted of fragments representing the following bones:

1. Distal Phalange Fragments (Two)
2. Cranial Fragments
3. Long Bone Fragments
4. Rib Fragments
5. Vertebral Fragments
6. Facial Bone Fragments
7. Carpal Bone Fragment (Possible Hamate)
8. Dental Structures (may include tooth roots, which are not shown below)

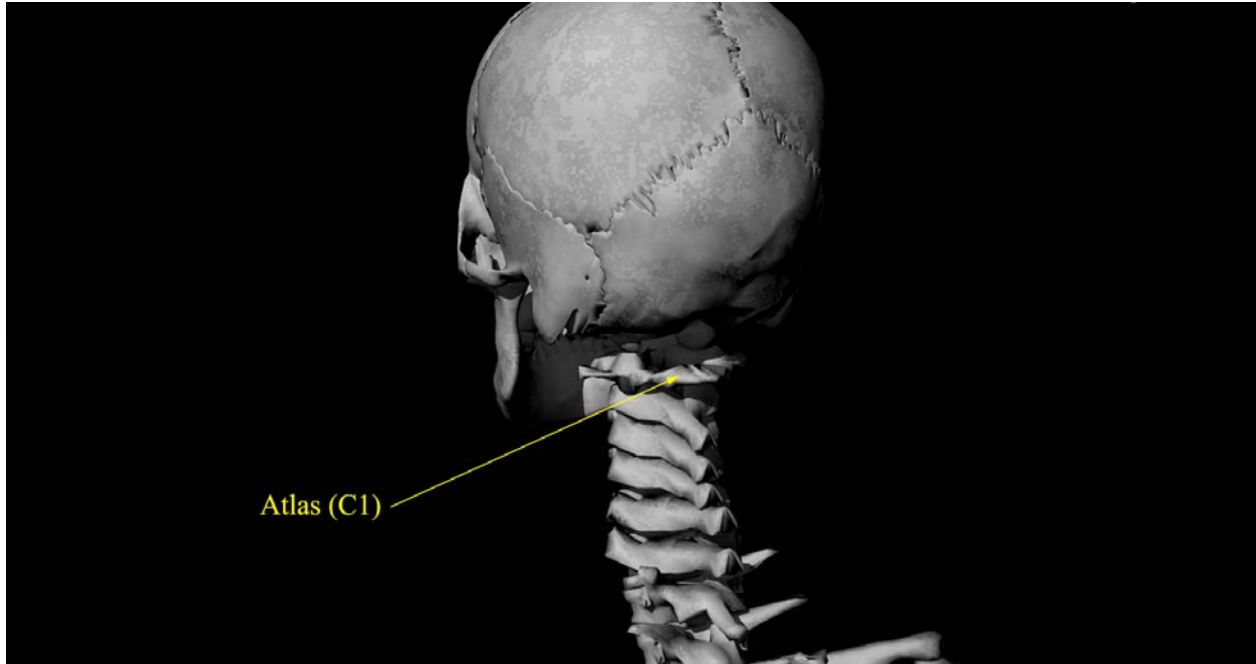


Under this particular evidence control tag, the vertebral fragments were identified by Dr. Eisenberg as being facets. The following model has been prepared to offer the facet location on an example vertebra:

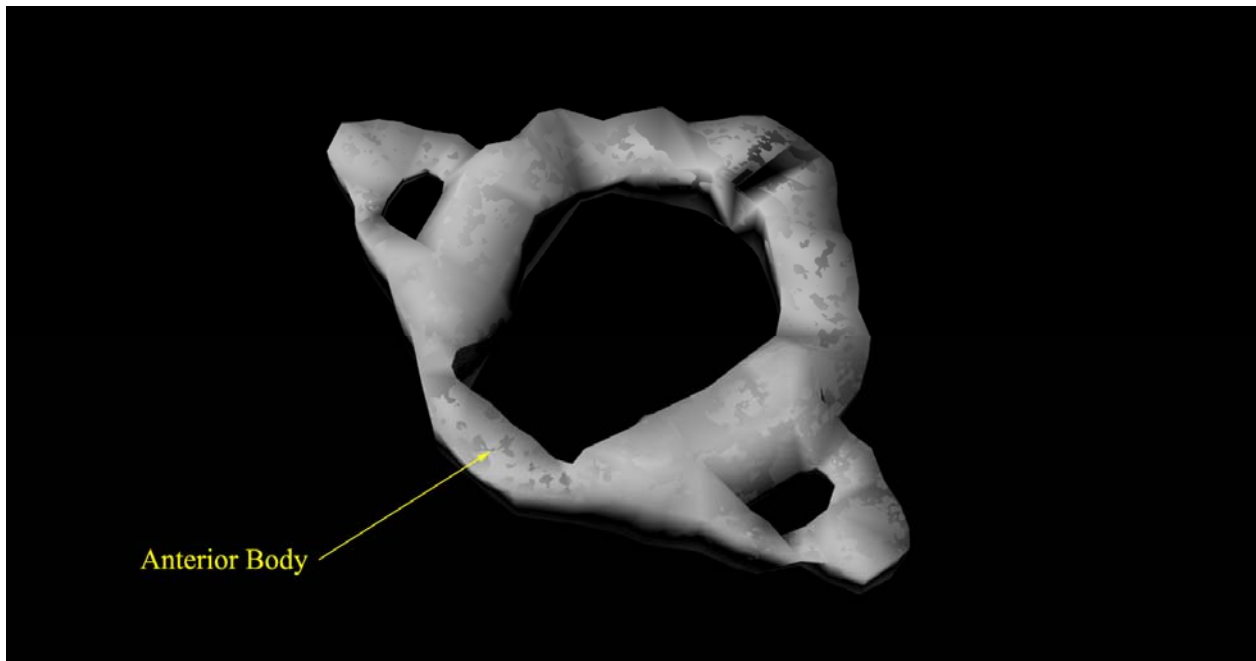


In addition, certain vertebral fragments were identified as being from the Atlas (C1), and, more particularly, from the anterior body (frontal portion) of the bone.

Location of Atlas (C1):



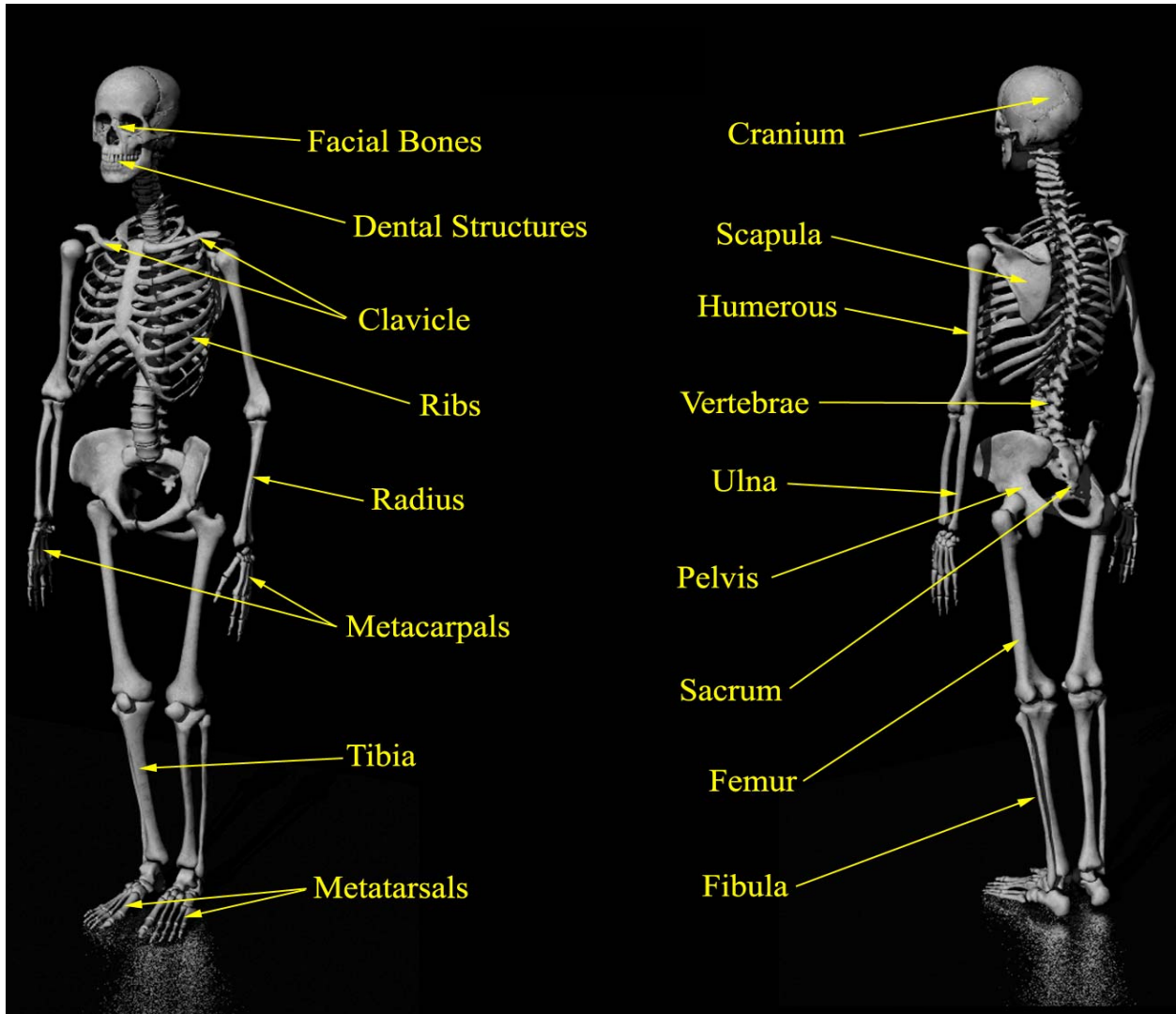
Anterior Body (Frontal Portion) of Atlas (C1):



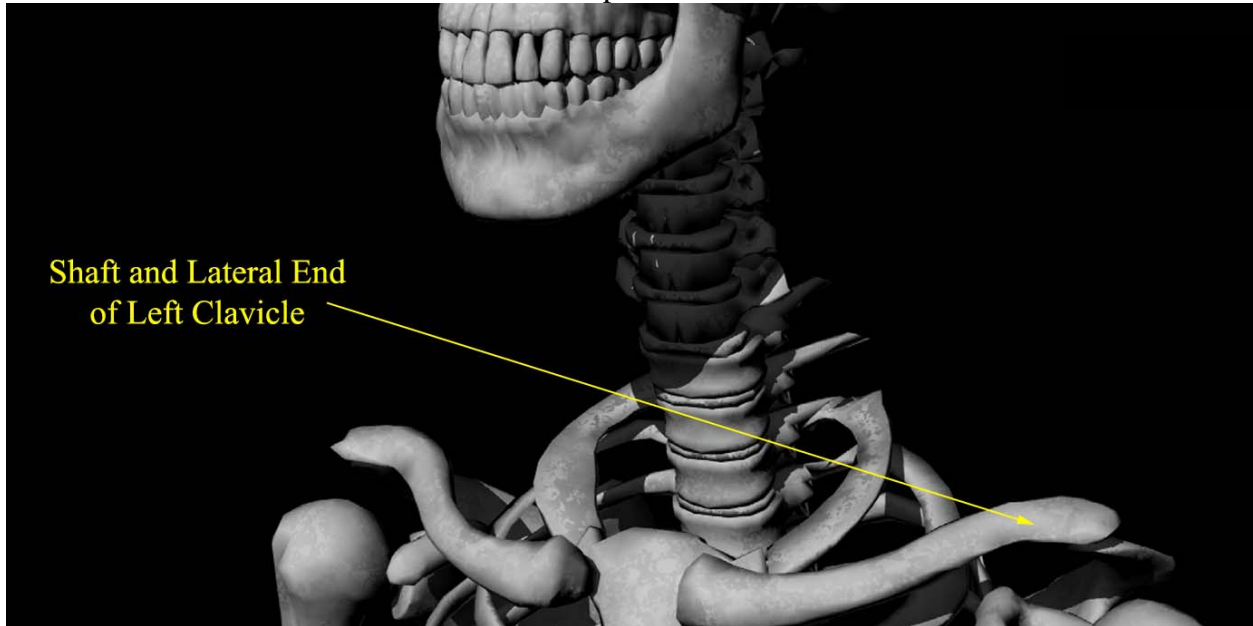
Evidence Tag Number 8318

Evidence Tag 8318, which consists of items collected from the burn area behind the Avery garage, consisted of fragments representing the following bones:

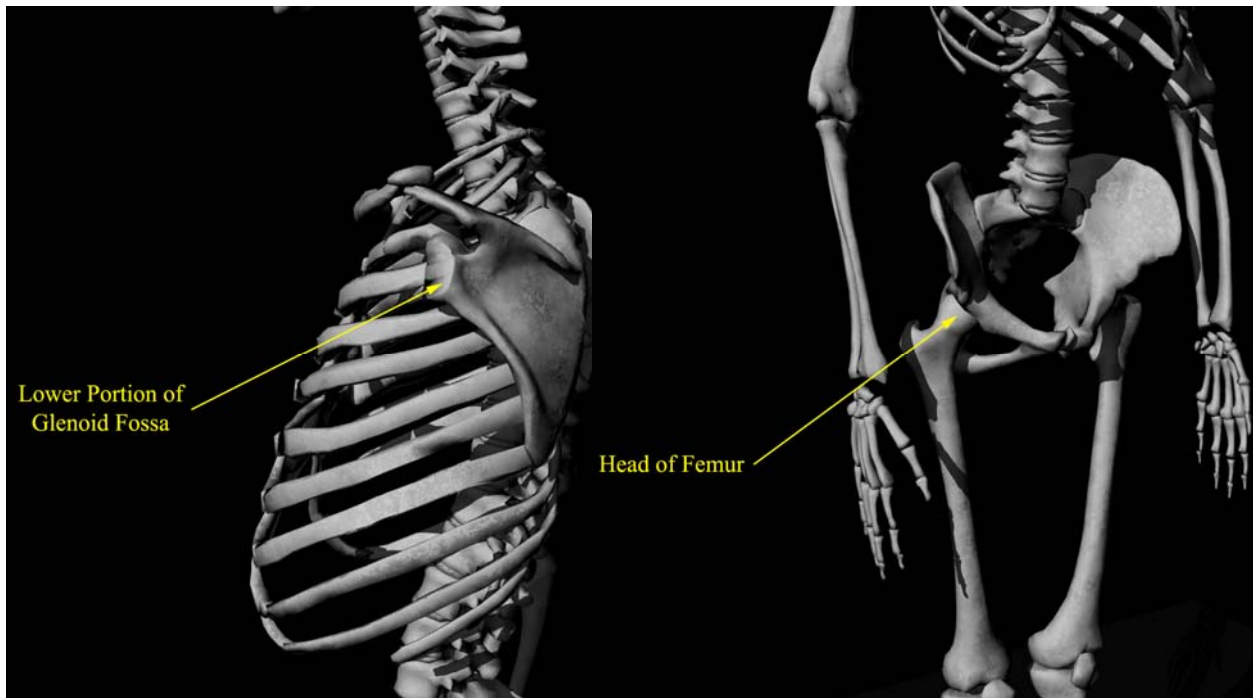
- | | |
|----------------------|---------------|
| 1. Clavicle | 10. Radius |
| 2. Cranial | 11. Ribs |
| 3. Dental Structures | 12. Sacrum |
| 4. Facial | 13. Scapula |
| 5. Femur | 14. Tibia |
| 6. Fibula | 15. Ulna |
| 7. Metacarpal | 16. Vertebrae |
| 8. Metatarsal | 17. Humerus |
| 9. Pelvic Bones | |



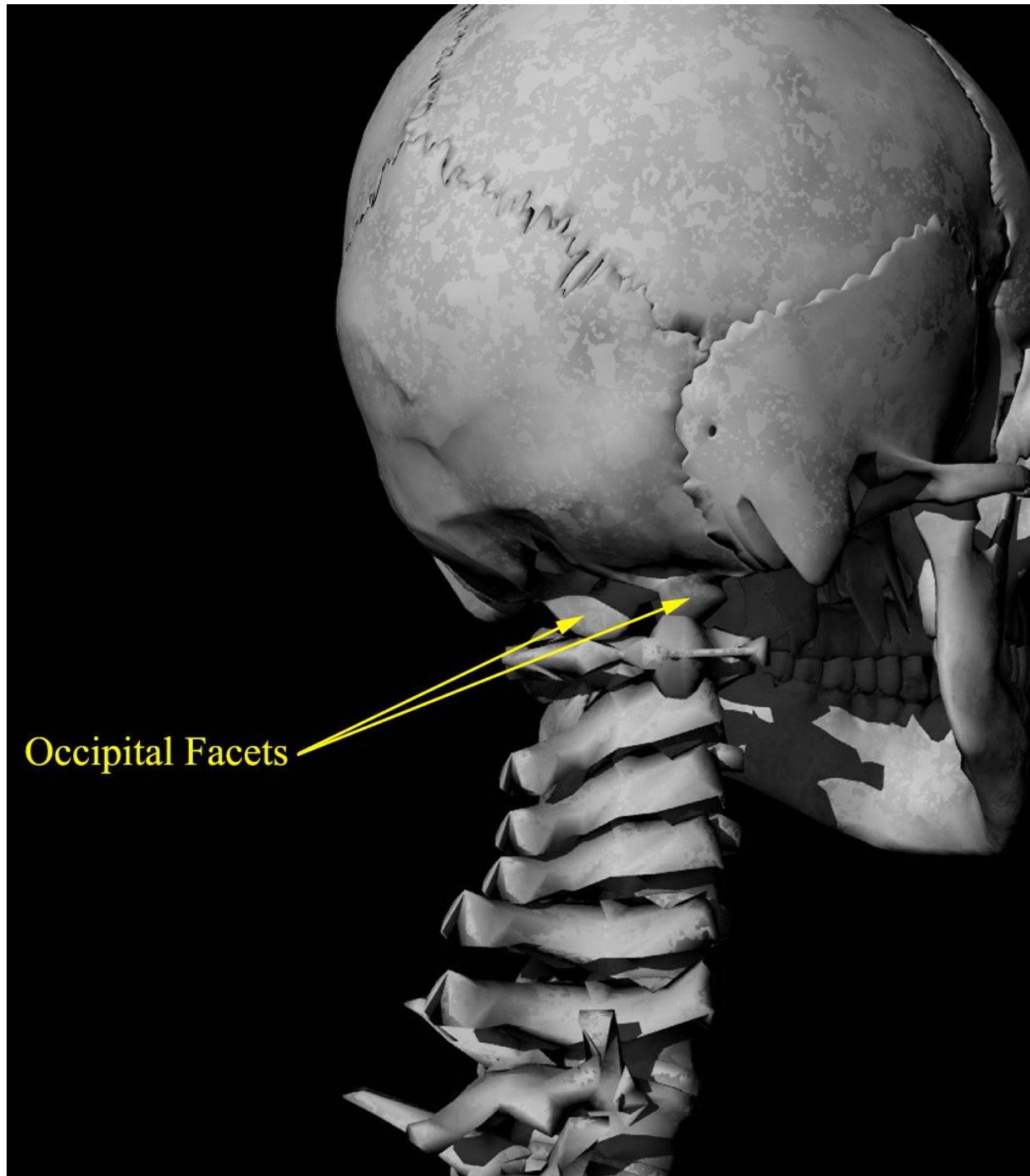
Under this evidence catalog number, there are certain diagnostic fragments which could be more precisely identified. For example, as is shown in the model below, two left clavicle fragments were refit and determined to be from the shaft portion and lateral end of the bone.



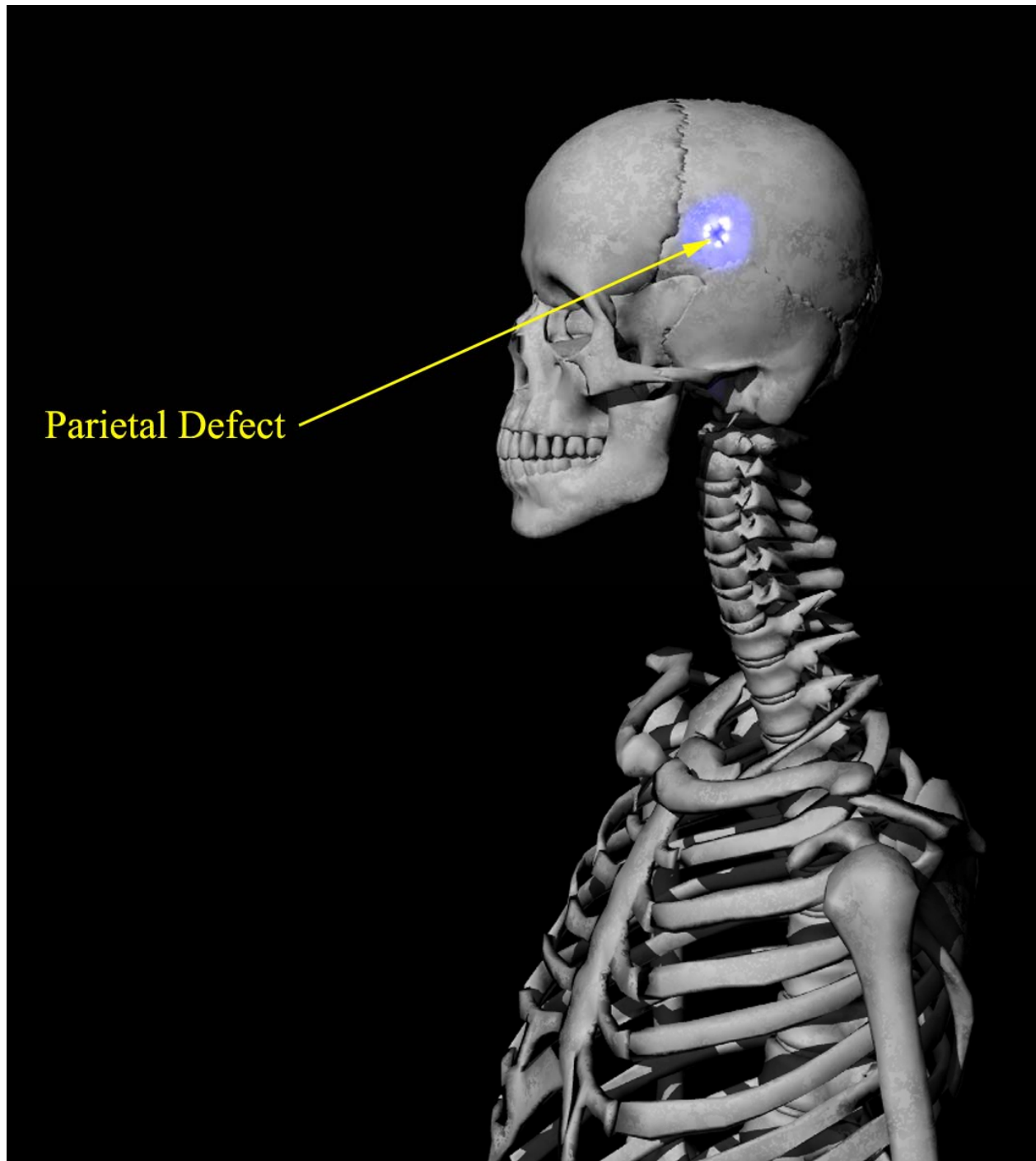
In terms of the scapula, the area identified was the lower portion of the left side Glenoid Fossa, as is shown at the below left. It should be noted that the Humerus has been removed to better view the area in question. A portion of a Femur head was also recognized (below right) among the bone fragments, but it cannot be determined which side (right or left) it represents.



Approximate locations of certain cranial bones were also identified, which include a fragment of the Occipital bone from one of the facets found near the base of the skull. According to Dr. Eisenberg reports, this basicranial fragment was forwarded to the FBI Laboratory for DNA analysis. The locations of the Occipital facets are shown below.

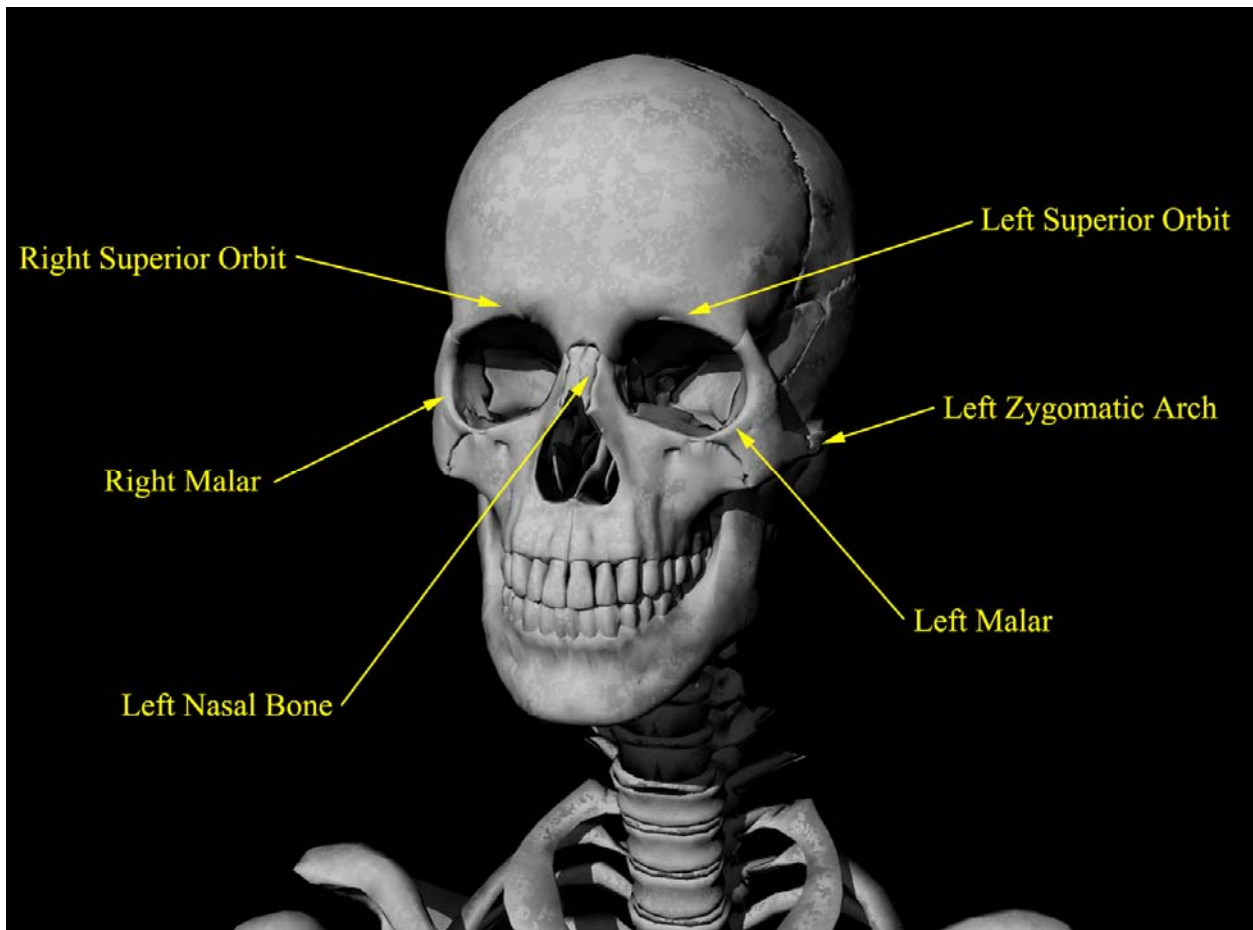


Also on the skull, fragments from a portion of the left Parietal bone were identified. According to her report, a defect was noted by Dr. Eisenberg. The analysis of these fragments falls outside of this author's expertise, and therefore is only discussed here with the intention of modeling its approximate location. Based on the analysis completed by the Forensic Anthropologist, the approximate location of the Parietal defect noted on one of the bone fragments is illustrated below.



The indicated facial bones were also able to be further broken down, with each of the following areas being identified:

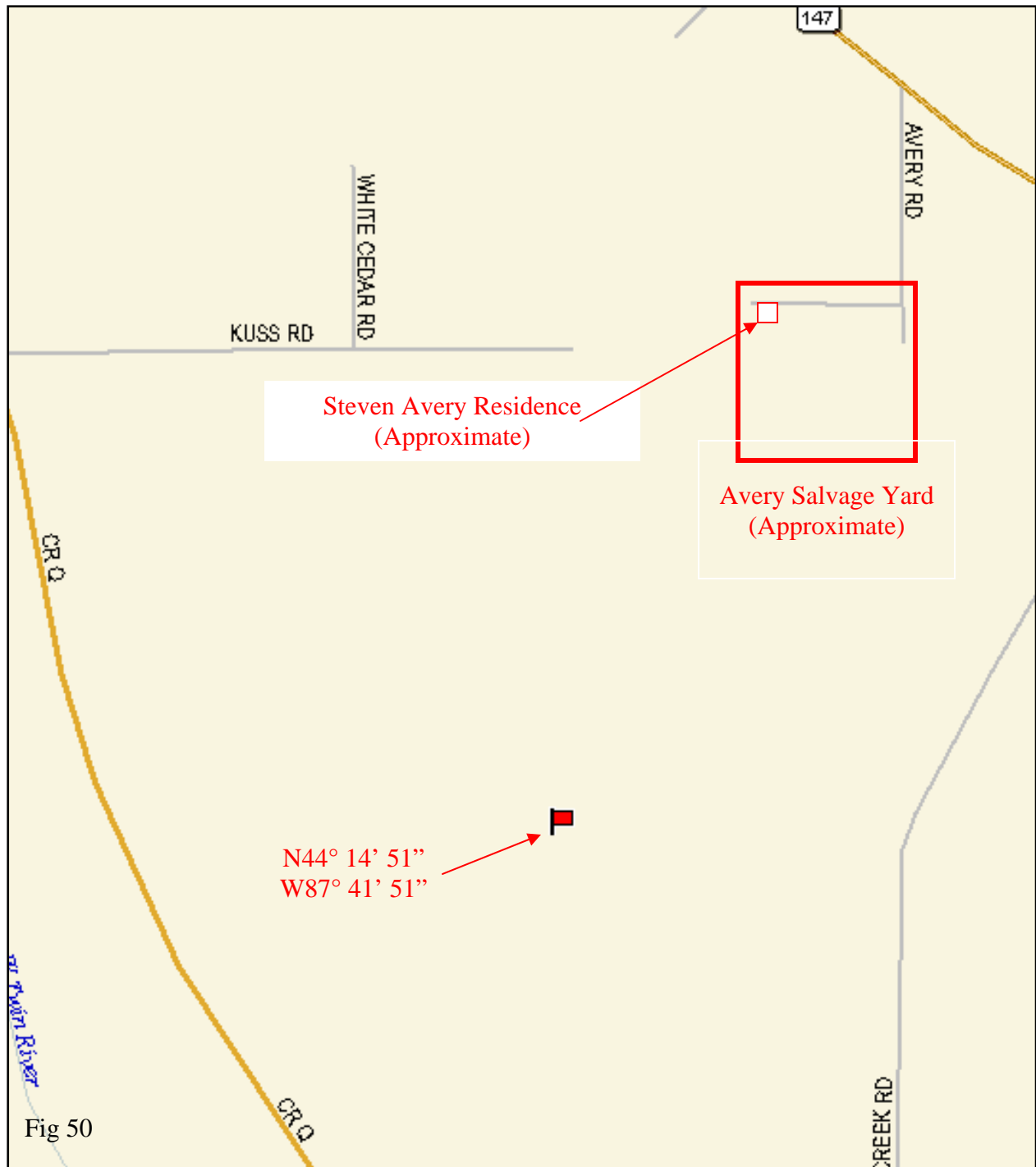
1. Fragment of Frontal Bone located above and lateral to Left Nasal Bone (not depicted)
2. Fragment of Frontal Bone with portion of Left Superior Orbit
3. Fragment from left Malar
4. Left Nasal Bone
5. Fragment of Left Zygomatic Arch
6. Fragments from Right Superior Orbit
7. Right Malar



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- **GPS Coordinates N44° 14' 51", W87° 41' 51"**

Reports indicate that additional possible human bone fragments were found at the above GPS coordinates. These locations correspond to ashes and burnt debris found in the quarry adjoining the Avery Salvage Yard. The location is depicted in the map shown below in Figure 50.

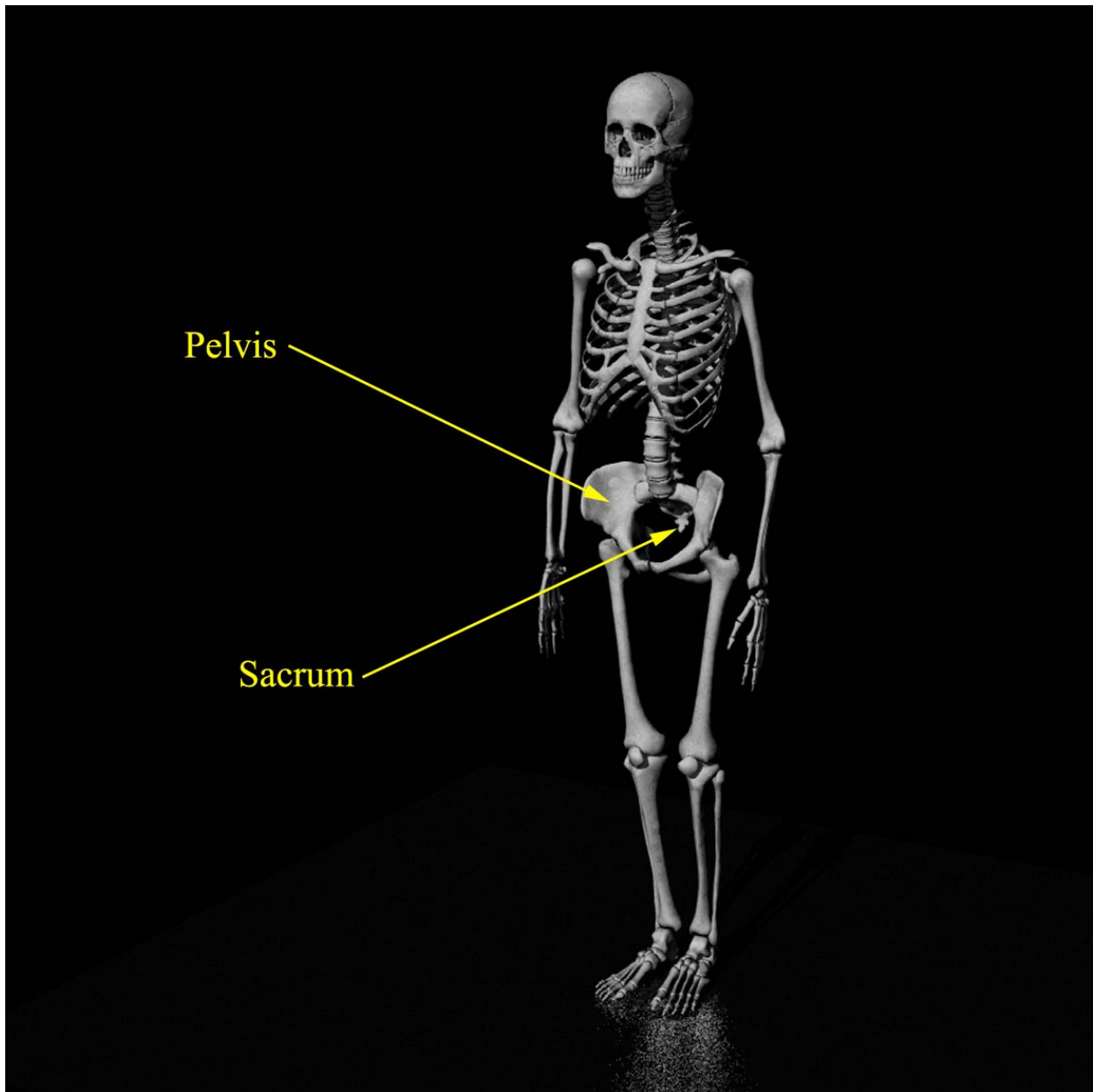


Evidence Tag Number 8675

Evidence Tag 8675, consisted of fragments representing the following possible human pelvic bones:

1. Sacrum Fragment
2. Innominate Fragments

In her narrative reports, Dr. Eisenberg notes that the bone fragments shown above have cut marks. As identifications of such a nature fall outside of this author's expertise, the reports prepared by the Forensic Anthropologist should be referenced for bone condition.

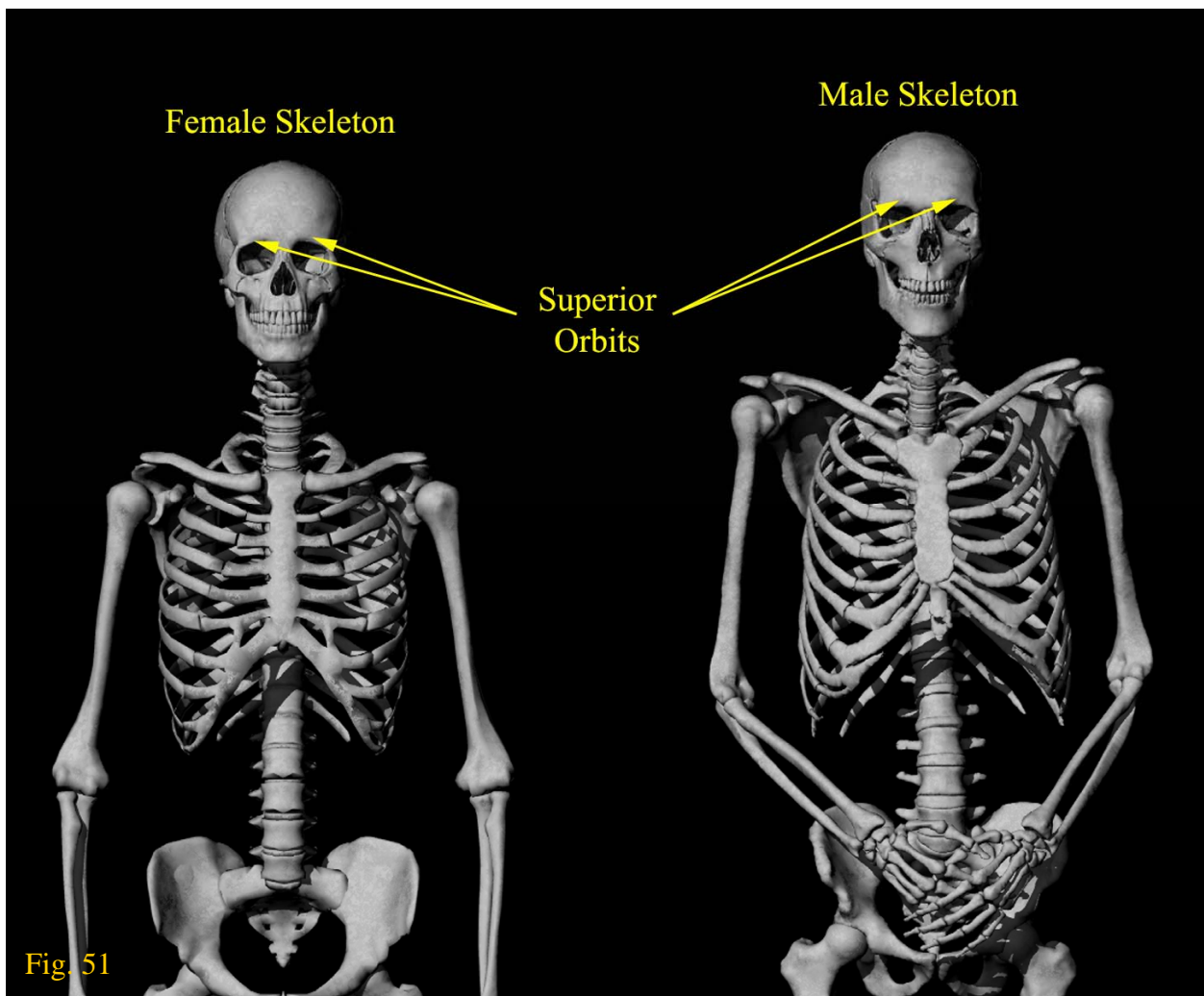


- ***Sex Determination***

According to the reports of Dr. Eisenberg, certain skeletal shape characteristics indicate that the fragments are from a female skeleton. As has been indicated previously, such an analysis lies beyond the author's areas of expertise. However, the male/female differences identified by the Forensic Anthropologist can be modeled for the purposes of visualization.

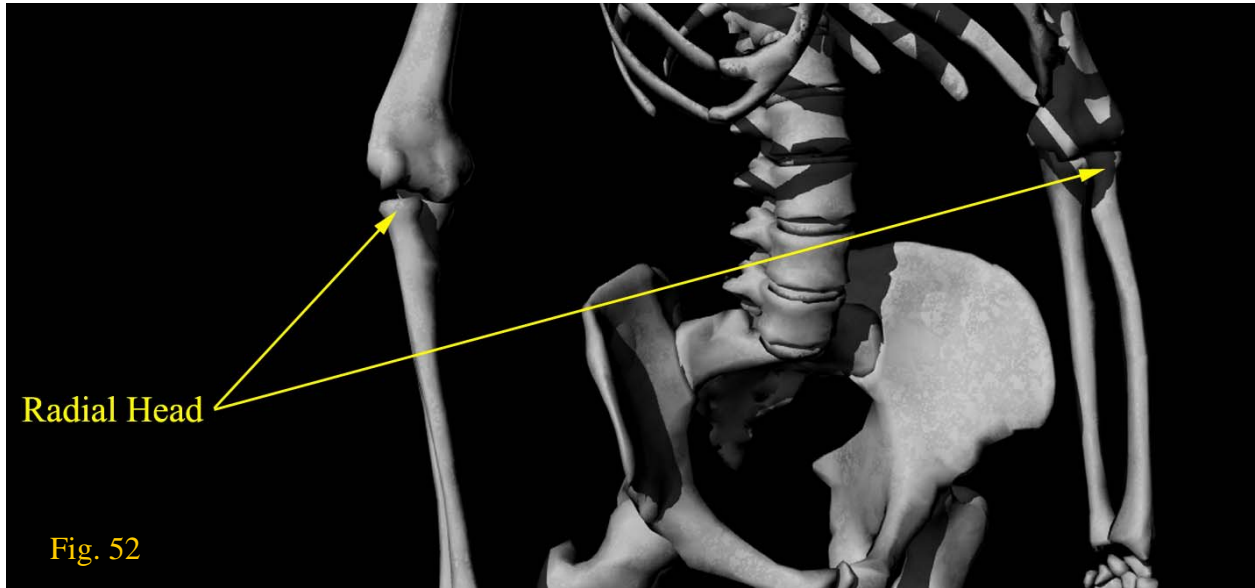
Left and Right Superior Orbits

In Evidence Tag 8318, fragments of both the right and left Superior Orbits were identified. These areas are slightly different when those of males and females are compared (Figure 51). Here, a rounder and more robust margin would suggest male properties, while a sharper and more gracile border would be indicative of the female sex. In this case, it is the latter which is represented.



Radial Head Size and Long Bone Shaft Diameter

A second skeletal area that permitted sex determination is derived from the measurement of the radial head fragment identified under Evidence Tag number 8318 (Figure 52). Here, the size falls within the expected measurements for females.

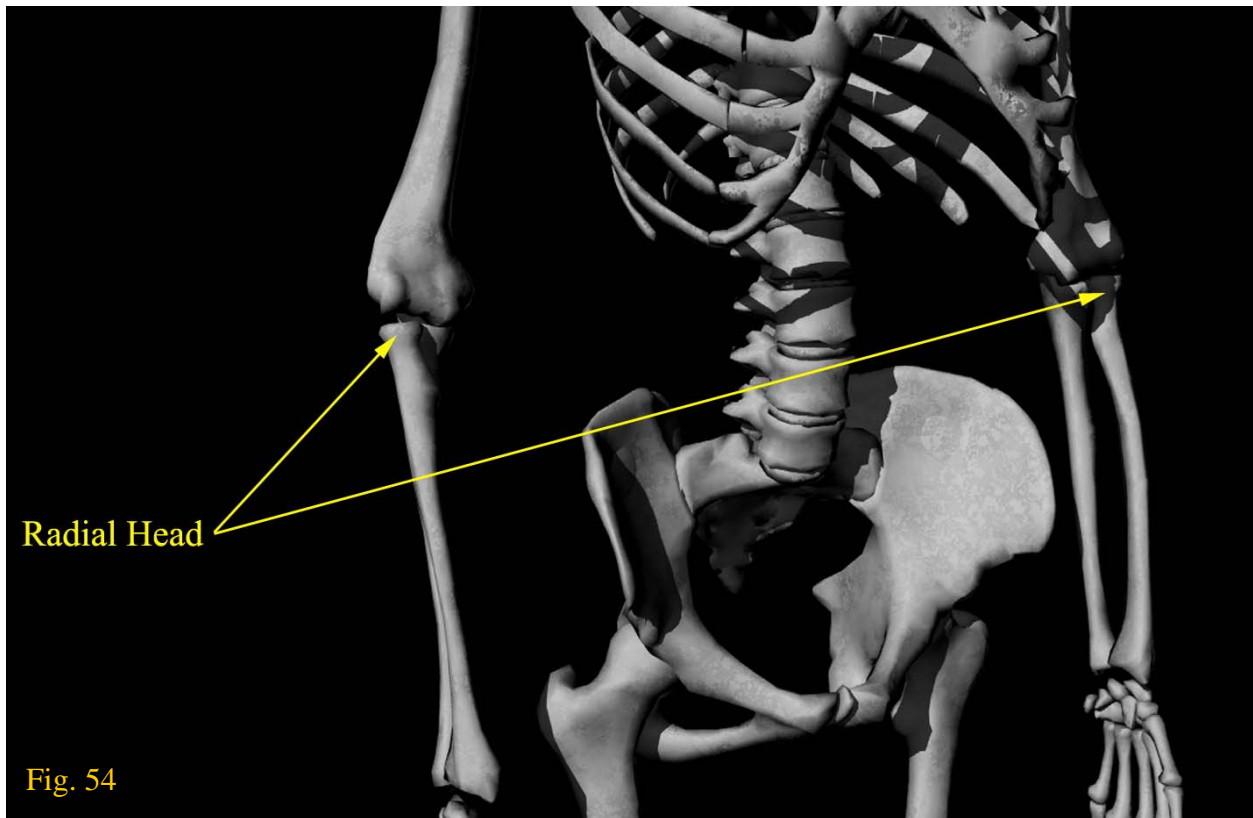


As has been previously discussed, the long bones are made up of several components, including the head (illustrated above for the Radius) and the shaft. As with the head, the Femur shaft diameter can be measured to determine whether it falls into the expected range for males or females (Figure 53). Again, measurements taken by Dr. Eisenberg indicate that the Femur shaft fragment cataloged under Tag Number 8318 falls within the expected range for female skeletons.



- *Age Determination*

In addition to having characteristics that support sex determination, some fragments also suggested approximate age. Here, the radial head shown in the previous topic discussion and in the image below did not show any evidence of arthritis (Figure 54). Based on this, the Forensic Anthropologist was able to estimate a not-older-than age range for the bone fragment. Because this falls outside of the author's area of expertise in forensic modeling, the importance of this observation is not addressed here. Rather, reports of Dr. Leslie Eisenberg should be consulted and referenced.




- *Skeletal Models Summary*

Based on evidence control numbers documented by the Calumet County Sheriff's Department and the reports of Forensic Anthropologist Dr. Leslie Eisenberg, three-dimensional skeletal models were created to depict the bones represented in totality by recovered fragments. It is again stated and stressed that while in most cases entire bones were highlighted in the models, only fragments were located by investigators. The intent of the author was to show in a graphical format how much of a human skeleton was indicated by recognizable and diagnostic fragments.

FORENSIC DIAGRAMMING SUMMARY

At the request of the Calumet County Sheriff's Department, scaled scene diagrams and three-dimensional models were generated concerning an incident having taken place at Avery's Auto Salvage in Manitowoc County. Based on requests and information received from investigators, the models were used to provide visual references to evidence collected by law enforcement personnel.

Respectfully Submitted,



Timothy P. Austin, Trooper
Accredited Reconstruction Specialist

Technical Reconstruction Unit
Wisconsin State Patrol Academy

APPENDIX I

Photo Logs and Narrative of Trooper James Reese

APPENDIX II

Photo Logs of Trooper Lewis Judge

APPENDIX III

Digital Photo Logs of Trooper Pilot Dennis McConnell

APPENDIX IV

Digital Photo Logs of Trooper Timothy Austin

APPENDIX V

Narrative Report of Trooper Duane Meyers

Narrative Report of Trooper Todd Weinberger

APPENDIX VI

Geodimeter Total Station Survey Data