



# Podiatry and medicolegal investigations

David Agoada, D.P.M., M.S.

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## The Truth About **Forensics**

*Debunking the Shaky Science of  
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# Crime Scene



# Objectives

- Describe when a podiatrist may become involved with a forensic investigation
- Define forensic podiatry
- Discuss forms of pedal evidence
- Demonstrate shoe wear and foot print evidence



A podiatrist may become involved in a forensic investigation when:

1. A podiatrist's medical records are requested to help determine an individual's identity
2. A podiatrist's knowledge of foot pathology or the practice of podiatric medicine is needed
3. A podiatrist's knowledge and experience in forensic podiatry is needed.



When a podiatrist's medical records may be requested to help determine an individual's identity

1. General patient information
2. Foot/ lower extremity description
3. General and foot specific medical history
  4. Pedal surgical history
  5. Relevant foot x-rays
  6. Preserved lab specimens





- **CHAPTER 38. MEDICAL EXAMINERS AND INQUESTS**
- **Chapter 38: Section 4. Investigation; transportation of bodies**



- In carrying out the duties prescribed by this section, the chief medical examiner or his designee shall be entitled to review and receive copies of medical records, hospital records, or information which he deems relevant to establishing the cause and manner of death. No person or hospital shall be subject to liability of any nature for providing such records or information in good faith at the request of the office





# Jasmine Fiore





**Slain Model Identified By Breast Implants After Fingers, Teeth Removed** — The body of slain model Jasmine Fiore was so mangled, it had to be identified by the serial numbers on her breast implants, a spokesperson for the Orange County District Attorney tells Usmagazine.com . Fiore's fingers and teeth were removed to "hinder law enforcement's ability to identify her," spokesperson Farrah Emami tells Us .



## Podiatry Practice is based on a core of knowledge includes (modified from Vernon):

- Lower limb anatomy and physiology
- Structural pathologies of the foot
- Recognition and care of the “at risk” foot (eg. diabetes mellitus)
- Lower extremity biomechanics
- Relationship between foot wear and the functioning foot.
- Medical and surgical treatment of foot related problems.







Forensic Podiatry is the “application of sound and researched podiatric knowledge in the context of forensic and mass disaster investigations. This may be for the purposes of person identification, to show the association of an individual with the scene of a crime, or to answer any other legal question concerning the foot or footwear that requires knowledge of the functioning foot”.

# When a forensic podiatrist may be consulted

1. Foot wear examiner makes a positive ID between the foot impression and the suspect's shoes, but..
  - the suspect denies ownership
  - it is an inclusive footwear exam
2. Gait analysis is needed
3. Foot profiling is required: need approximations to help determine an individual's height or shoe size from print or impression
4. Determine pathological or biomechanical problems.



## What a forensic podiatrist may do

1. Examination of foot prints; bare or sock clad
  2. Examination of foot impressions
3. Examination of footwear - particularly where there is a question of the predominant wearer or ownership of the footwear in questions
  4. Footprint profiling
  5. Mass disaster applications



# EVIDENCE

Evidence – data, information, or testimony on which judgments are made



## Daubert Criteria or Standards

1. Has the scientific technique or theory been (or can be) tested?
2. What is the known or potential rate of error for the theory or technique?
3. Do standards exist for the control and maintenance of the theory or technique's operation?
4. Has the theory or technique been subjected to peer review and publication?
5. Has the theory or technique attracted widespread acceptance within a relevant scientific community?



## Guidance from the Kumho decision (Grivas and Kumar)

1. Expert witness can develop theories based on their observation and experiences and then apply those theories to the case before the court.
2. All forms of expert witness testimony should be evaluated with the same level of rigor.
3. The Daubert standards are flexible guidelines that may not be applicable in every instance of expert testimony.



# Forms of Evidence



# Identification

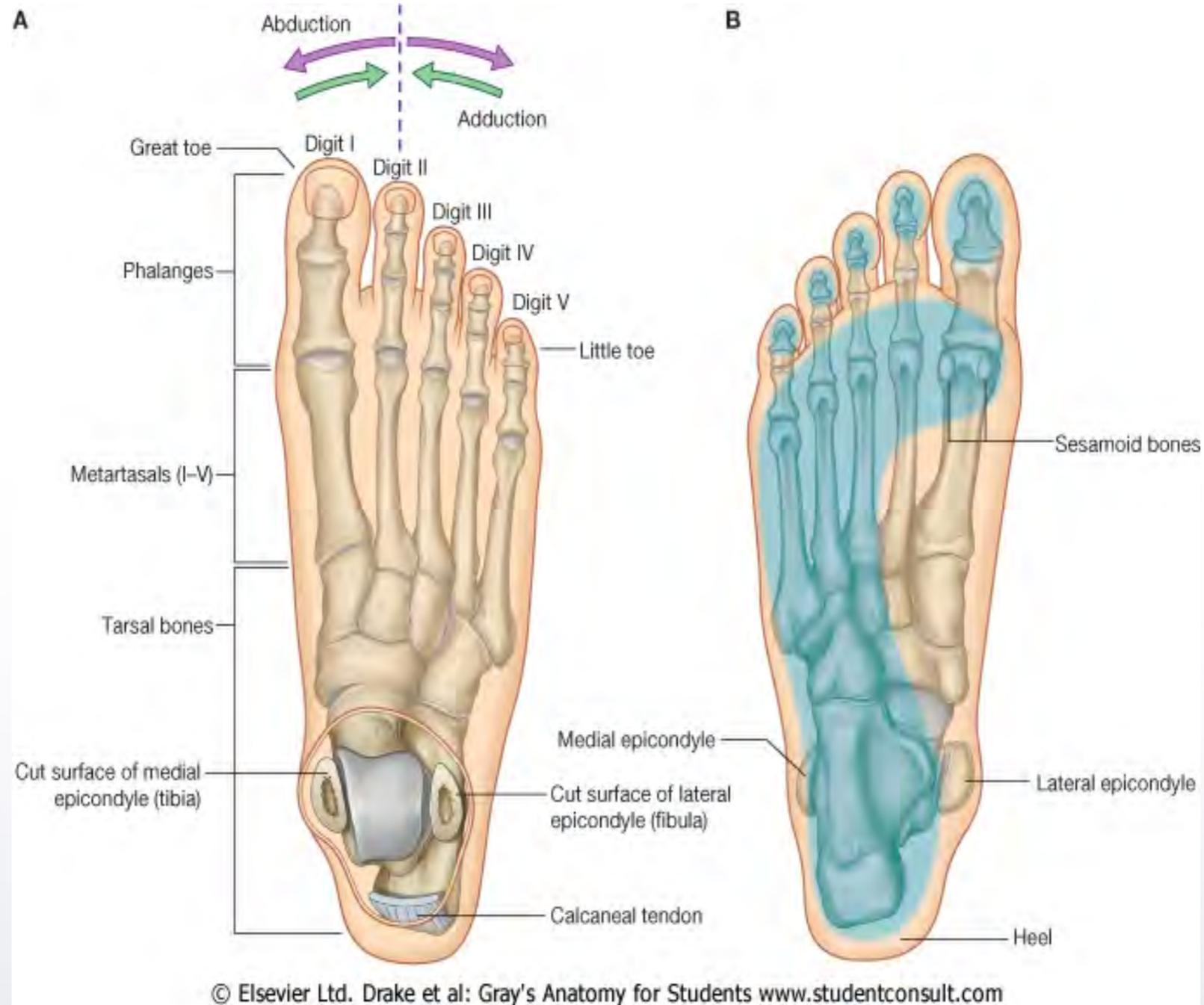
- Fingerprints
- Pedal prints
- Dental
- Osteology
- Hair and soft tissue
- DNA

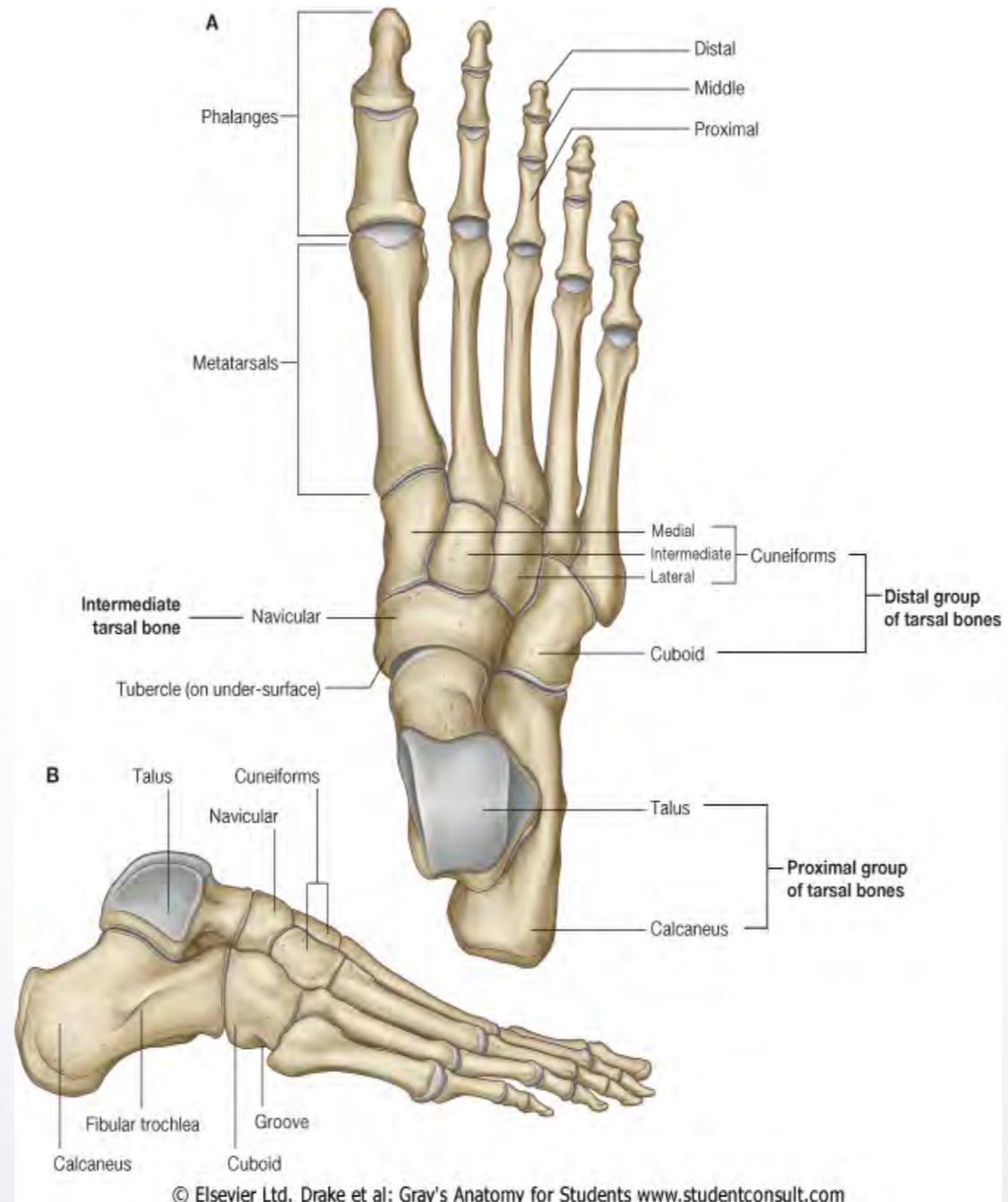




## Foot morphology

The foot's anatomical, morphological and biomechanic configuration is genetically programmed and modified by use and events throughout one's life. It is different in everyone, even ridge patterns in identical twins. The challenge is to identify those unique features and compare them with the evidence available.







Foot morphology classification may be based on such things as:

1. Relative digit length
2. Arch configuration
3. Biomechanics (the “dynamic foot”)
4. Pathology and pathologic features



# Forms of Barefoot Impression Evidence

- **Naked foot impressions with ridge detail**



- **Naked foot impressions without ridge detail**



- **Sock clad impressions**
- **Visible or latent**



- **Impressions in lost or abandoned footwear**







## Comparison Techniques Š K to Q

Direct

Side by Side

Measurements

Overlay



## Analysis of Ball Area of Foot Impression

### □ BALL AREA

Š Space between foot pad and toes

Š Medial / Lateral landmarks

Š WRL- Web Ridge Line





# Identification Lines / Foot Zones





# Analysis of Heel Area of Foot Impression

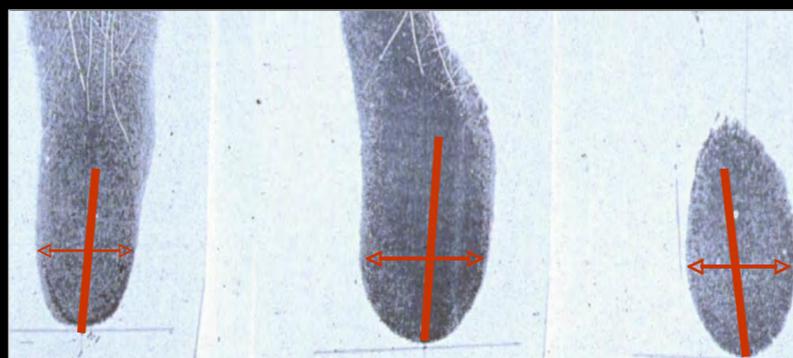
**HEEL**

Width

Shape

Length

Angle





## Analysis of Arch Area of Foot Impression

- ARCH

- ??????????????????

- Š High arch / Flat arch
  - Š Minimum arch width

- Š Arch shape and contours





## Shoeprints





## Analysis of Toe Area of Foot Impression



### □ TOES

- § Relative positions to each other.
- § Size - length and width of toe pad; extension of toe.
- § Shape and Contours.
- § Toes that do not print.
- § Printing or non-printing toe stems.





## METHODOLOGY

- ANALYSIS
- COMPARISON
- EVALUATION

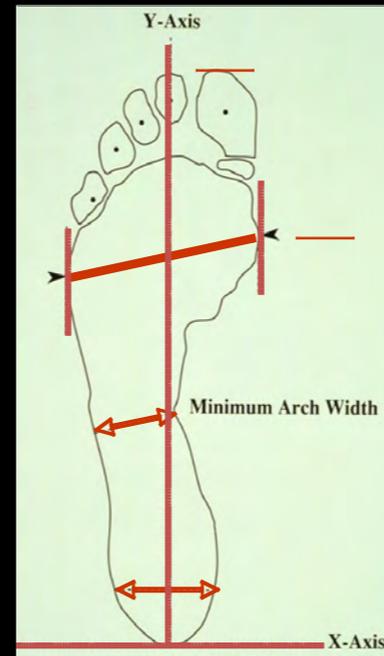


# Footprints



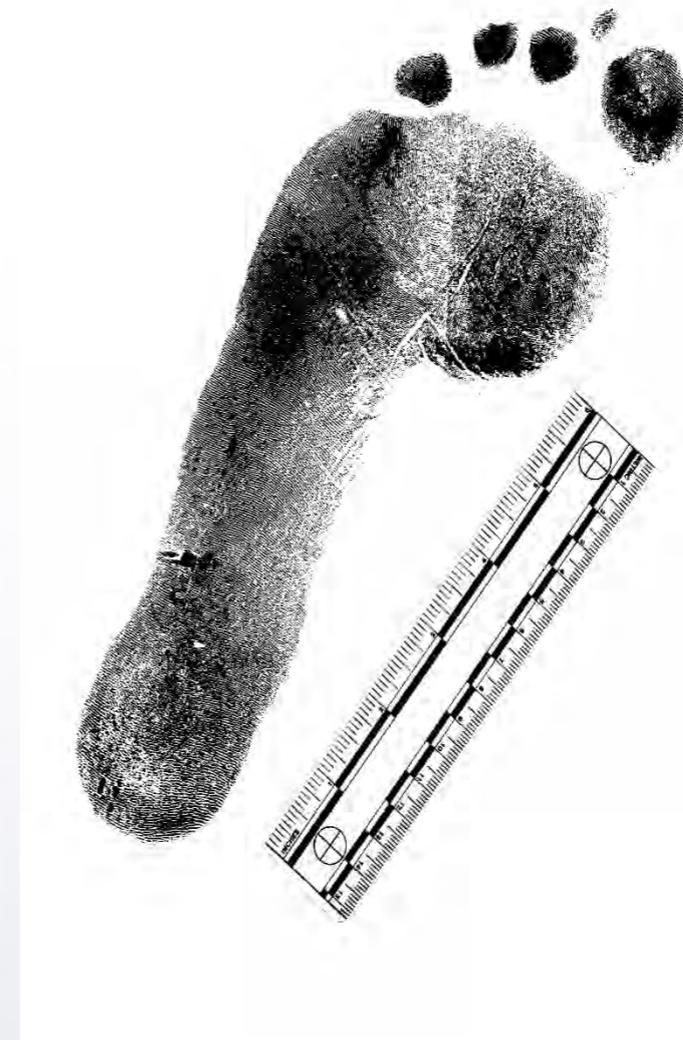
## Analysis of the General Dimensions of Foot Print

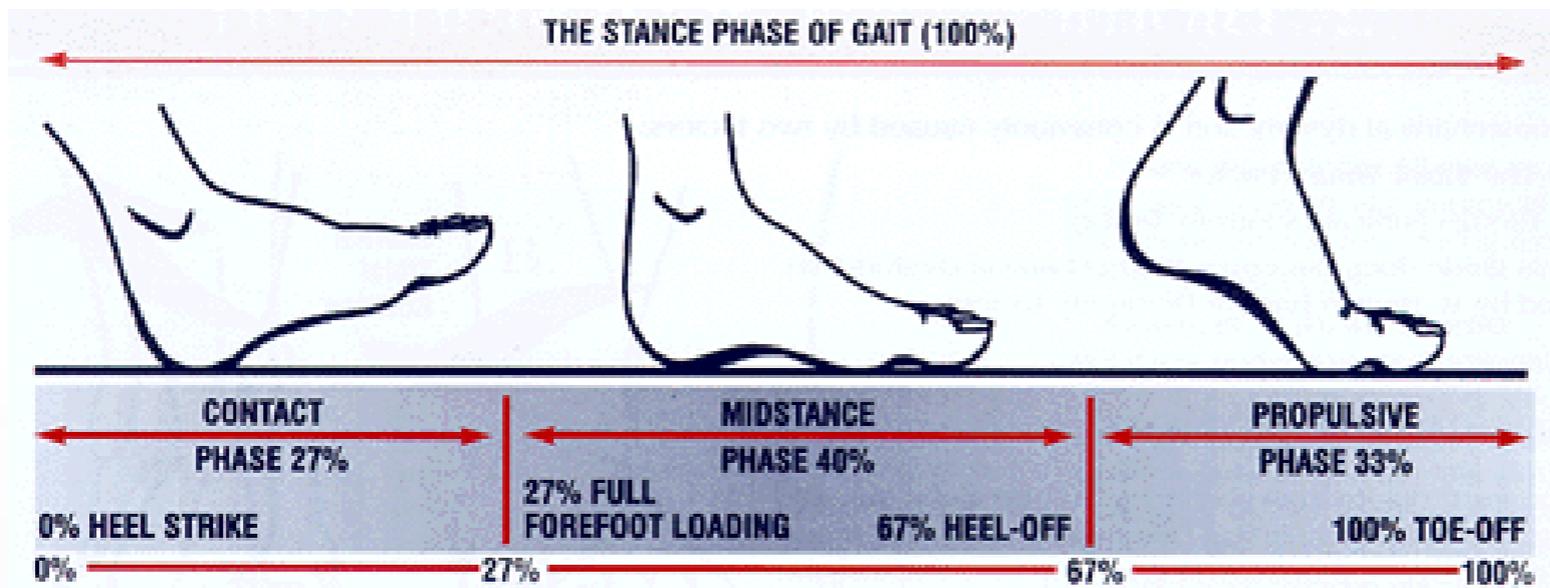
- ❑ Heel to toe length
- ❑ Maximum foot length
- ❑ Heel to ball length
- ❑ Width across ball area
- ❑ Heel width
- ❑ Minimum arch width

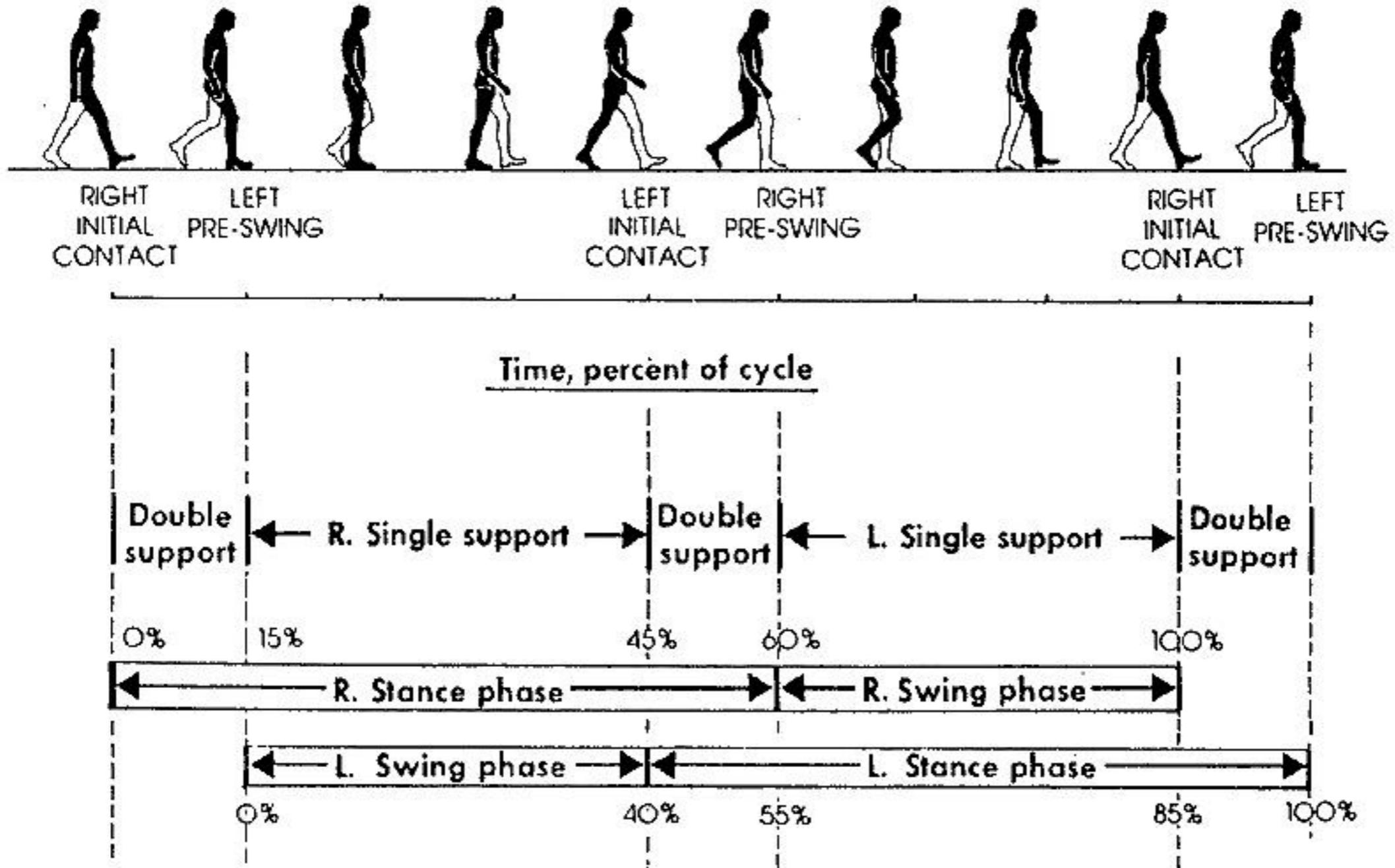




# K (Known) to Q (Questioned)



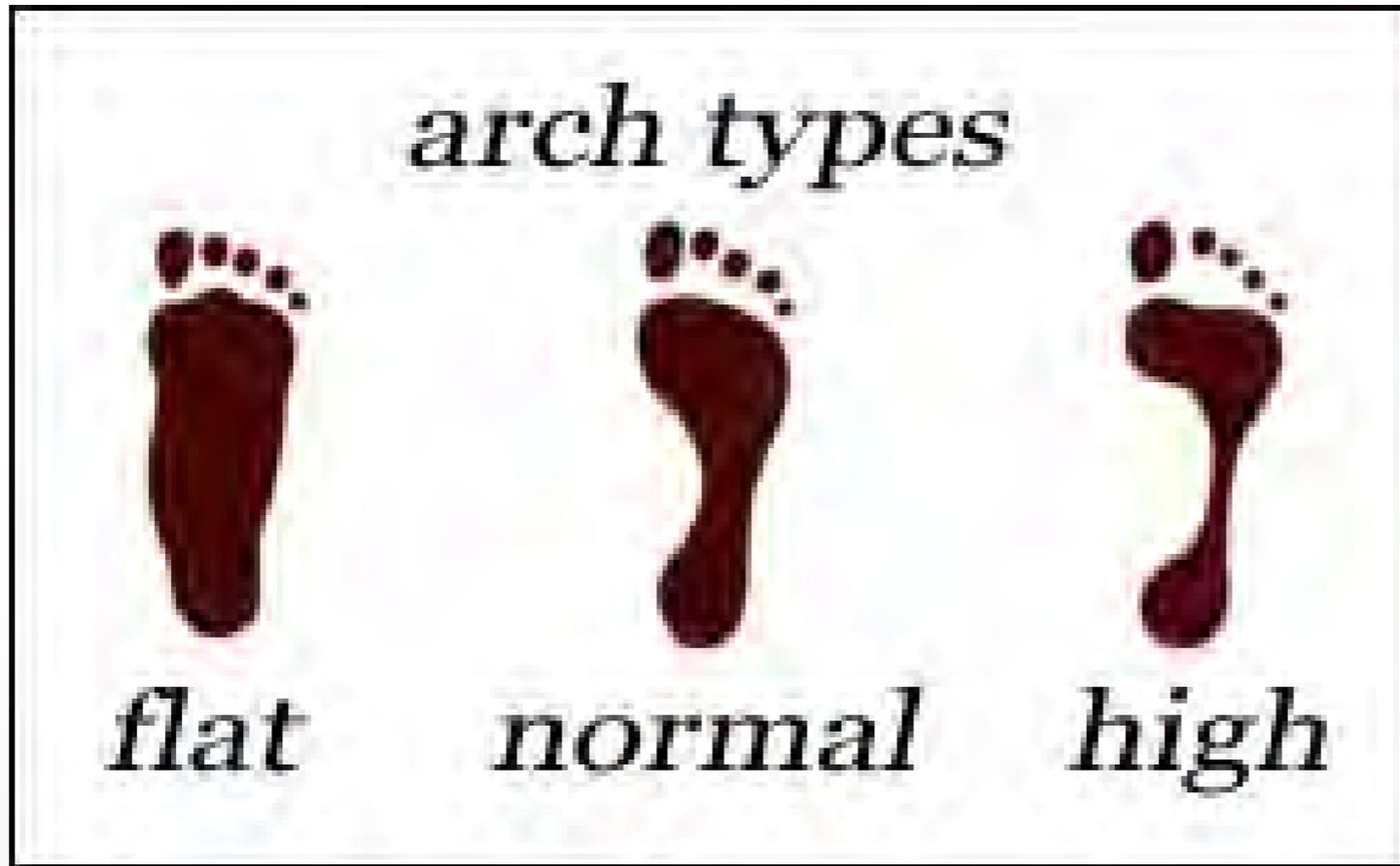






## Foot print morphology

1. High Arch (Pes cavus)
2. Normal arch
3. Flat foot (Pes Cavus)

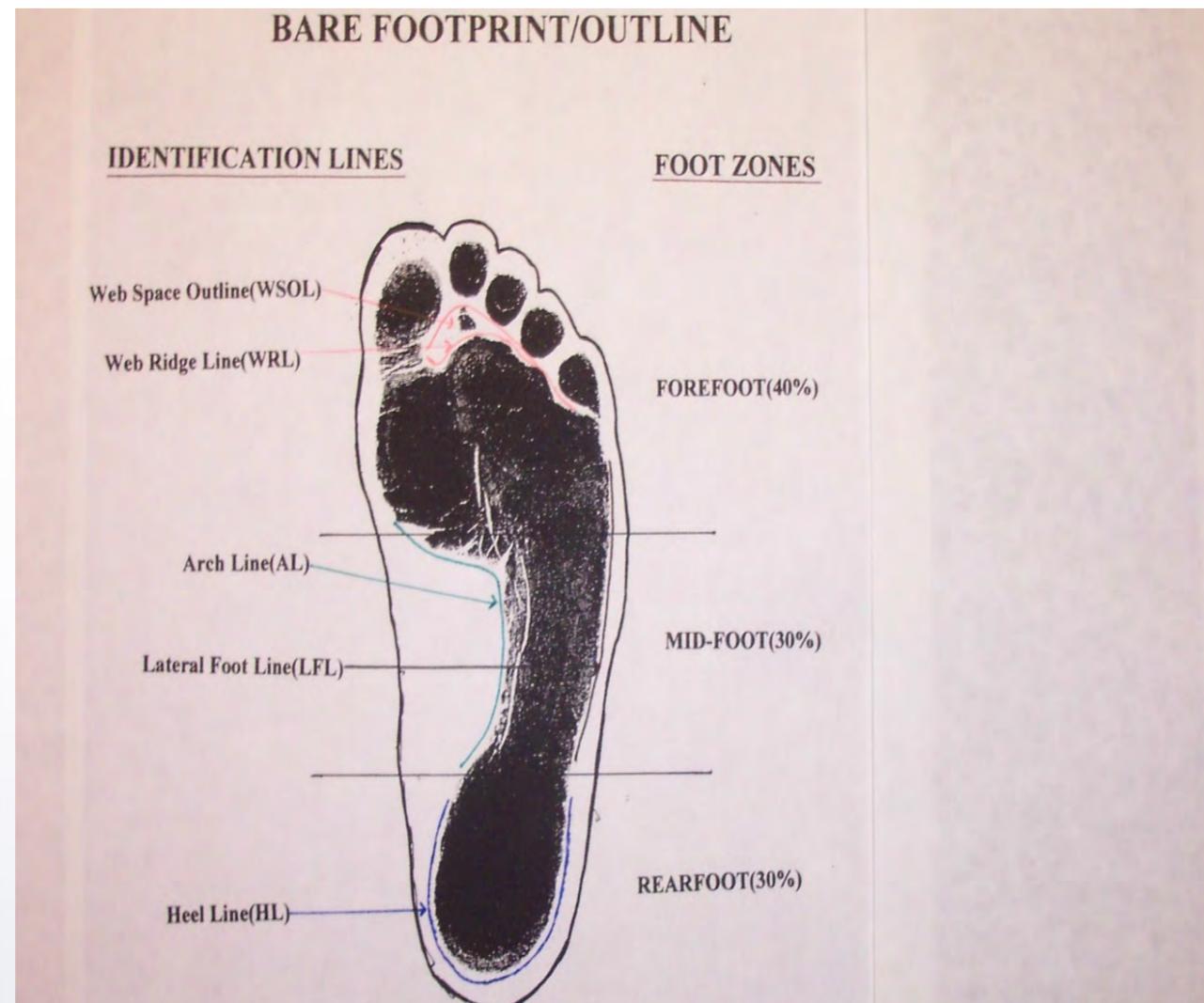


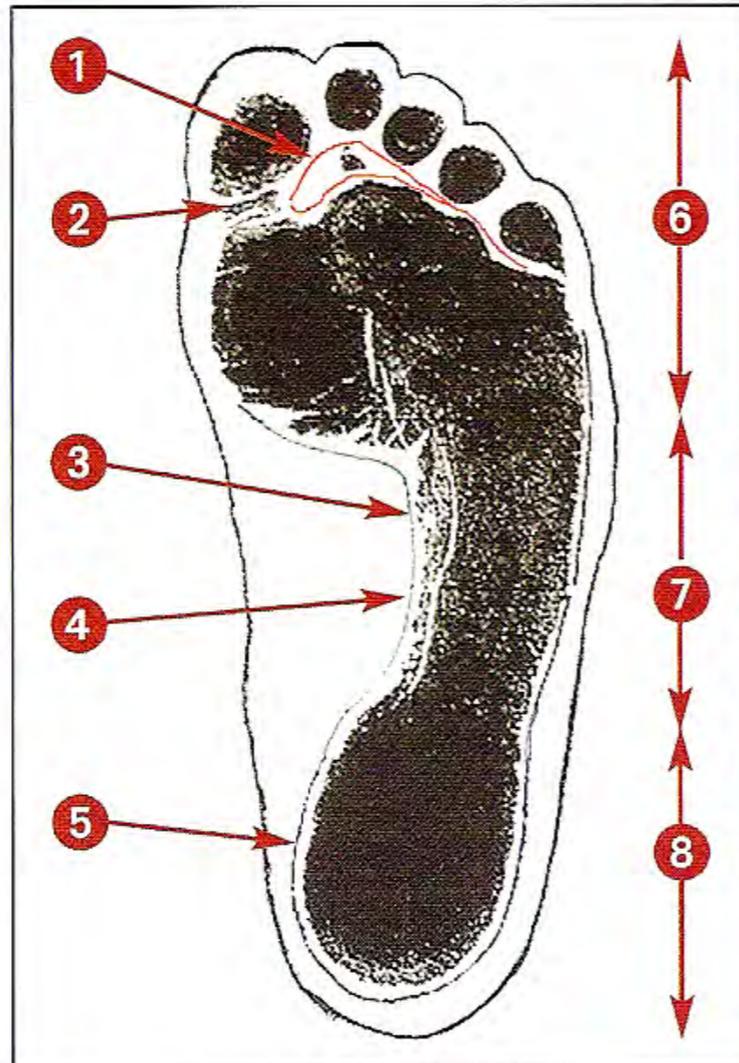


- Footprints may contain foot impression that can give information about
1. digital length
  2. digital position
  3. shape of toes
  4. increased areas of pressure (e.g. callus formation)
    5. Arch line
    6. Heel line
    7. web ridge line
    8. webspace

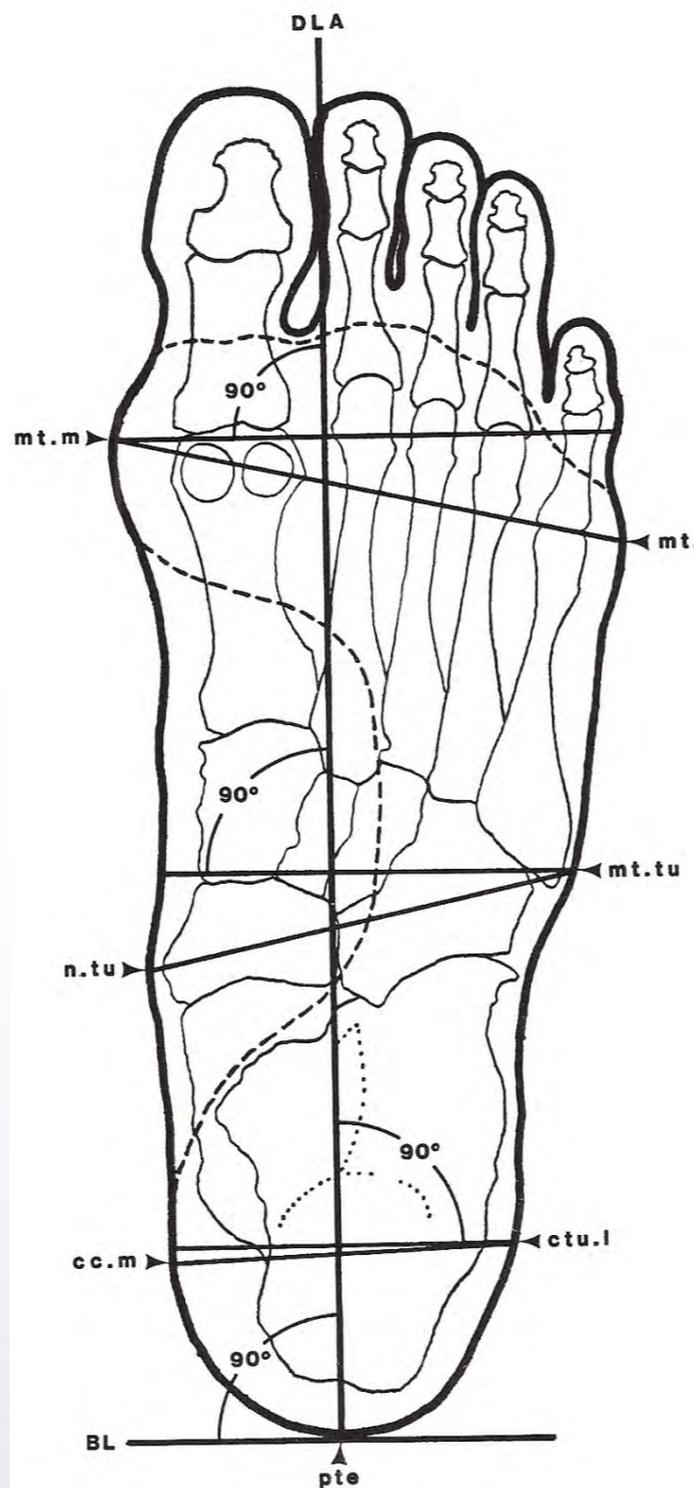


# Identification Lines / Foot Zones





*This is a diagram of a bare footprint and its outline. On the left are shown identification lines that are used by forensic podiatrists: (1) web space outline; (2) web ridge lines; (3) arch line; (4) lateral foot line; and (5) heel line. On the right are the foot zones and their relative sizes: (6) forefoot—40%; (7) mid-foot—30%; and (8) rearfoot—30%.*







# Footwear





## Footwear

A discussion of pedal evidence would not be complete without a discussion of what houses the foot most of the time

The shoe acts as an extension of the foot.

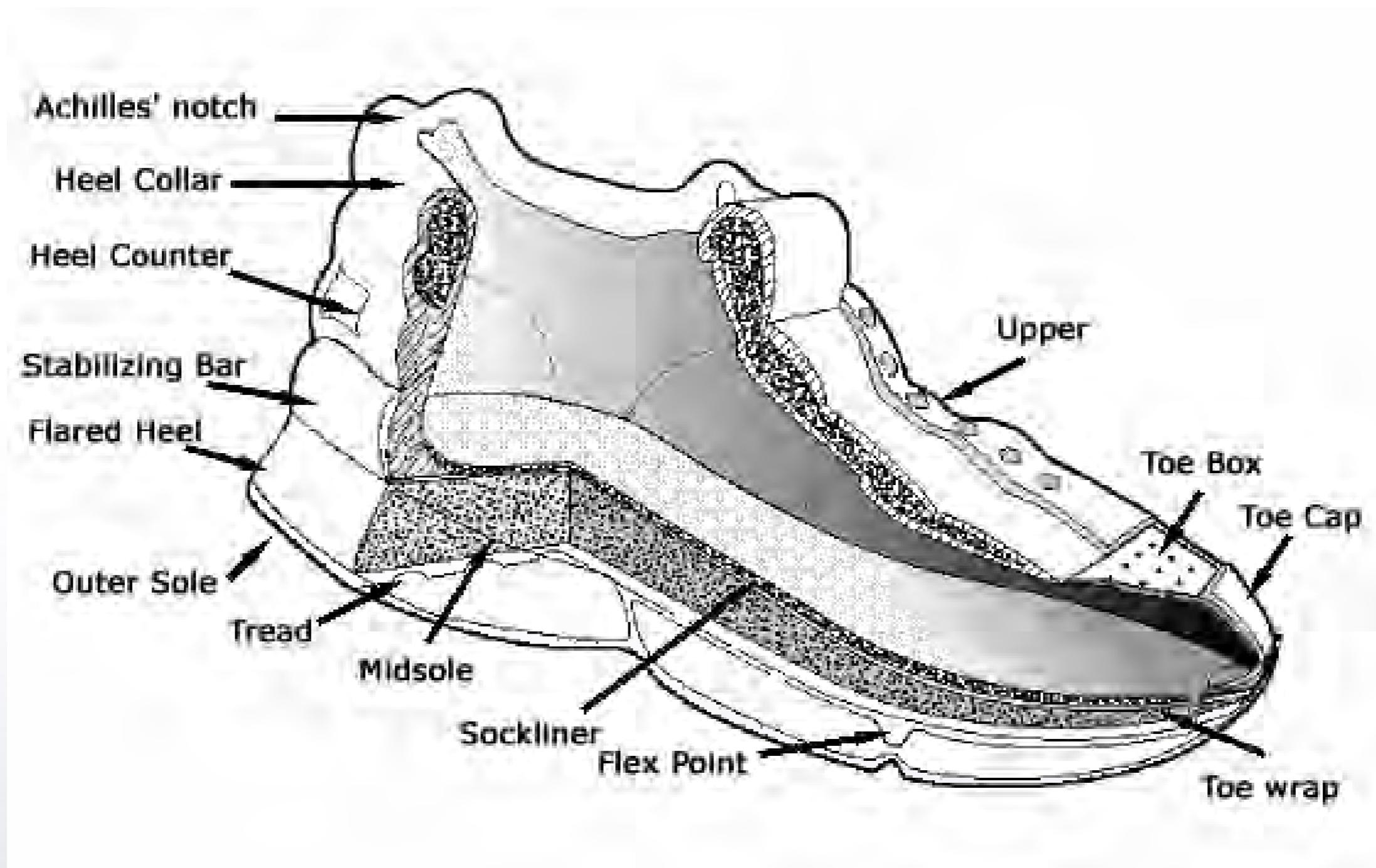
There is a close association between the foot and the shoe; they almost function as a single unit.



A **footwear examiner** identifies and compares characteristics to match impressions left at the crime with that of the suspect.

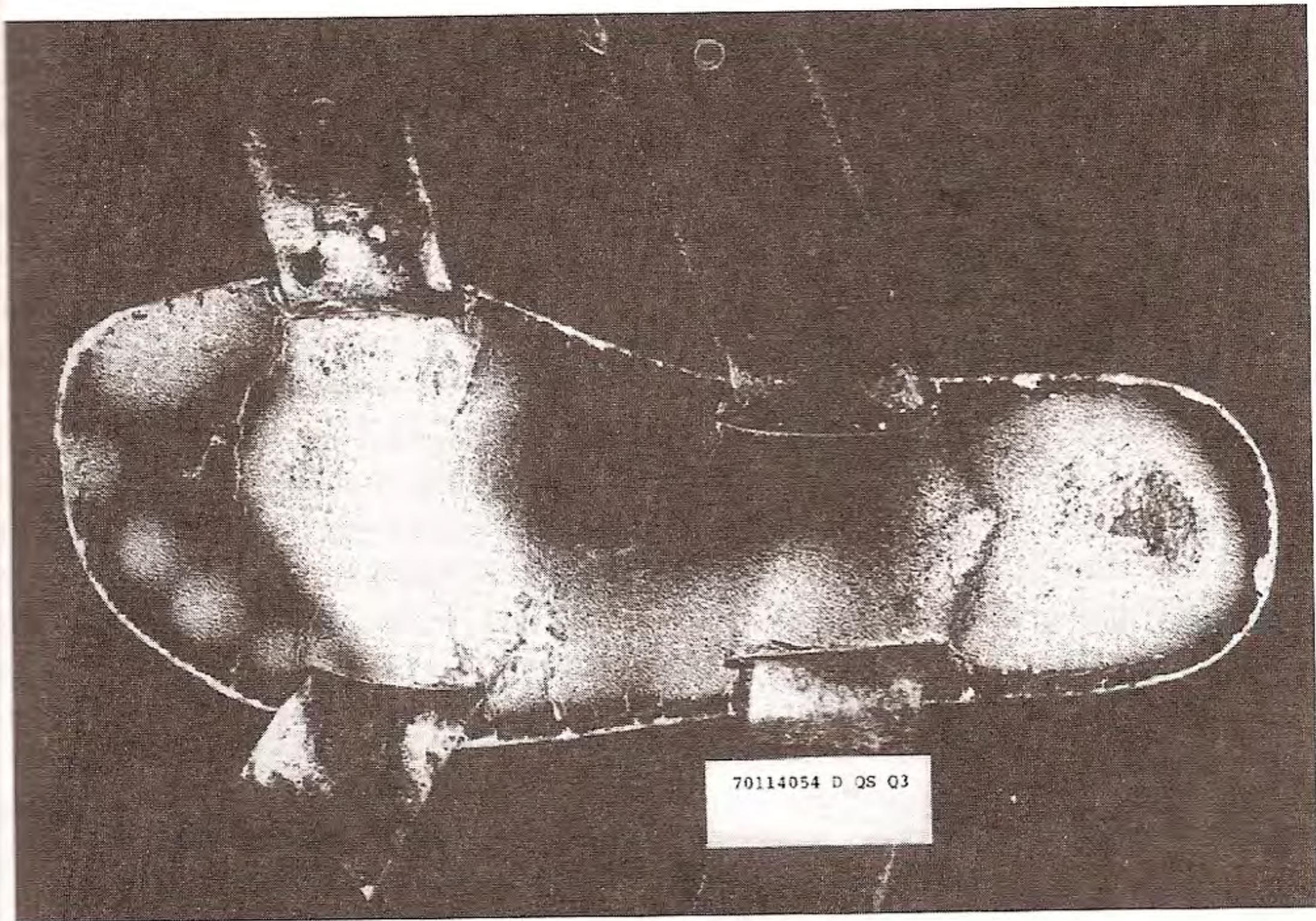
A **forensic podiatrist** evaluates evidence relating to the human foot for the purpose of connecting an individual to footwear or a footprint

Forensic podiatrists analysis pedal evidence; they are **not** experts in technique or device use.





- Sockliners may contain foot impression that can give information about
1. digital length
  2. digital position
  3. shape of toes
  4. increased areas of pressure (e.g. callus formation)
    5. Arch line
    6. Heel line
    7. web ridge line
    8. webspace



12.9 Plate 1 of inside of sandal, denoted sweat stains, and enhanced with ultraviolet



## Footwear evidence

1. Remove suspect's shoes as soon as possible after he/she is apprehended

2. Obtain representative sample of suspect's shoes (especially those similar to the shoes associated with the crime.

3. Do not have suspect try on unknown shoes

4. Photograph and cast sockliner

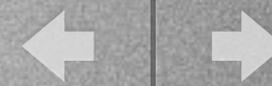
5. Photographs, prints, casts of outsoles



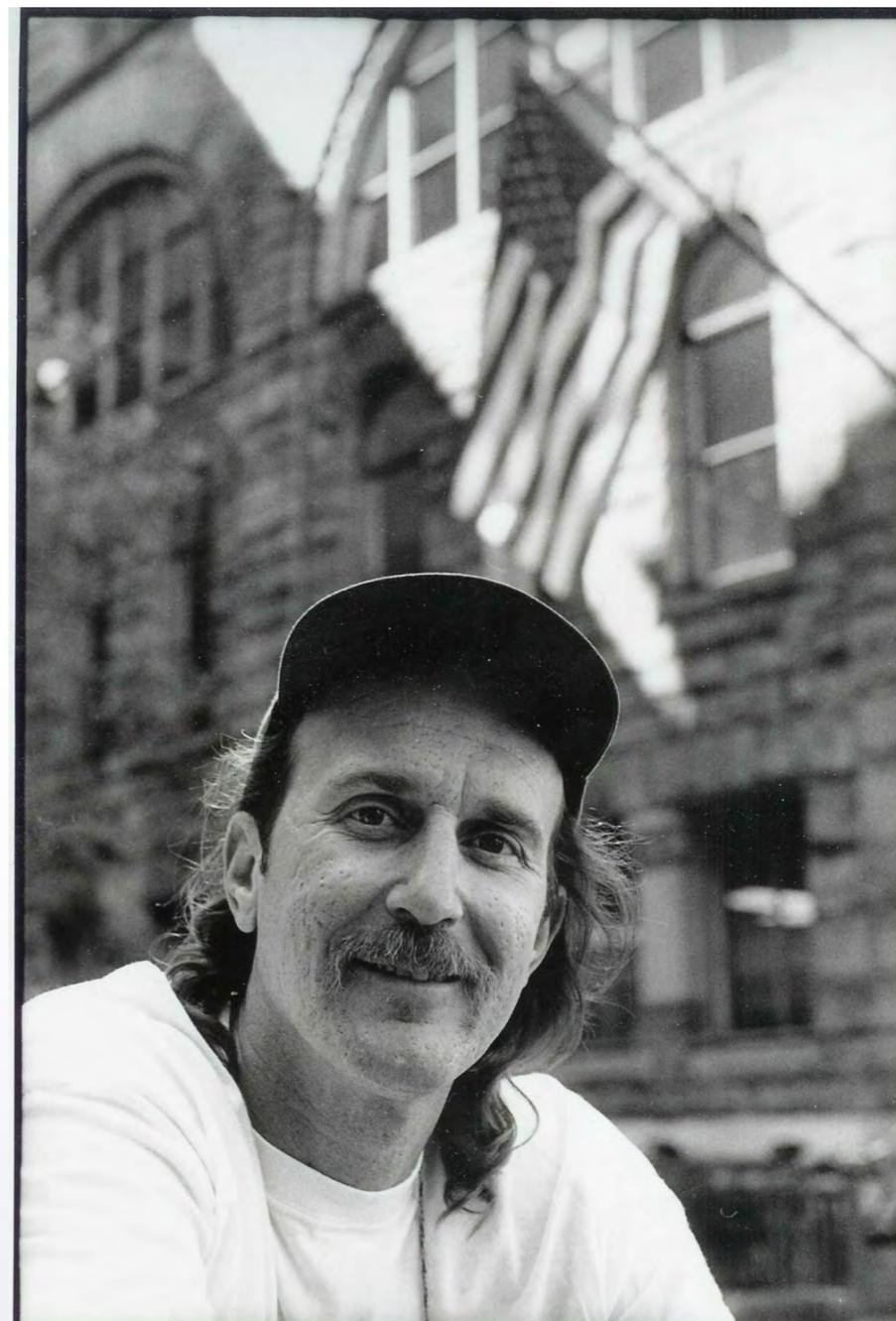


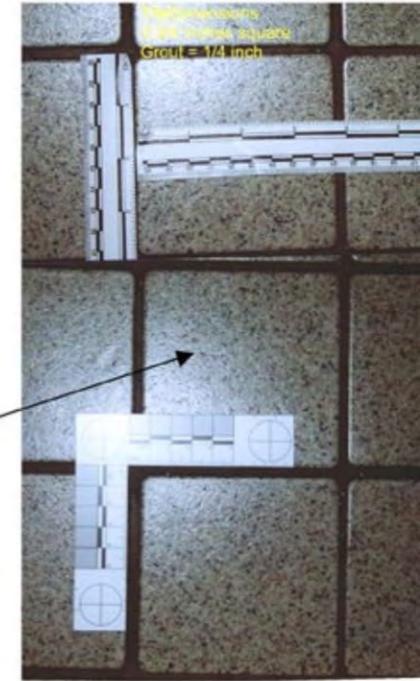
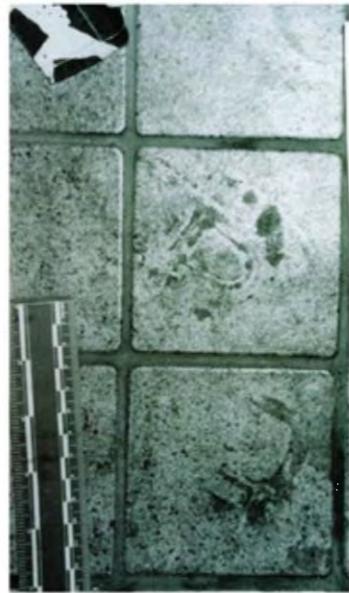


“Despite the long history of the foot’s being considered an identification factor, there has been little research development in this field until recent times. The research undertaken to date has indicated that there is much potential for the use of the human foot in identification.” Wesley Vernon P.318



Ray Krone





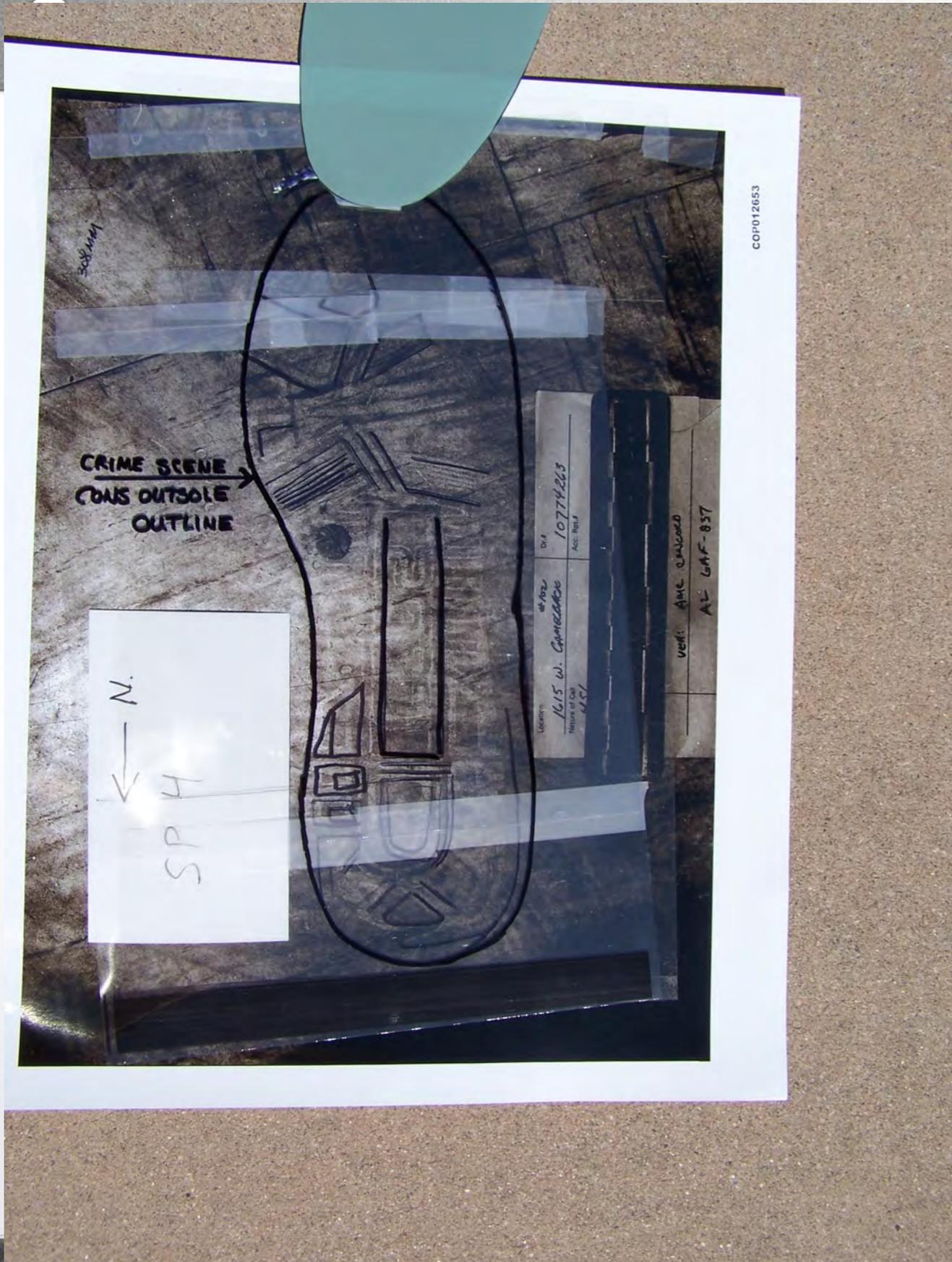


# The Crime

- On the morning of December 29, 1991, the naked body of Kim Ancona was found on the floor of the men's room at the CBS lounge in Phoenix Arizona. She had been stabbed in the back and sexually assaulted. The victim was last seen alive at about 1 AM, getting ready to close the bar.

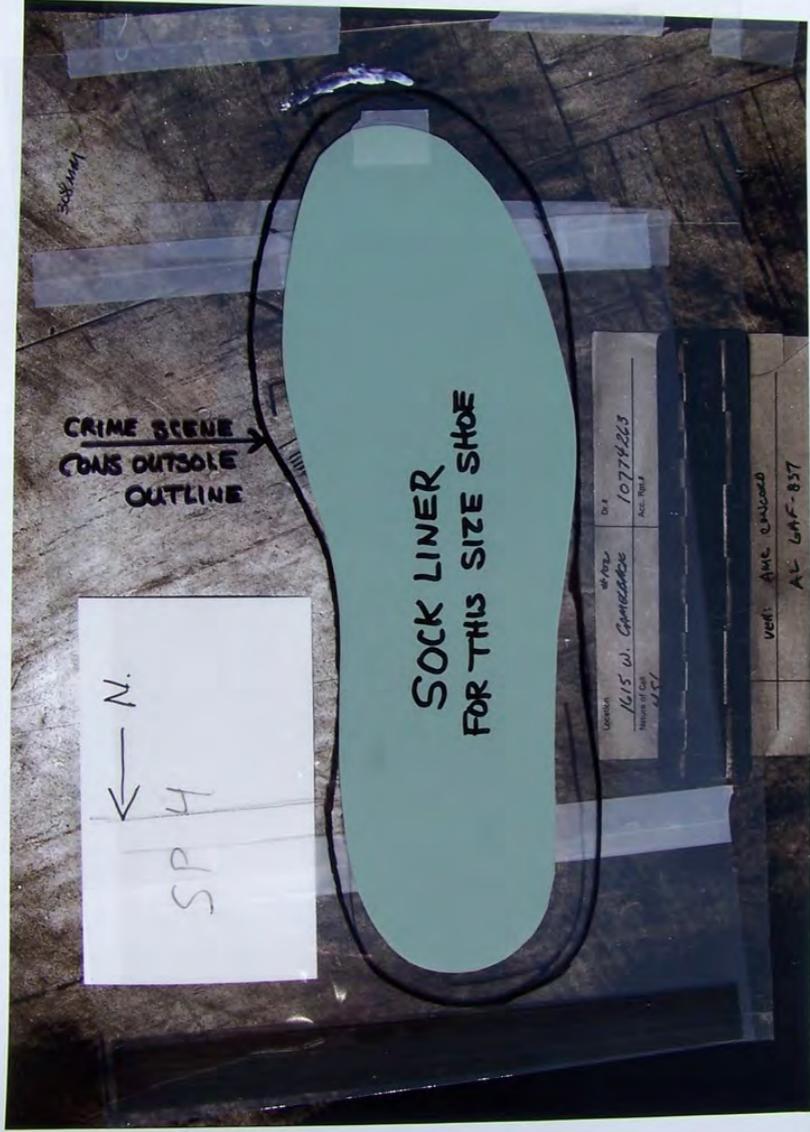
# The Evidence

- It was reported that there was hair, fingerprint and footprint evidence. There was no semen evidence noted. The murder weapon, a kitchen knife taken from the bar, was found at the scene. There were stab wounds on the victim's back and a bite mark on her left breast. The hair found on the body was described as being consistent with either the victim or the accused. The 14 footprints found were described as belonging to a "size 9 ½ to 10 ½ Converse sneaker. The fingerprints were not described.

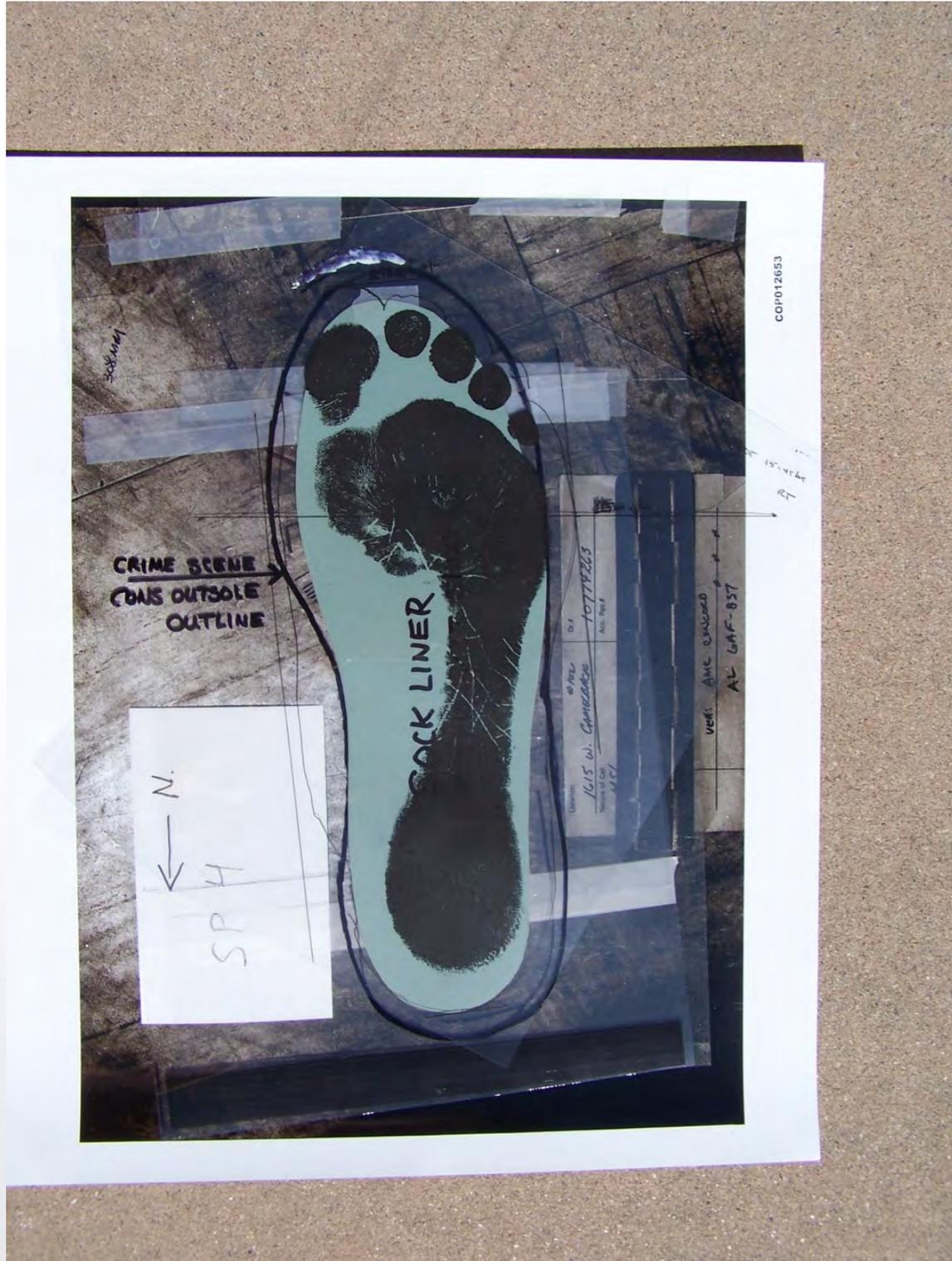


Crime scene photo with shoe outline.

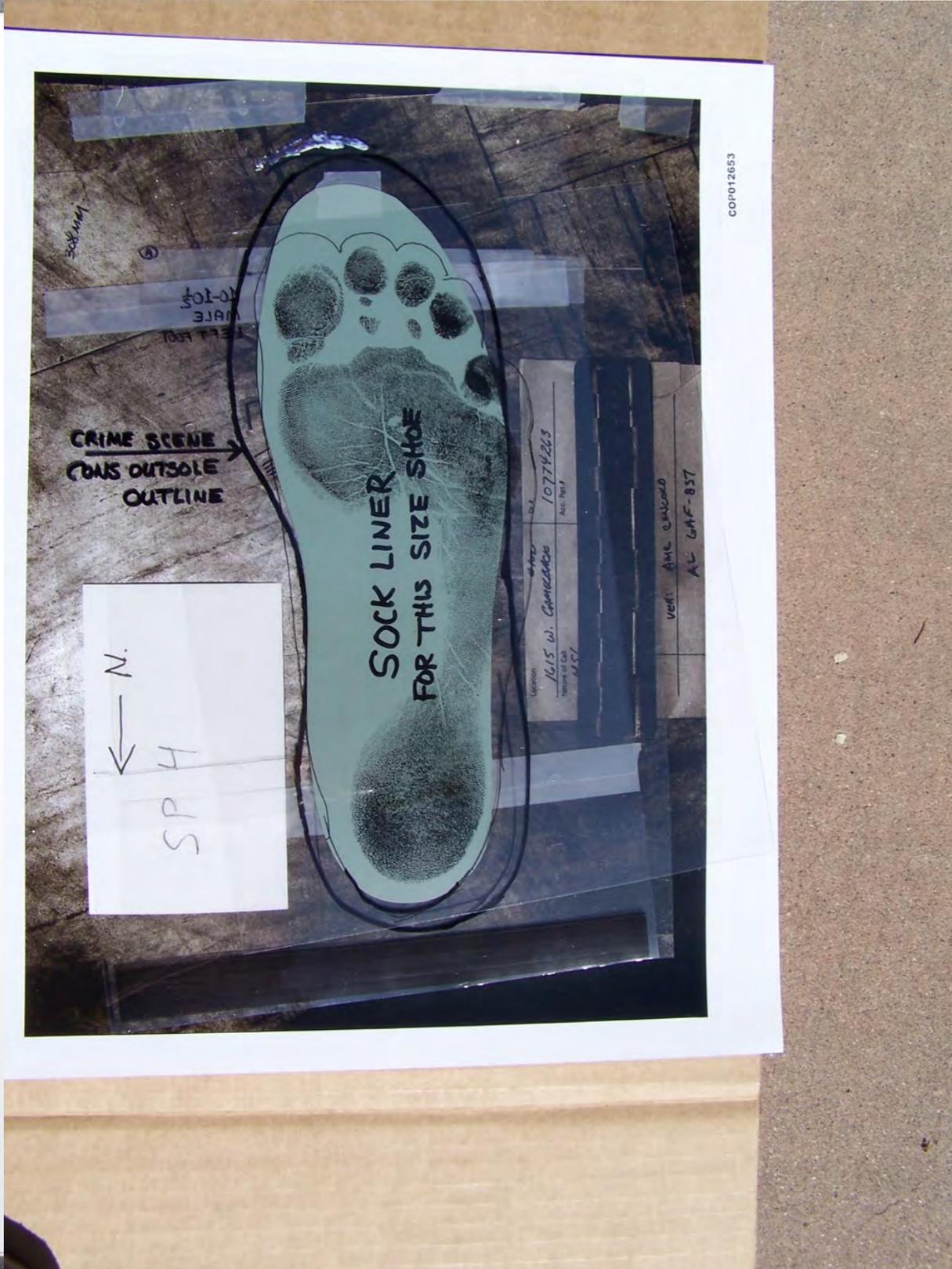
Estimated size 10



## Sockliner fit for shoe



Suspects foot fit; too big.  
Overlaps sockliner



Shows proper foot sizing



# The First Trial

In 1992, Ray Krone was found guilty of the murder of Kim Ancona and sentence to death by legal injection.

# The Second Trial

- At the second trial in 1995, despite the new evidence present by the defense, including the expert forensic dentists' opinions and the FBI report of the blood analysis, Ray Krone was again found guilty of murder in the first degree. However, because of doubts that the presiding judge had about Ray Krone's guilt, he sentences Krone to life in prison, rather than death.



# Exoneration

In March 2002, Krone's defense team learned that the DNA taken from the CBS Lounge crime scene matched that of **Ken Phillips**. At the time of this finding, Ken Phillips was in prison for the rape and assault of a 7-year-old girl, a crime he committed shortly after Kim Ancona's murder. Phillips lived 600 yards from the tavern and was on probation for breaking into a woman's apartment and attempting to choke her at the time of Ancona's murder. In addition to the blood evidence, a hair, with attached follicle, which was listed but not initially described by the crime lab technician, was also found to contain DNA consistent with that of Phillips. Phillips eventually pleaded guilty to the murder and is serving a life sentence in prison for the crime.

# Epilogue

- Ray Krone eventually received cash settlements from Maricopa County and the city of Phoenix for his wrongful imprisonment. In 2004 he was on the TV program Extreme Make-over where, among other things, his teeth were fixed. He continues to be a vocal activist against capital punishment. Ray Krone was the 100<sup>th</sup> person who was on death row and eventually exonerated by DNA evidence.



Questions?

[david\\_agoada@VMED.org](mailto:david_agoada@VMED.org)





