

Microscopic Trace Evidence: The Overlooked Clue

Skip Palenik

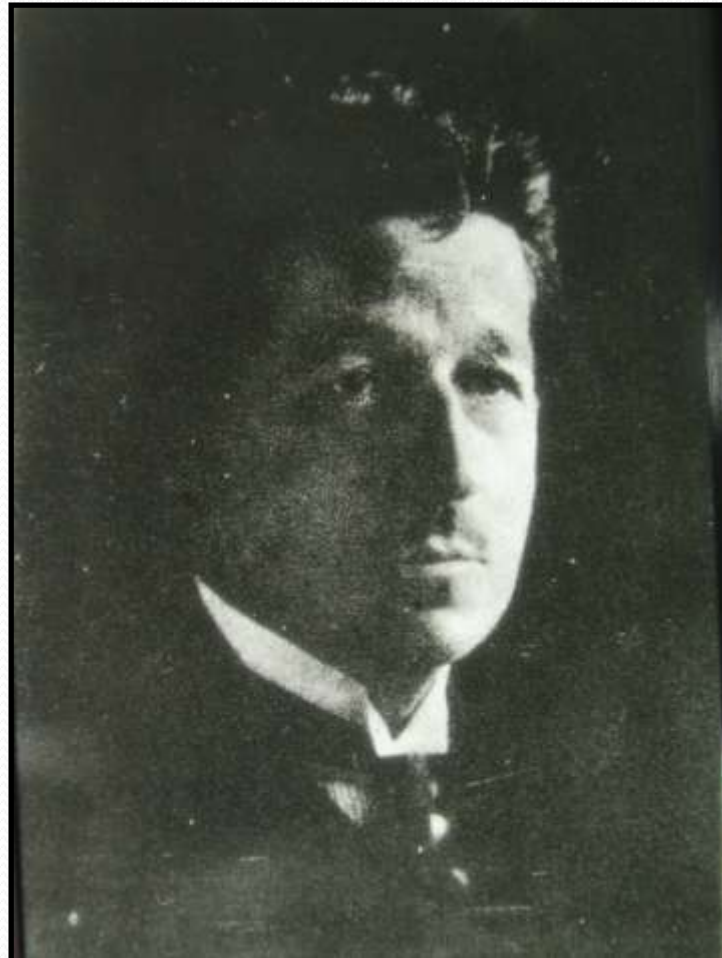
Microtrace_{LLC}

www.microtracescientific.com

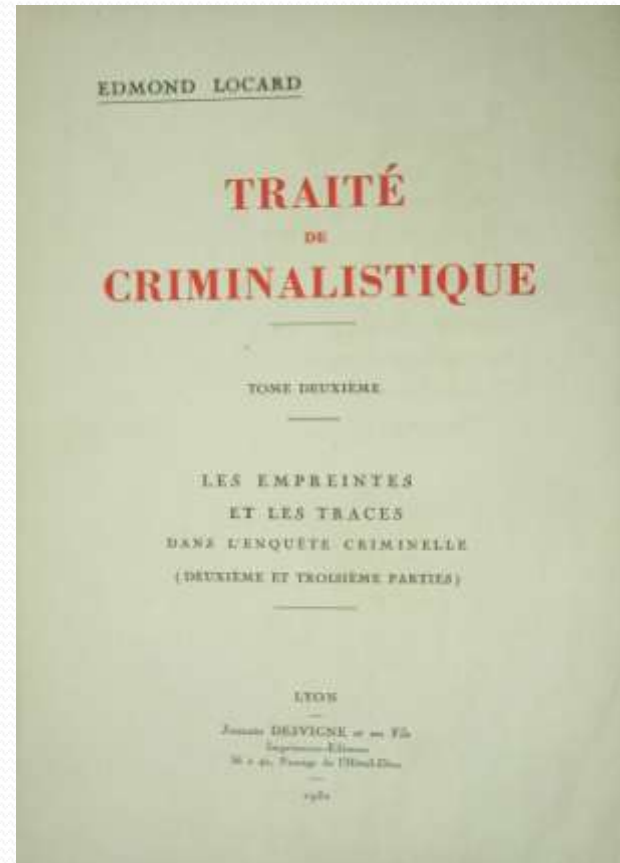


Edmond Locard

Locard believed passionately in the value of microscopic trace evidence as a tool to aid the police in their investigations. He collected examples of the cases of others and performed experiments to develop the analysis of dust into a useful tool. He admitted that his interest in dust was inspired by Hans Gross and Sherlock Holmes.



Locard's Exchange Principle



In the 1929 Locard and other leading proponents of microscopic trace evidence met to form the International Academy of Criminalistics



Paul Kirk advocated the utilization of microscopic trace evidence in the U.S. to help solve crimes



The meticulous and thorough nature of the work which is necessary in the examination and segregation of microscopic evidence is a deterrent to its general use. It is at times trying on the patience and requires a significant amount of time. ...

It must always be remembered that the proof of a single fact is more important than any number of theories, leads or hunches. Microscopic evidence is capable of providing facts of great significance.

- Paul Kirk (1953)



Microscopic trace evidence

- today is used *almost* exclusively to attempt to establish associations to be presented at trial. This was not always so.
- was formerly utilized extensively to aid investigators.
- does not fit in the framework of preconceived methods currently in vogue when attempts are made to utilize it for developing investigative leads.
- can often, in spite of great pressure to analyze it by a set of cookbook procedures conducted by technicians, provide assistance to detectives during a criminal investigation when it is studied as an analytical problem.



These and other early forensic scientists were accustomed to using microscopic trace evidence to aid detectives in the investigation of crimes by providing facts and developing well-reasoned inferences to assist in the search for locations, persons, vehicles, etc.



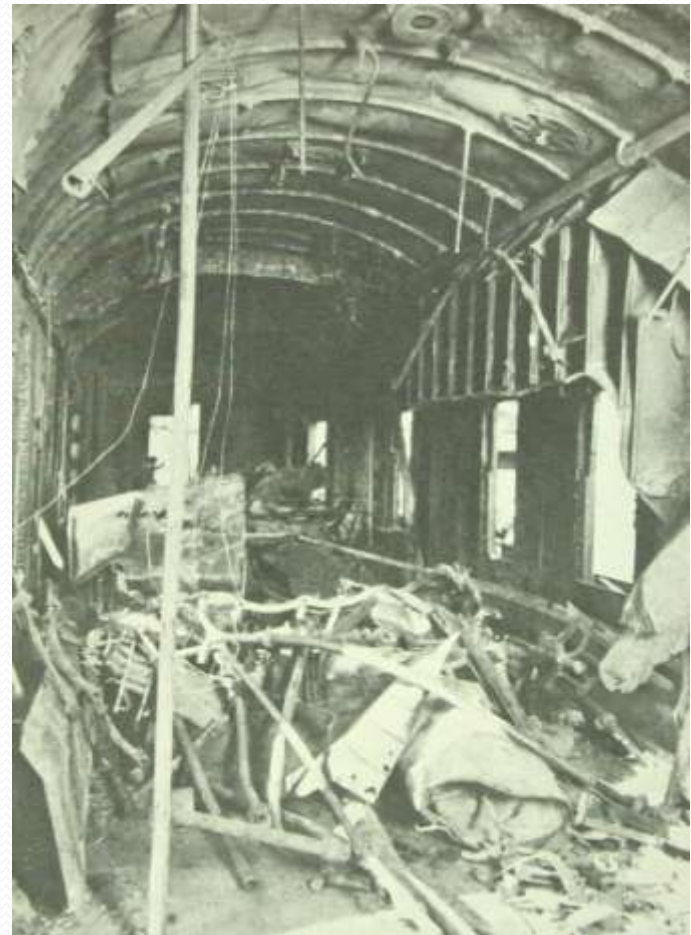
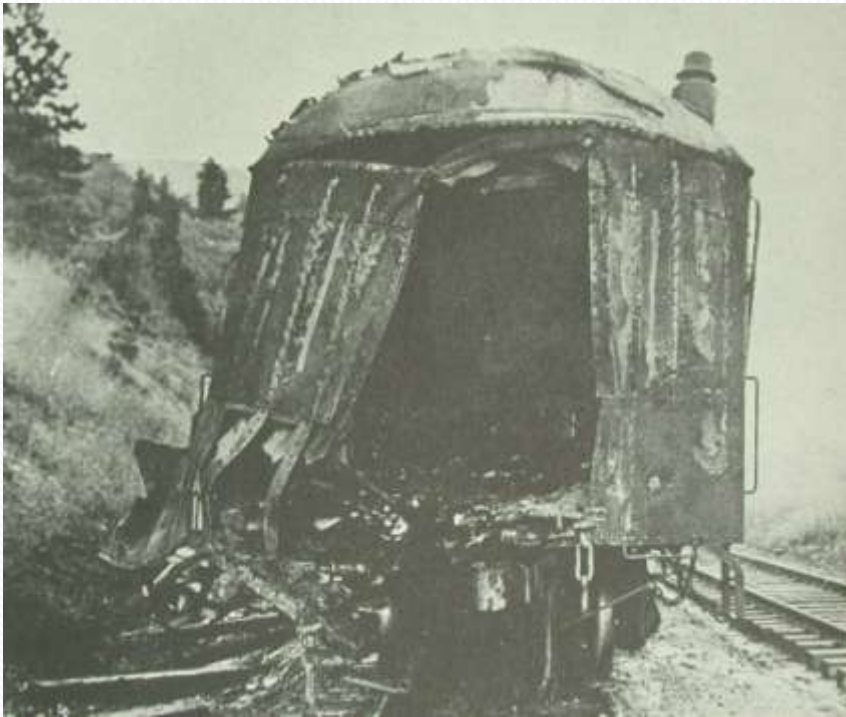
Edward Oscar Heinrich

“The Wizard of Berkeley”



Siskiyou train robbery – 11 October 1923

Southern Pacific Express Train No. 13





Heinrich analyzed the overalls and the dust and debris they contained and provided his report



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Heinrich's results led to the biggest manhunt in U.S. History up that time

REWARD!

\$14,400.00

Holdup of Southern Pacific Train No. 13, 1st Section, at Siskiyou, October 11, 1933

FOUR MEN KILLED

Reward of \$2200.00 will be paid by the Southern Pacific Railroad Company, of \$200.00 by the American Rail- road Company, and will be raised \$2,000.00 by the United States, for the arrest and conviction of each per- son implicated in the holdup.

At least three persons participated in the crime. Below are photographs and descriptions of three travelers who are believed to have been connected with the holdup and who should be arrested on sight and held incommunicado.





DICKSTEIN

No. 1. Age 35-40 years. Height 5 ft. 10 in. Hair brown, eyes brown. Build 5 ft. 10 in. Complexion fair. Medium build. Hair short. Eyes light. Brown. Nose straight. Mouth wide. Lips closed. Teeth white. Hair neatly combed. Wears dark suit and tie. Formerly lived in Lakeland, Fla. Station.

No. 2. Age 35-40 years. Height 5 ft. 10 in. Hair brown, eyes brown. Build 5 ft. 10 in. Complexion fair. Medium build. Hair short. Eyes light. Brown. Nose straight. Mouth wide. Lips closed. Teeth white. Hair neatly combed. Wears dark suit and tie. Formerly lived in Lakeland, Fla. Station.

No. 3. Age 35-40 years. Height 5 ft. 10 in. Hair brown, eyes brown. Build 5 ft. 10 in. Complexion fair. Medium build. Hair short. Eyes light. Brown. Nose straight. Mouth wide. Lips closed. Teeth white. Hair neatly combed. Wears dark suit and tie. Formerly lived in Lakeland, Fla. Station.

All three men are rugged and may be found in logging camps working as stevedores, bank tenders or other jobs. They have a habit of talking a long way across and backward should be kept for those attempting to take of any person. They speak Spanish fluently and may attempt to cross the Mexican border. Formerly lived in Lakeland, Fla. Station.

Photographs of two and three men taken about a year ago; of two, taken in 1930.

For information, please refer to D. O'Connell, Chief Special Agent, Southern Pacific Railroad Company, Ashland, Oregon; E. L. Taylor, Sheriff, Jackson County, Jacksonville, Oregon; or C. H. Hildford, Post Office Inspector at Clatsop, Seaside, Wash.

Fugitives will post and publish leaflets distributed to Rural and Star Route Carriers, also use to 6 Star of Post Office are supplied with these notices.

C. BISHOP,
Post Office Inspector in Charge,
Seaside, Washington

D. O'CONNELL,
Chief Special Agent, Southern Pacific R. & Com-
pany, Ashland, Oregon

Case No. 2783 D
Date 10-11-33

Ashland, Oregon, October 24, 1933.



Tunnel 13

At the time of the robbery



Recently



Edmond Gaston Balye

The Tessier Affair



Bayle's laboratory at the Surete



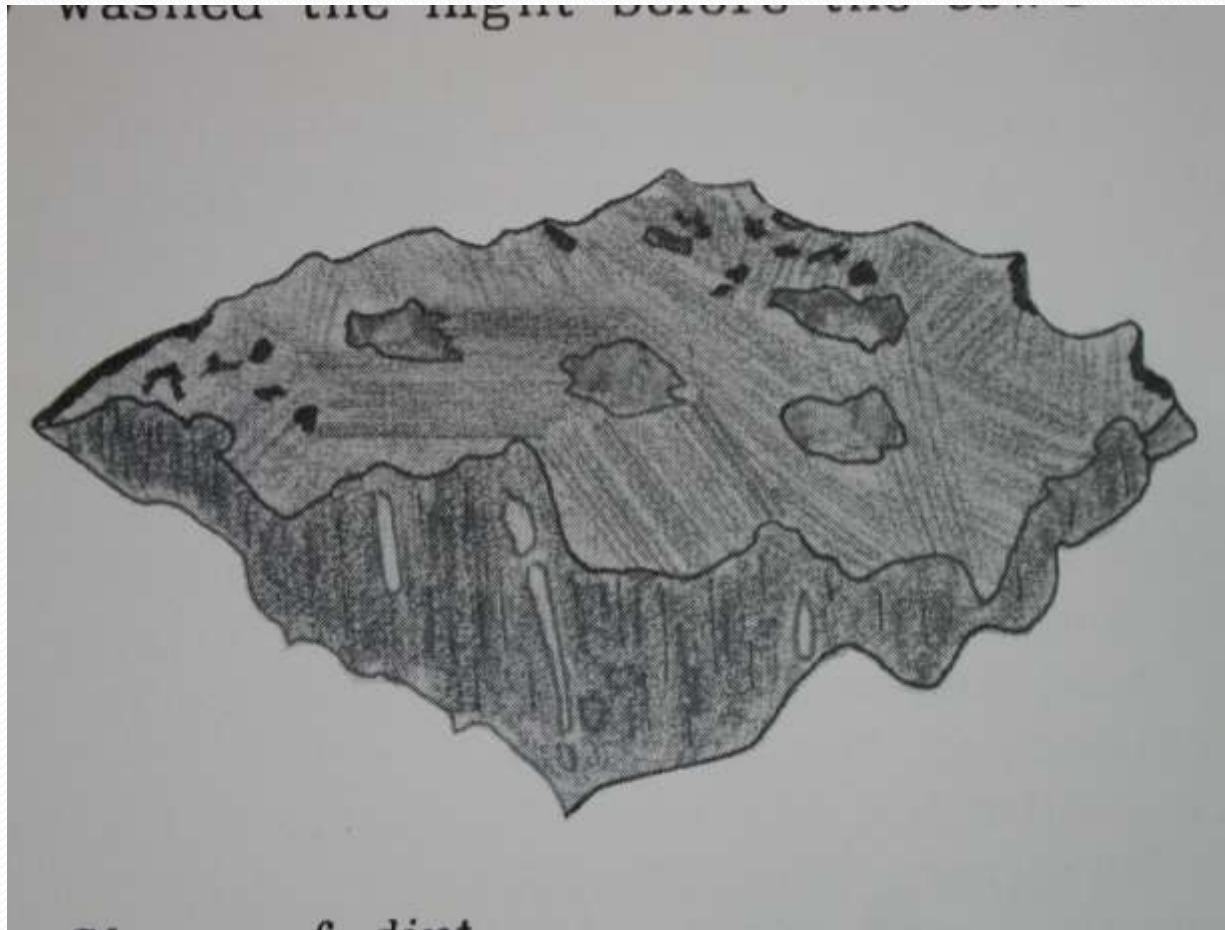
Police photograph of the body upon opening the parcel



Max Frei-Sulzer



The clump of mud left in the stall



Stratigraphy of the mud clump

Layer	Components	Inference
1. (closest to shoe)	Yellow-brown clay and sand grains	clay from exposed incline
2.	Brown. Peat moss, sphagnum cells	Bog or moor
3.	Black. Leaf fragments of beech, ash, maple and pine needles. Beetle fragment	Forest where these trees grow
4.	Fine sand. Chenopodium.	Pasture outside to the rear of the barn





A more recent case:

Serial rapist in Montgomery County Maryland



Background

- We were contacted by the police in Montgomery County, Maryland (suburban Washington, D.C.) for assistance in their investigation of an unsolved series of rapes.
- The M.O. in each case was similar and the unknown suspect's DNA was recovered from every victim.
- However, the DNA profile was not in CODIS and the victims' could not even describe their attacker.



- After two and one-half years and many victims later, the crimes remained unsolved and, except for the unassociated DNA profile, no potential suspect had been developed.
- In apparent desperation, Sgt. Collins of the Montgomery County Police requested that we analyze and identify possible food stains on athletic shirts left behind in two of the attacks.
- We received the shirts in evidence and quickly determined that the stains had been nearly washed out and would be difficult or impossible to identify.



The shirts left behind at two of the crimes





Report of the dust analysis

- Based on our analysis of the dust from the two shirts we were able to draw the following inferences:
 - The two shirts had been worn by the same person.
 - They were worn by a person who worked indoors.
 - An oak tree (or trees) grew in the area where he was working in the spring of the year when shirt was lost.
 - The owner's occupation was drywall installer and finisher.
 - He worked on large scale commercial projects or renovation and, therefore, most likely for a larger company.



- This information was used to give police officers their first description of the suspect in the rapes.
- Photographs of the two shirts along with our description of the suspect were given to the media who printed the information in newspapers and reported it on television.
- Our inferences were proven correct in all respects one and a half months later when I received a telephone call from Sgt. Collins of the Montgomery County Police.



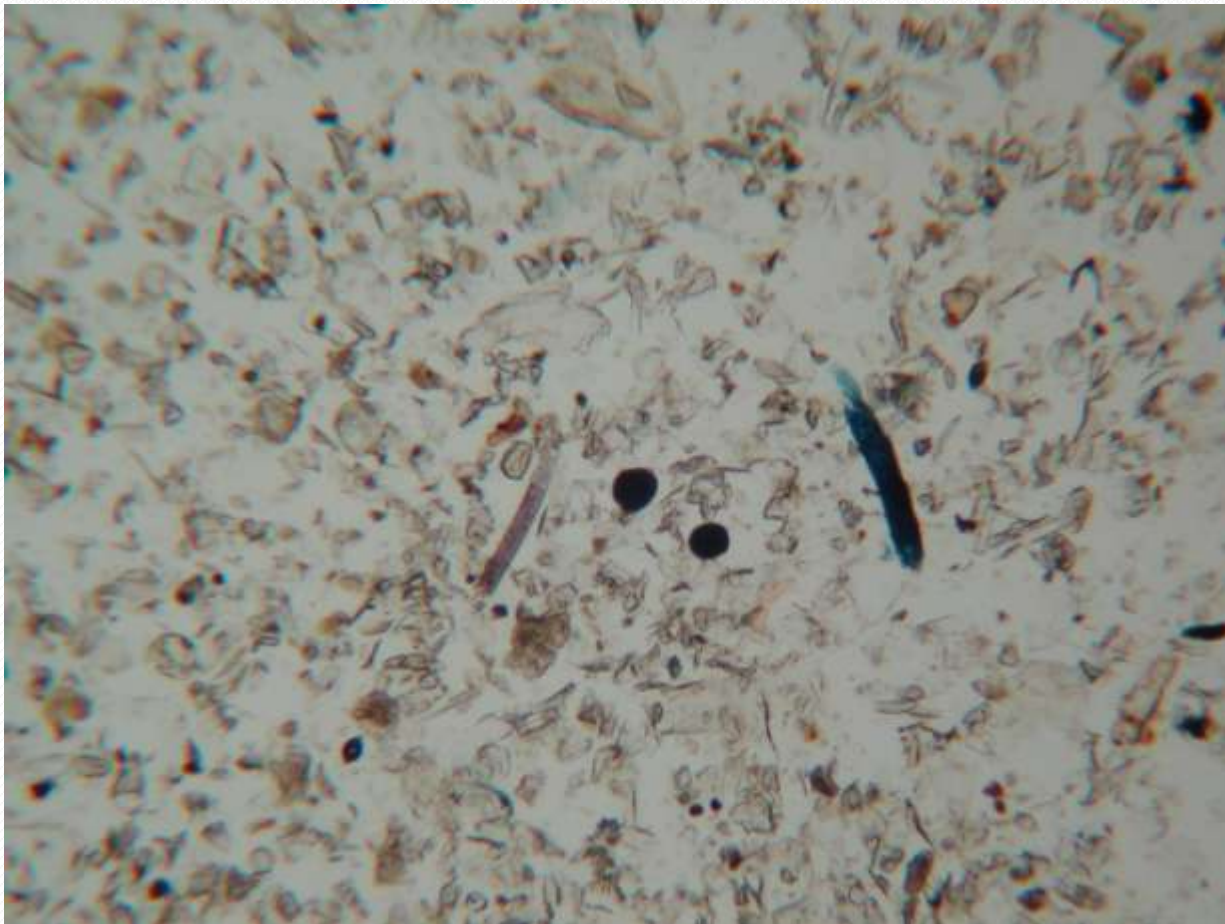
“Chance favors the prepared mind”

Louis Pasteur

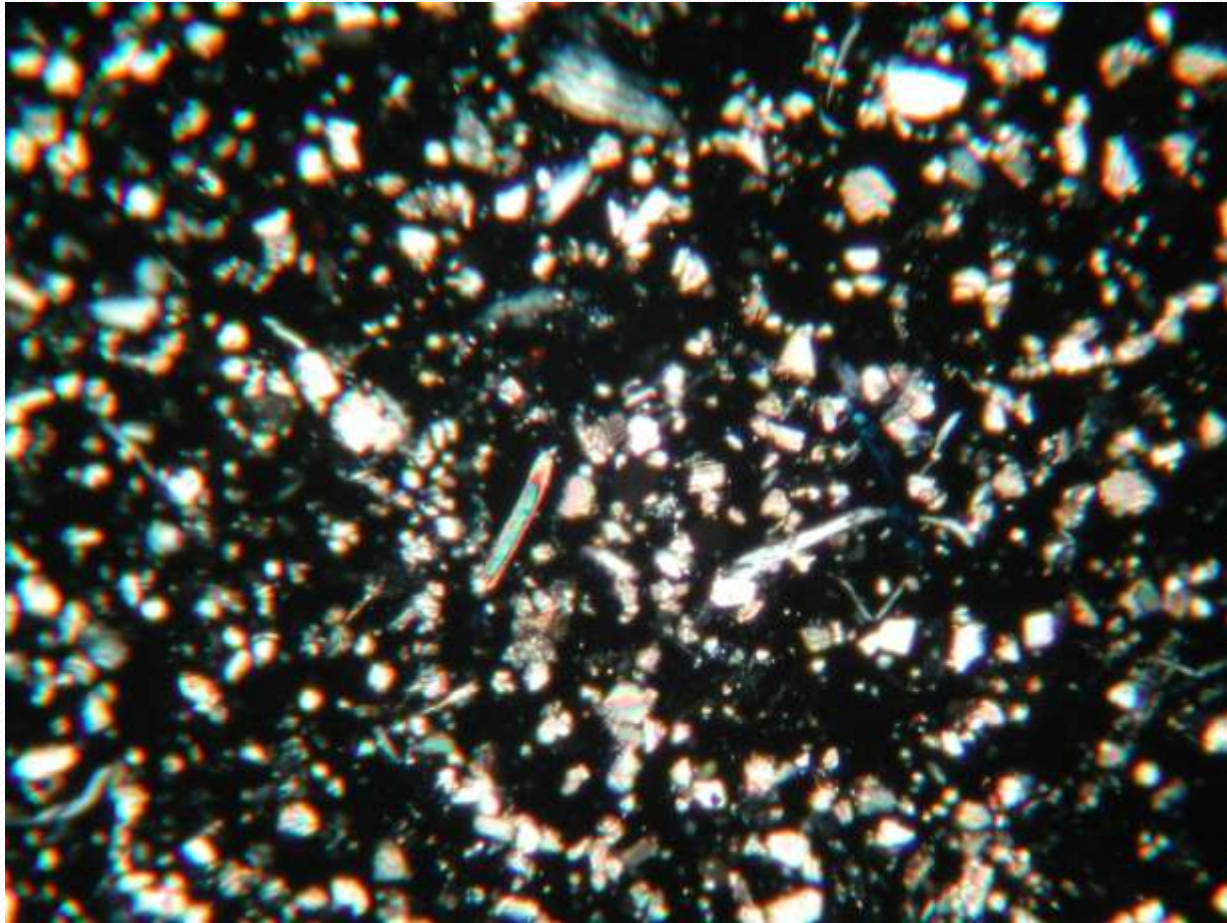
- Shortly after submitting our report, a man was seen leaving the apartment of a young girl, early one morning, by an inquisitive neighbor who called the police.
- When the police pulled over the vehicle they were struck by the fact that the driver was operating a commercial drywall contractor’s van and, consequently, questioned him about the rapes.
- During this questioning the driver confessed stating: “I saw that you were looking for a drywall installer on tv and I knew it was only a matter of time before you found me.”

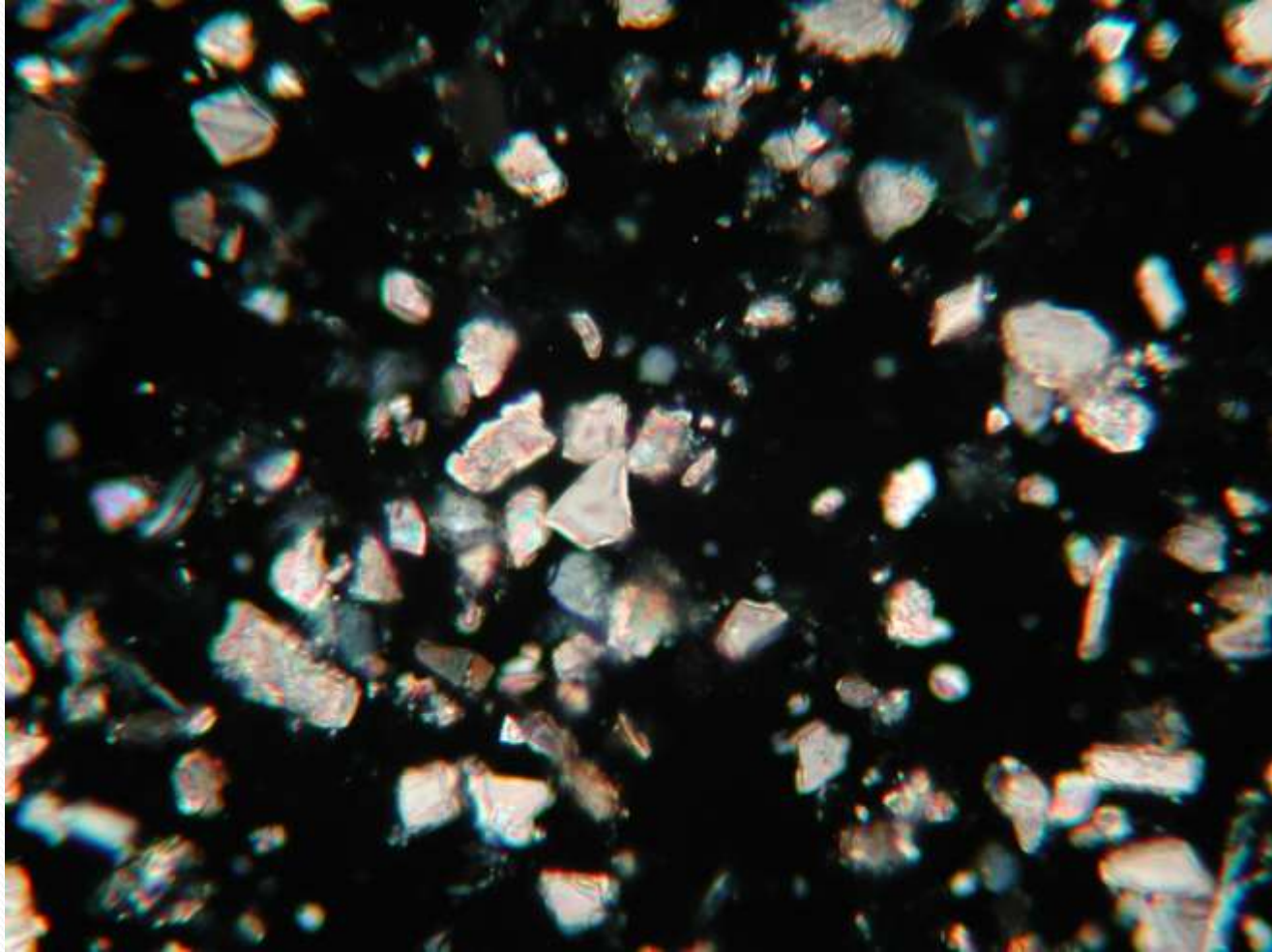


The dust analysis

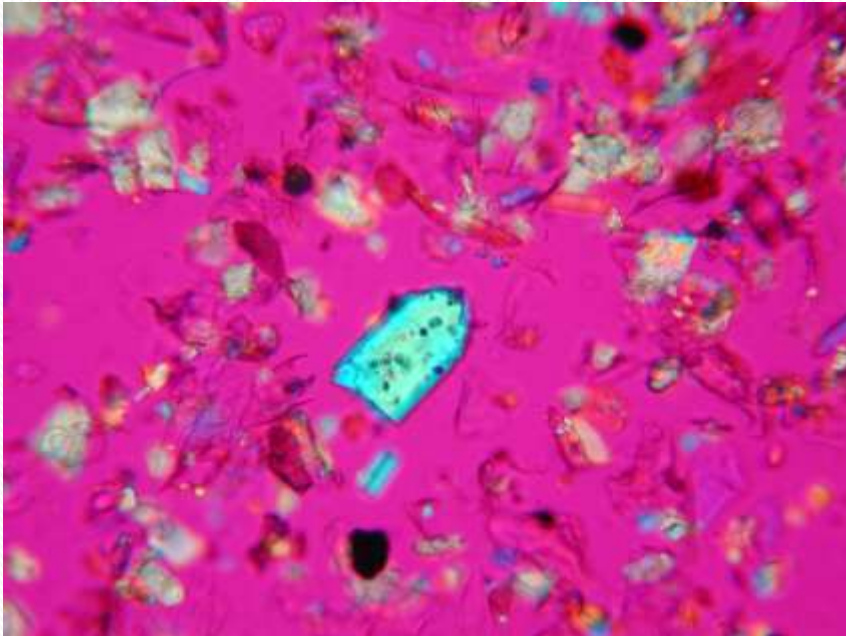


Although the shirts appeared clean there was a relatively large amount of dust on them

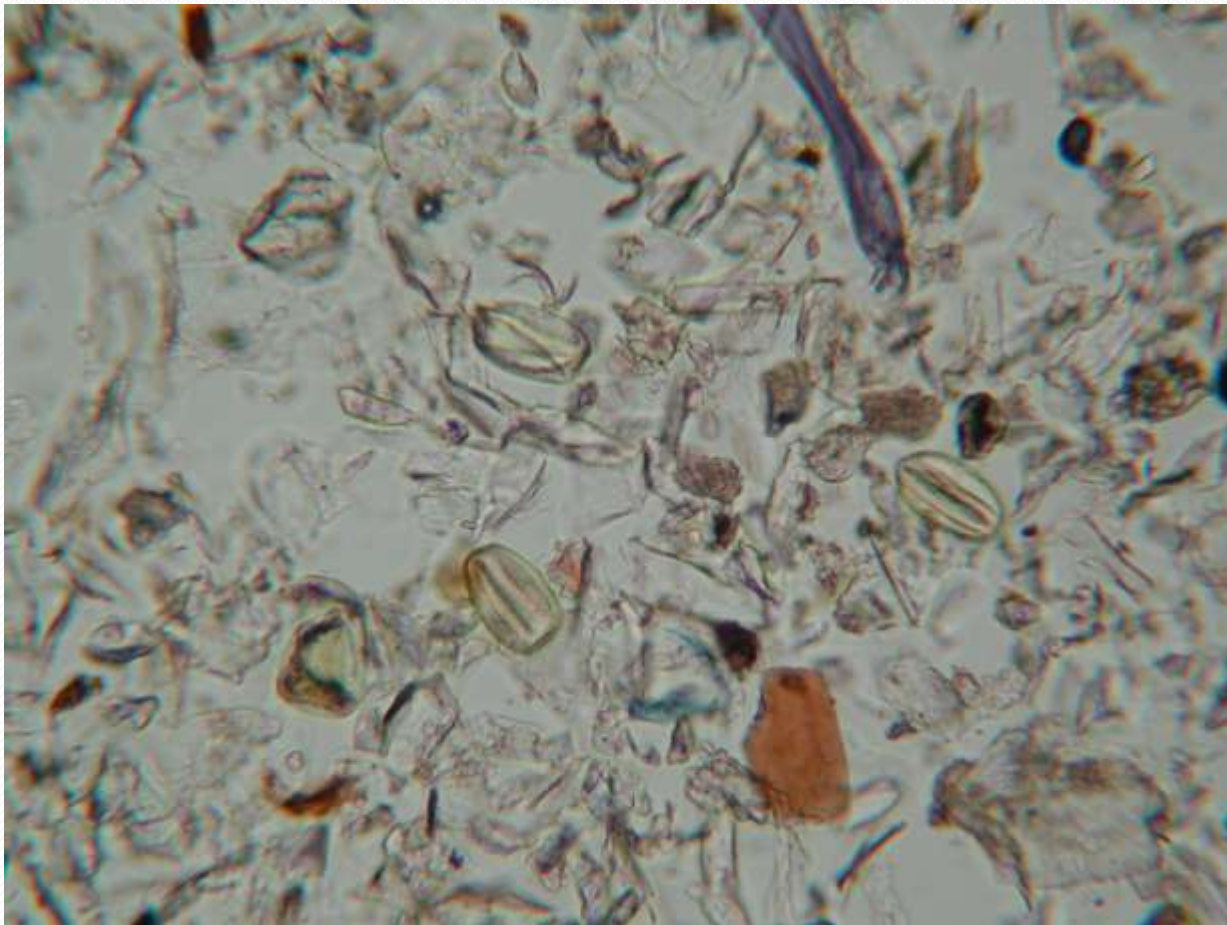




Subhedral gypsum crystal



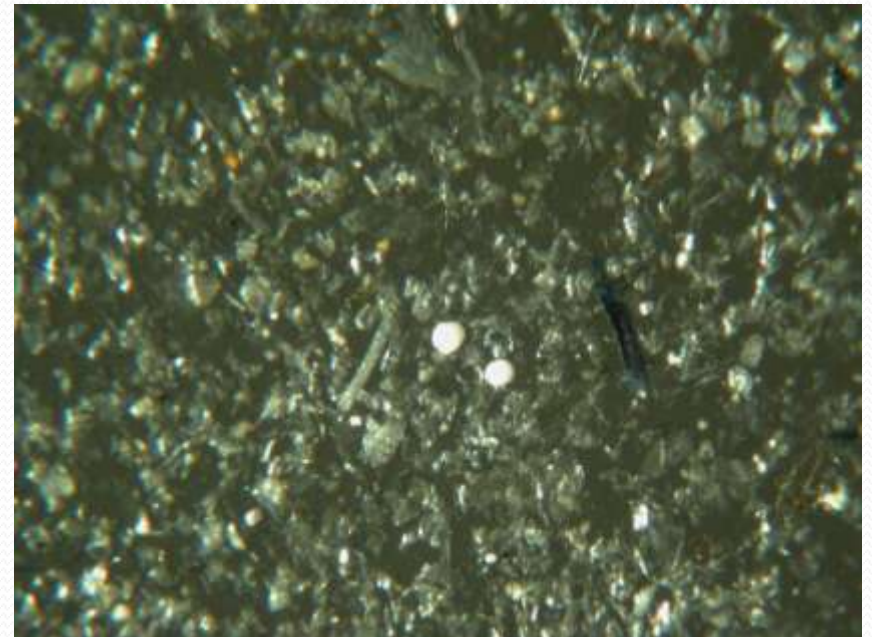
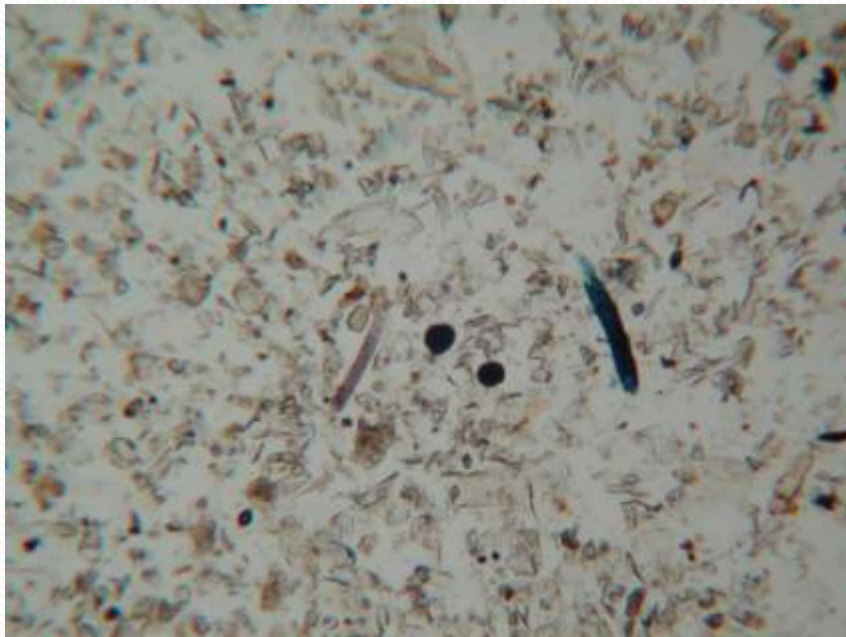
Oak pollen in dust (1.660)



The oak pollen after acetolysis and staining



Spheres of white spray paint in both dust samples were isolated and analyzed



Trace evidence as an investigative tool

- The forensic microscopist pursues an investigation by accumulating facts from the evidence itself and not according to a scheme, flow-chart or standard method of analysis but by application of the scientific method.
- The resulting facts are interpreted in light of the investigation at hand.
- Since the process is analytical and not merely comparative, it can be performed on evidence for which no comparative material is presently at hand.





