Crown of Thorns on the Turin Shroud: Image-Constrained Architecture and Botanical Attribution to *Ziziphus spina-christi*

Author: Otangelo Grasso, written with AI assistance
Correspondence: otangelograsso@gmail.com
Date: 24 October 2025

Abstract

Cranial bloodstains on the Turin Shroud present a perimeter-band topology—frontal/temporal and nuchal clusters—separated by a vertex interval without transfer. **The vertex interval exceeds the projected front–back scalp depth, evidencing non-contact across the apex.** Using an operational locus definition on a composite of the head regions, we count 28–37 discrete puncture loci in the visible anterior+posterior fields. The lateral–posterior dispersion, together with the vertex non-contact, excludes a thin diadem and favors either a low-seated multi-coil circlet or a shallow capiform wreath that does not engage the superior scalp. A botanical/mechanical screen of Levantine thorn taxa identifies *Ziziphus spina-christi* as the most likely stock: paired stipular spines (≈2–4 cm), branchlets ≈0.6–1.0 cm in diameter, stiff-pliable enough for 3–4 structural coils. A parametric crown specification is provided for replication and quantitative fitting to mapped loci.

1. Introduction

The Shroud's head-region bloodstains can be treated as constraints on the geometry and material of the headgear that produced them. Two image-level observations are decisive: perimeter dispersion, where puncture/locus clusters appear around the brow/temples anteriorly and the nuchal/occipital band posteriorly; and a vertex gap, where a continuous ≈20 cm interval across the apex shows no visible transfer.[1] Any viable crown model must create many active punctures along the cranial rim while leaving the vertex unengaged at wrap time. This paper focuses on what the image supports and couples it with botanical feasibility.

2. Materials and Methods (Image-Based)

Composite overlays of the frontal and dorsal head regions with an aligned crowned profile were examined. A *locus* is counted where a discrete clot origin or primary rivulet start is resolvable; adjacent micro-marks feeding the same flow are clustered as one locus. Visible anterior and posterior bands were annotated; lateral fields are partially occluded by hair. Counts are reported as a range.

The vertex interval represents the linear distance between the anterior and posterior head images across the apex where no transfer is present; measured as ≈20 cm on the composite. Candidate shrubs/trees native to Judea/Samaria were compared by thorn geometry, node frequency, branchlet stiffness/pliability, and plaitability into structural coils.

3. Results

3.1 Loci Count and Topology

A conservative manual count yields ≈28 loci; with less aggressive clustering and thresholding the total rises toward ≈37 for the visible anterior+posterior fields. The topology is not limited to the hairline; loci are distributed across frontal, temporal, and nuchal bands. A thin diadem concentrated at the brow does not explain this spread.

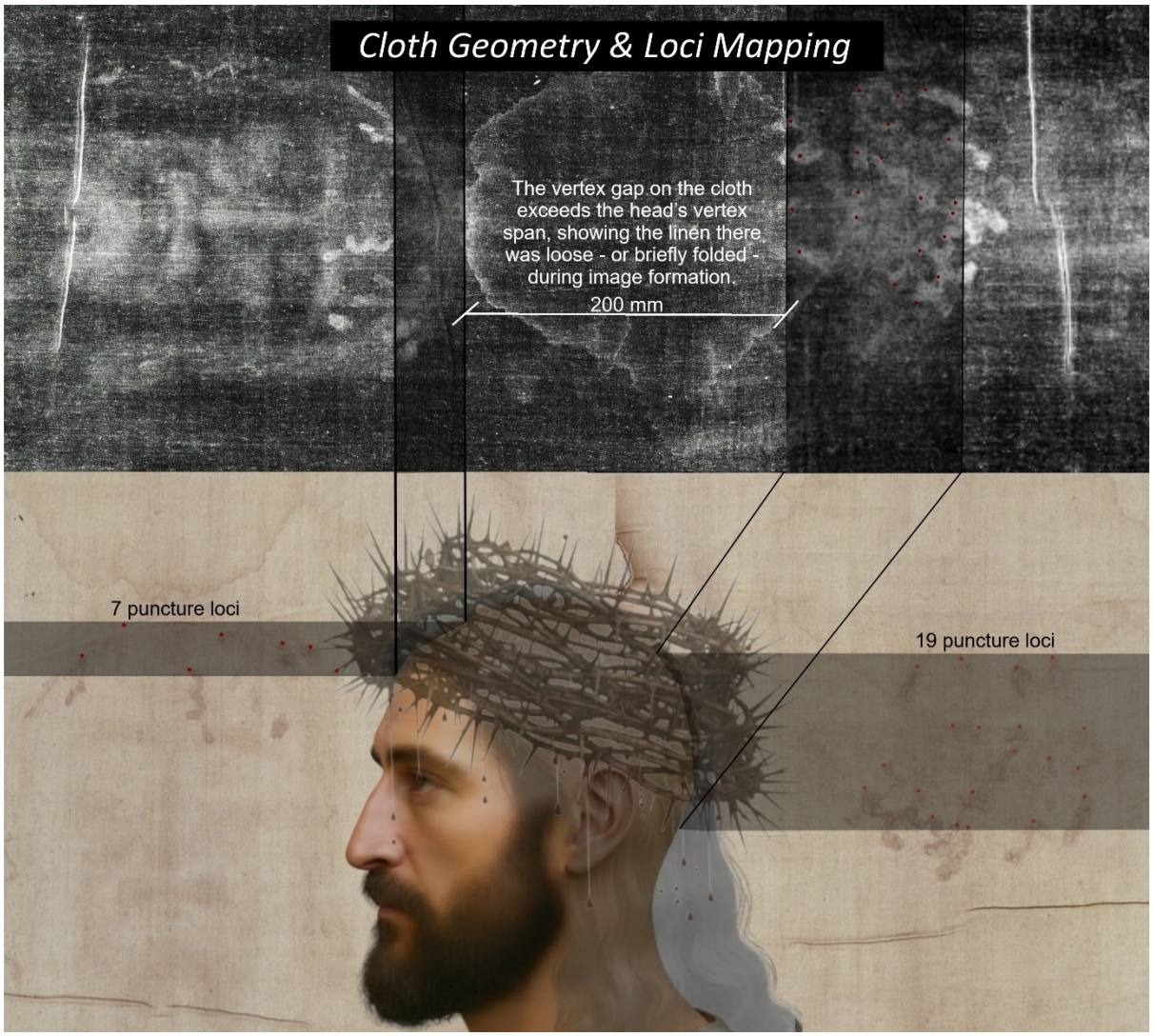


Figure 1. Cranial wound topology and cloth–head geometry.
Top: dorsal head zone; middle band: horizontal transect across the frontal-to-occipital region; bottom: lateral reconstruction with a cap-like circlet. Red dots mark discrete puncture loci within the band (**7 frontal/temporal, 19 occipital/nuchal; 26 shown**). **The inter-image interval across the vertex exceeds the scalp front–back depth,** leaving the apex non-imaged and demonstrating a vertex non-contact bridge. The loci cluster where the linen recontacts at the crown's rim, consistent with a low, multi-coil cap-like circlet that elevates the cloth over the vertex; a narrow radial circlet is excluded.

3.2 Vertex Non-Contact Bridge

A continuous apex interval shows no transfer—no clots, gravity streaks, or free-fall droplets—and the measured inter-image spacing on the cloth is wider than the anatomical front–back scalp span. The cloth therefore did not contact the vertex at wrap time. The geometry seen on the linen is sufficient: the apex was bridged, either by a loose drape or a brief fold/pleat across the vertex, consistent with a low, multi-coil circlet that engages the rim while leaving the superior scalp unengaged.[3]

3.3 Seating Mechanics (Qualitative)

A multi-coil circlet with inward-pointing spines initially "floats" on hair. Forced seating/handling produces tangential tracks with entrance–exit pairs or triads (entrance–exit–re-entry); yields posterior concentration near an overlap/tie; and can create occasional supraband punctures a few centimeters above the hoop plane when spine tips break and re-enter. These behaviors align with the perimeter-band pattern.[2,3]

4. Botanical Attribution

4.1 Candidate Taxa (Levant)

Ziziphus spina-christi (Christ's-thorn jujube) — paired stipular thorns at each node (one straighter, one slightly recurved); thorn length ≈2–4 cm; branchlets ≈0.6–1.0 cm in diameter; wood stiff yet plaitable; abundant from the Jordan Valley to the Judean lowlands.[5,6]

Paliurus spina-christi (Jerusalem thorn) — paired thorns; more whippy branchlets; workable but less rigid for high-stability hoops.[5]

Gundelia tournefortii (tumble thistle) — a spiny composite with rigid, branched heads and sharp bracts; often cited in Shroud discussions due to reported pollen identifications. Its architecture tends toward globular, helmet-like modules rather than long, plaitable shoots; mass and brittleness are higher than in woody thorn branchlets.[5]

Other local thorny shrubs (*Rhamnus lycioides*, *Sarcopoterium spinosum*, *Lycium shawii*) have sharp spines but twiggy/brittle growth forms prone to fragmentation or collapse under multi-coil loading.[6]

Note on Danin: In his monograph, Danin highlights image features consistent with both *Z. spina-christi* and *R. lycioides* and uses these to motivate a museum reconstruction; he does not select a single "prime" species.[5]

4.2 Why *Z. spina-christi* fits best

• *Thorn geometry/density.* Paired stipular spines at ≈1.5–3.0 cm node spacing generate alternating left/right incidence angles that account for multidirectional puncture loci without unrealistic thorn frequencies.

• *Branchlet mechanics.* Stiff-pliable shoots sustain 3–4 structural coils that hold shape under compression, producing many rim punctures while leaving the vertex unengaged.

• *Availability and tradition.* Common around Jerusalem with long regional identification as "Christ's thorn."

• *Failure modes consistent with data.* Spine tips can snap near the base and re-enter slightly above the hoop plane, explaining occasional supraband loci.



Paired stipular thorns at nodes (one straighter, one slightly recurved); node spacing ≈1.5–3.0 cm; branchlet diameter ≈0.6–1.0 cm—suitable for rigid coils that hold geometry under compression. Mechanical balance of stiffness and pliability supports 3–4 coils; thorn length commonly 2–4 cm, aligning with the locus density without demanding unrealistically high node counts. Source Link

• *Against a Gundelia helmet.* A crown assembled from *G. tournefortii* heads would be bulkier, more brittle, and naturally dome-forming—tending to engage the superior scalp. That geometry conflicts with the measured ≈20 cm vertex non-contact and with the perimeter-band dispersion on the cloth. While *Gundelia* material may have been present in the environment (or contributed incidental spines/pollen), it is a poorer fit as the primary structural stock for a multi-coil wreath.[5,7]

5. Image-Constrained Crown Architecture

5.1 Two Viable Geometries

A large multi-coil circlet (low-seated) with 3–4 coils, outer/inner diameter 21–23 cm / 17–19 cm, and vertical height 7–9 cm produces frontal/temporal and nuchal dispersion while maintaining vertex standoff via hair and hoop geometry. Alternatively, a shallow capiform

wreath with 3–4 coils and partial cross-weave, vertical height 9–12 cm, provides similar perimeter dispersion where dome and hair volume explain vertex non-transfer.[2,3]



This four-view sequence renders a low-seated, multi-coil circlet—the configuration that best matches the Shroud's perimeter puncture bands and the ≈20 cm vertex non-contact. From the front, the crown sits below the apex and compresses the hair at the brow and temples; inward-angled thorns enter tangentially and create vertical rivulets that follow skin furrows and, at the temples, the course of trigeminal branches, echoing the Shroud's forehead/nasion clots. In the oblique and profile views, forced seating is evident in entrance–exit tracks and occasional short streaks beginning just above the hoop plane, the kind of supraband marks expected when spine tips snap and re-enter during compression. The geometry explains how lateral punctures can be numerous while the vertex remains free—precisely the cloth's "bridge" zone with no transfer. The rear view concentrates attention at the nape, where an overlap or tie would naturally gather and where the Shroud shows clustered occipital staining. Gravity-ruled flows descend cleanly from this band, consistent with a circlet worn low rather than a helmet that would perforate the superior scalp. The build and thorn rhythm correspond to *Ziziphus spina-christi*: paired stipular spines about 2–4 cm long on branchlets ~0.6–1.0 cm thick, stiff yet plaitable enough for three to four coils. Such stock can produce the observed 28–37 anterior+posterior puncture loci without vertex engagement, something a thin diadem under-predicts and a thistle "helmet" would contradict.

A thin diadem is rejected due to insufficient posterior/lateral loci and no natural explanation for the continuous vertex gap.[3,1]

5.2 Parametric Specification (For Replication)

Species: *Z. spina-christi* (primary), *Paliurus spina-christi* (secondary). Branchlet diameter: 0.6–1.0 cm. Thorn length/spacing: 2.0–3.5 cm / 1.5–3.0 cm (paired, alternating). Coils: 3–4; outer diameter 21–23 cm; inner diameter 17–19 cm. Vertical height: 7–9 cm (circlet) or 9–12 cm (capiform). Binding: minimal ties at crossings; optional rush/bast stabilizer at the overlap.[2,5]

6. Discussion

The Shroud provides boundary conditions: many rim punctures, a continuous vertex gap, and occasional supraband hits. A helmet-like dome implies frequent superior-scalp lesions; with other head wounds still transferring at burial, one would expect traces across the bridge. Their absence pushes the solution toward a low-seated circlet or shallow capiform wreath.[3,4] The architectural choice persists across the counting range 28–37 because the geometry, not the

exact tally, drives the conclusion. Hair occlusion and thresholding explain the range; adding lateral fields would raise the global total but does not alter the vertex constraint.[1]

7. Conclusion

The perimeter-band puncture field and the ≈20 cm vertex non-transfer interval constrain the "crown" to a low-seated multi-coil circlet or shallow capiform wreath. A thin diadem is inconsistent with dispersion; a helmet requires ad-hoc conditions to hide vertex engagement. Among Levantine taxa, *Ziziphus spina-christi* best satisfies the image-based constraints and the mechanical behavior required to reproduce the observed loci. The parametric specification above enables reproducible reconstructions and quantitative fitting to mapped points.[1]



This diptych sets a thin diadem (left) against a cap-like wreath (right). The Shroud's data exclude the diadem: a narrow circlet concentrated at the hairline cannot generate the broad lateral–posterior dispersion of puncture loci, nor can it account for the continuous ≈20 cm vertex gap with no blood transfer. The cap-like build on the right—multiple stacked coils forming a shallow dome—fits the perimeter bands on the forehead/temples and at the nape while leaving the superior scalp unengaged. Forced seating of such a cap explains the tangential tracks down the brow and the denser staining near the occipital overlap. In short: a small circlet is inconsistent with the cloth; a shallow cap remains a coherent alternative that matches the mapped loci and the apex non-contact.

References

1. Barbet, P. (1963/2017 ed.). *A Doctor at Calvary*. Allegro/Muriwai. Link. (Classic surgical analysis proposing a cap-like crown based on posterior blood flows and testimonia, establishing the interpretive framework for the helmet hypothesis that this study critiques.)

2. Rodante, S. (1982). The Coronation of Thorns in the Light of the Shroud. *Shroud Spectrum International*, 2, 4-24. Link. (Detailed examination of cranial bloodflow patterns and puncture wound distribution on the Shroud, proposing geometric constraints for crown architecture based on observed loci topology.)

3. Zugibe, F. T. (2005). *The Crucifixion of Jesus: A Forensic Inquiry*. M. Evans. Link. (Forensic medical examination of crucifixion trauma providing context for wound interpretation and blood-flow patterns relevant to Crown of Thorns analysis.)

4. König, L., Kolzer, J., Haltaufderheide, K., & Schaaf, B. (2024). Experiments regarding possible formation of blood stains on the Turin Shroud by contact with a human body. *International Journal of Legal Medicine*, 138, 1059-1068. Link. (Experimental validation of bloodstain transfer mechanisms under burial conditions, quantifying contact pressures and fabric-skin interface requirements for pattern formation.)

5. Danin, A. (2010). Botany of the Shroud of Turin. Link. (Documents plant images near the head; Jerusalem–Hebron localization; March–April seasonality; reports Prof. Litt's finding that Frei's pollen grains cannot be securely identified to genus/species.)

6. Zohary, M. (1982). *Plants of the Bible*. Cambridge University Press. Link. (Survey of Levantine flora with historical and archaeological context, documenting distribution, traditional uses, and morphological characteristics of candidate thorn species in first-century Judea.)

7. Frei, M. (1982). Nine Years of Palynological Studies on the Shroud. *Shroud Spectrum International*, 3, 3-7. Link. (Palynological evidence supporting Eastern Mediterranean provenance, with identification of pollen taxa consistent with Jerusalem-area vegetation including *Ziziphus* and related Rhamnaceae species.)

Further references:

From the St Louis Conference 2025.

For the wounds to the heels and the crown of thorns as a deep crown:

Moon Pam; The Shroud of Turin: Unveiling the Medical and Spiritual Significance; Shroud of Turin International Conference 2025; St Louis; Available online: Symposium and Educational Endeavours Corporation; https://www.youtube.com/watch?v=jgrPw1N3Mko

For the debate between the Image of Edessa/ Holy Mandylion and the Image of Camuliana and St. Mary Blachernae and the folding patterns for the *Man of Sorrows*:

Moon Pam; Folding Patterns and the History of the Shroud; Shroud of Turin International Conference 2025; St Louis; Available online: Symposium and Educational Endeavours Corporation; https://www.youtube.com/watch?v=Boq_Ufe7s7o

A few additional papers:

The crown of thorns as a deep crown rather than a circlet:

Moon P: *THE LIER SHROUD AND LUCAS CRANACH THE ELDER*; British Society for the Turin Shroud; Newsletter 79; June 2014; Available online: https://www.shroud.com/pdfs/n79part6.pdf; page 30-32

Wounds to the heels and Genesis 3:15:

Moon P; *Spiritual reflections on the heel injury of the Man of the Holy Shroud*, Lent 2024; Available online:

https://www.academia.edu/115675406/Spiritual_reflections_on_the_heel_injury_of_the_Man_of_the_Holy_Shroud

St Mary Blachernae:

Moon P; *The Folding Patterns of the Shroud of Turin*; 7th January, 2025; Available online:

https://www.academia.edu/126895116/The_Folding_Patterns_of_the_Shroud_of_Turin

Numbers 5 and 6

Other papers include:

Moon P; *Three treasures of Constantinople*; Science, Theology and the Holy Shroud; ed. R Gary Chaing and Evelyn M White; Edited papers of 2019 International Shroud Conference; Doorway Publications 2020: Available Online: https://www.academia.edu/42642715/Three_Treasures_of_Constantinople_The_Holy_Blood_of_Bruges_a_relic_the_Limburg_Staurotheke_a_reliquary_and_the_Madrid_Skylitzes_an_illustrated_manuscript_all_provide_historical_evidence_that_the_Shroud_of_Turin_is_much_older_than_the_1988_radiocarbon_dating_suggests