Analysis of a .54-caliber Minié Ball From the Immanuel Church, Pilot Knob, Missouri

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June20, 2004

A single lead bullet was submitted for analysis by Steve Dasovich. The bullet was recovered from the Immanuel Lutheran Church at Pilot Knob, Missouri and is believed to have a Civil War origin. The bullet was examined following standard firearms identification procedures, including visual examination using a 10x hand lens and microscopic examination using an American Optical Universal Comparison microscope with 30 to 70 power magnification. Photographs of the bullet were taken using a Nikon 995 digital camera attached to the microscope.

The submitted bullet is made of soft lead, although no remains of casting or pressing scars remain that allow the method of manufacture to be determined. The bullet is a hollow base round nose conical form with three lubricating grooves or cannelures around the base (Figure 1). This form is commonly known as a Minié ball. The bullet type was developed by a Belgian army officer, Claude Minié in the 1850s and adopted for U.S. service in 1854 (Thomas and Thomas 1996:vii).

The bullet is damaged, which was caused by impact after being fired, but measures approximately .521 inch in diameter and .883 inch long, and weighs 27.5 grams. The diameter, length, and weight are consistent with .54-caliber Minié ball (Thomas 1997:124-124). The style is similar to types known to be manufactured by the U.S. Army's Allegheny Arsenal (Thomas 1997:124) and by Confederate forces as well (Thomas and Thomas 1996:34).

The bullet was fired and retains land and groove impressions from the rifled bore in which it was fired (Figure 2). There appear to be six evenly spaced land and groove impressions on the bullet with a right hand twist, but these are lightly impressed in the lead. Two firearms have this type of rifling. One is the British Kerr rifle of the type imported by both the Union and Confederate governments during the Civil War (Noe et al. 1999:30). The second is the Model 1836 Hall carbine, an outdate cavalry arm, but one that saw wide used in the Trans-Mississippi theater by troops of both sides during the war (Gluckman 1965:320). The bullet was most likely fired in the Hall carbine.

The lightly impressed land and groove impressions suggest the weapon's bore was fouled to some degree at the time the bullet was fired. Dirty or fouled bores tend to fill the rifling causing the fired bullet to inadequately grip the rifling as it travels down the gun's barrel, thus becoming spin destabilized, or unbalanced in flight.

The bullet is impact damaged in such a way as to support the fact it was spin destabilized and began tumbling during its flight toward its target. The base is damaged (Figuer 2)

suggesting the bullet hit base first in mid tumble. Microscopic examination showed there is foreign material, minute particles of quartz, feldspar and other rocks, imbedded in the body of the bullet (Figure 3). The bullet nose also shows impact damage with the presence of several widely spaced striae that are undetermined to source (Figure 2). There is additional mechanical damage to the bullet's base that is exhibited as a series of multiple overlapping scars (Figures 4, 5) that were the last scarring to occur to the bullet since they overlay all other damage features.

The evidence suggests that the bullet was tumbling as it struck an intermediate target that contained some sand or small rocks before striking its final target. The second object was likely a person, since the final series of scars are entirely consistent with the tips of a medical forceps. The overlapping nature of the probable forceps scars suggest the surgeon lost his grip on the bullet one or more times before successfully withdrawing the bullet from the wound track.

In summary, the bullet submitted for analysis is a .54-caliber Minié ball. The bullet was most likely fired from a Hall carbine with a fouled bore, although the British Kerr rifle cannot be ruled completely out. The bullet was spin destabilized during its flight, most likely tumbling through the air. It struck at least one intermediate object that caused fine sands to be imbedded in the bullet's body before coming to rest in the body of person. The overlapping medical forceps scars suggest the surgeon had some difficulty in gripping and removing the bullet from the wound track. The forceps slipped from the bullet one or more times before it was successfully withdrawn and came to be deposited below the trapdoor of the Immanuel Lutheran Church some time during the Civil War.

References Cited

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Noe, David, Larry W. Yantz, and James B. Whisker
1999 *Firearms from Europe*. Rowe Publications, Rochester, NY.

Thomas, Dean S.
1997 Round *Ball to Rimfire: A History of Civil War Small Arms Ammunition, Part One*. Thomas Publications, Gettysburg, PA.

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Figure 1. The .54-caliber Minié ball from Pilot Knob's Immanuel Lutheran Church.

Figure 2. The bullet highlighted to show various diagnostic features and impact damage: top arrow points to nose damaged area, bottom arrow points to base damage, and the line denotes the right-hand twist of the land and groove impression.

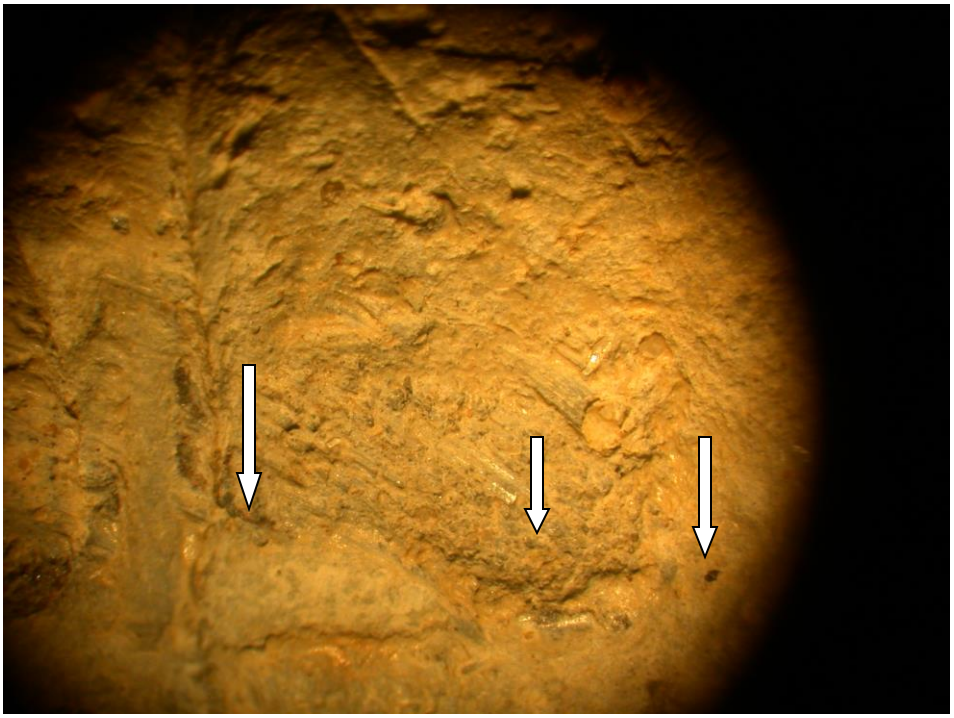

Figure 3. Microphotograph with arrows pointing to sand inclusions in the body of the bullet.

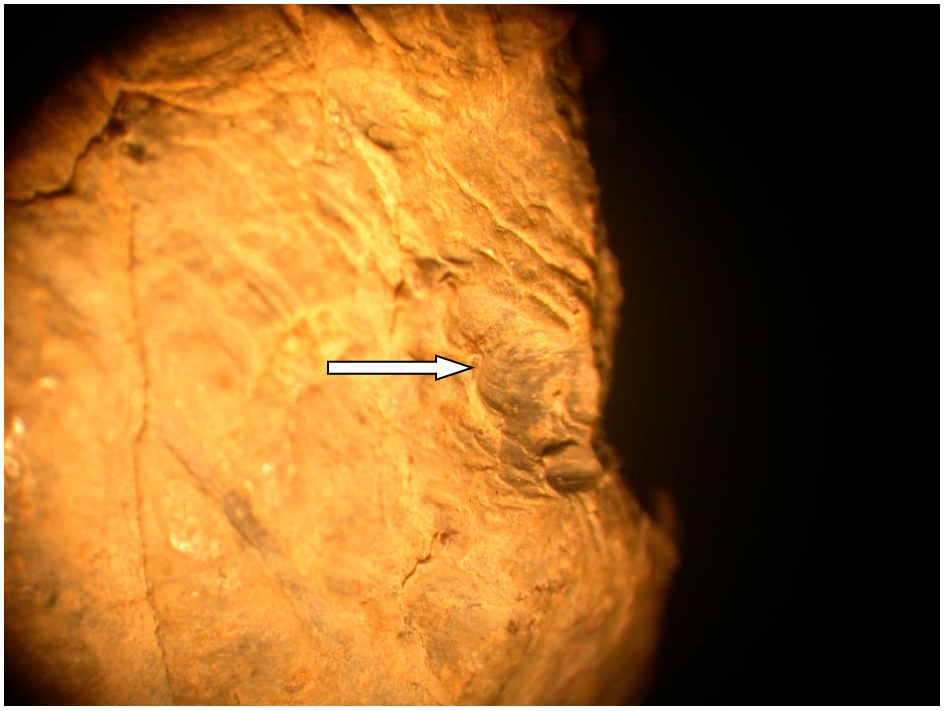

Figure 4. Medical forceps scars on the base of the bullet. The line running vertically across the image is on of the bullet's lubricating grooves.

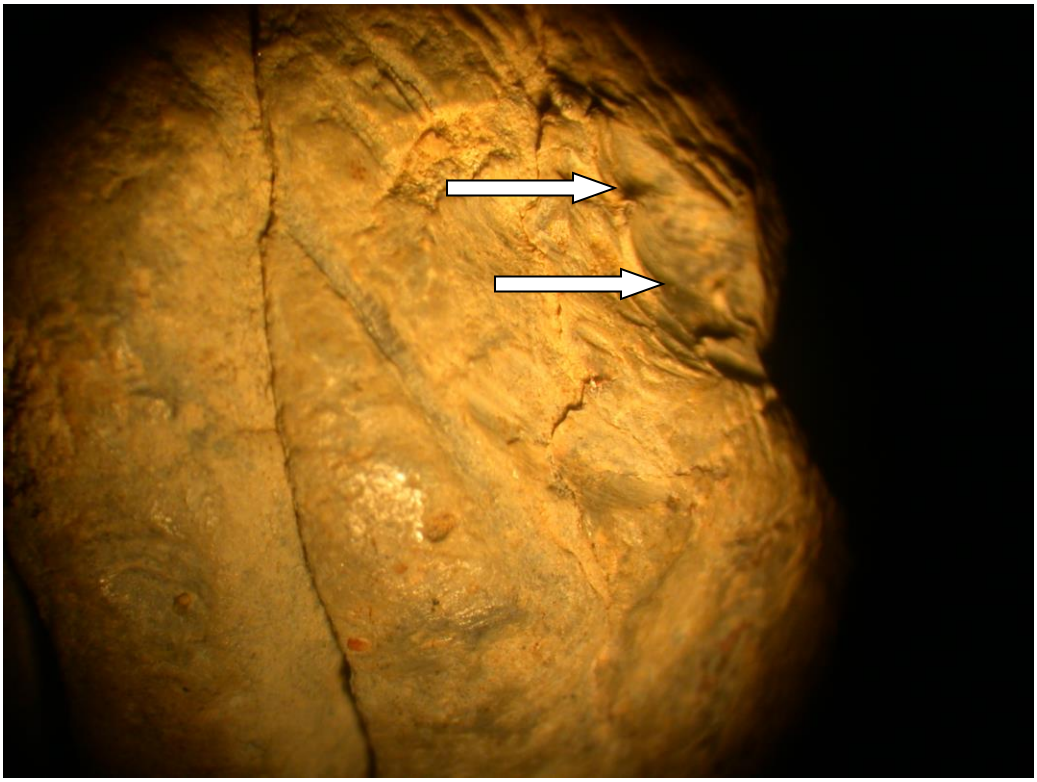

Figure 5. Multiple overlapping scars of a medical forceps as indicated by the arrows. The line running vertically across the image is on of the bullet's lubricating grooves.