



# Analysis of the human scent on the cartridge cases using GC×GC-MS/TOF

# MOTIVATION

## **Thermal stability of the scent<sup>1</sup>**

Ethyl esters of higher fatty acids in human scent → survives the heat of 500°C for 1 minute

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## **Multiplicity of the human scent signature<sup>2</sup>**

Fractionation of the scent (according to volatility)

olfactoric identification (trained canines)

→ the most important less volatile fraction

<sup>2</sup>Doležal P., Furton K. G., Lněničková J., Kyjaková P., Škeříková V., Valterová I., Pinc L., Urban Š.: Egypt. J. Forensic Sci. 9, 7 (2019)

IS SCENT MORE  
SUITABLE  
ALTERNATIVE TO  
DACTYLOSCOPIC  
PRINT?



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# PILOT STUDY – SIMULATED CRIME SCENE



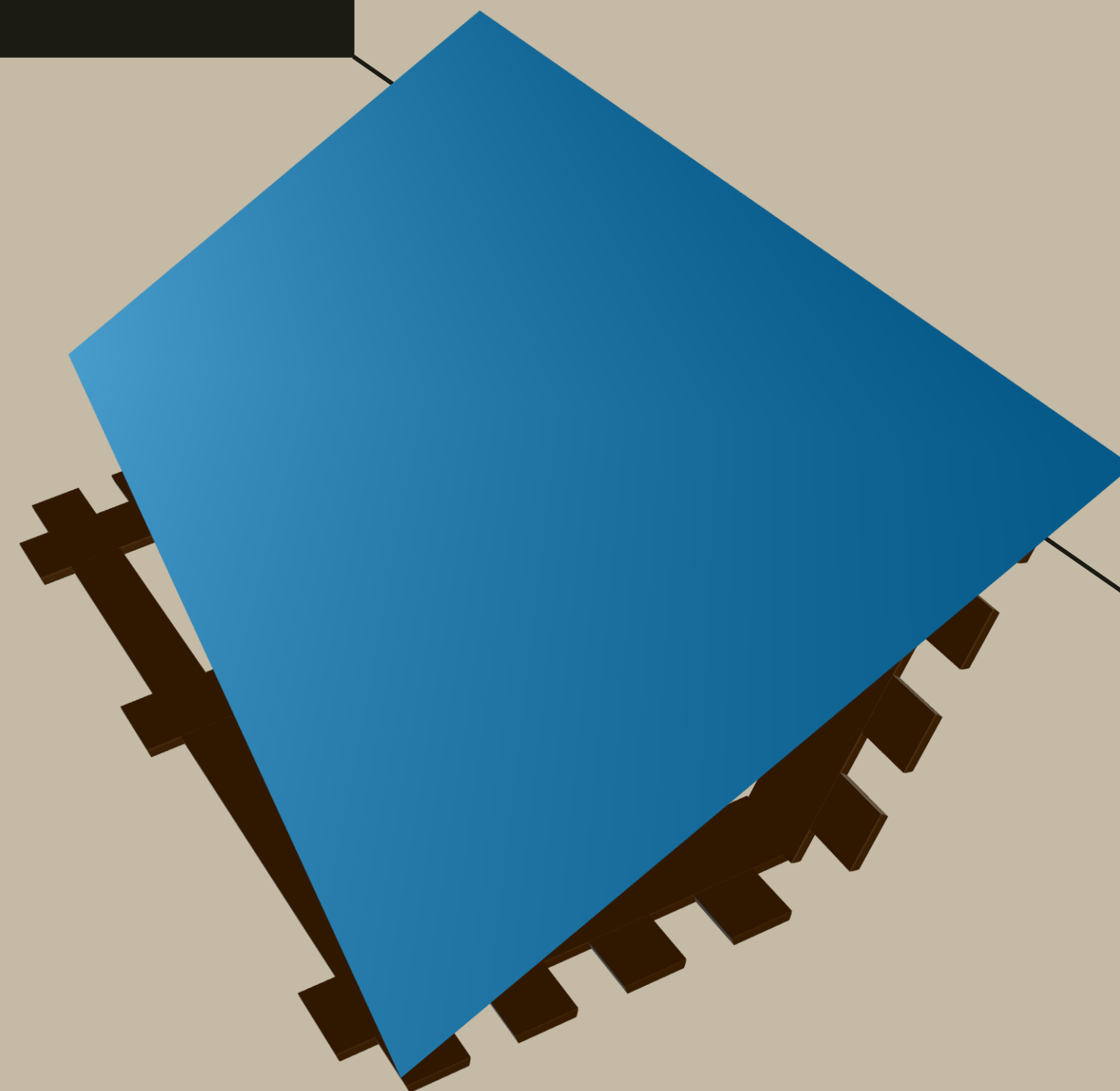
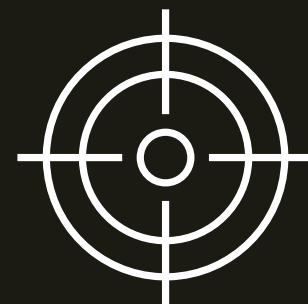
4 volunteers, 1 shooter  
→ 12 samples on glass beads  
and 4 unknown samples on  
cartridge cases



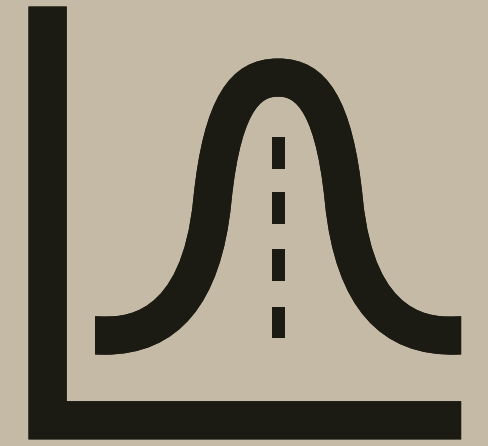
VS..



# SIMULATED CRIME SCENE

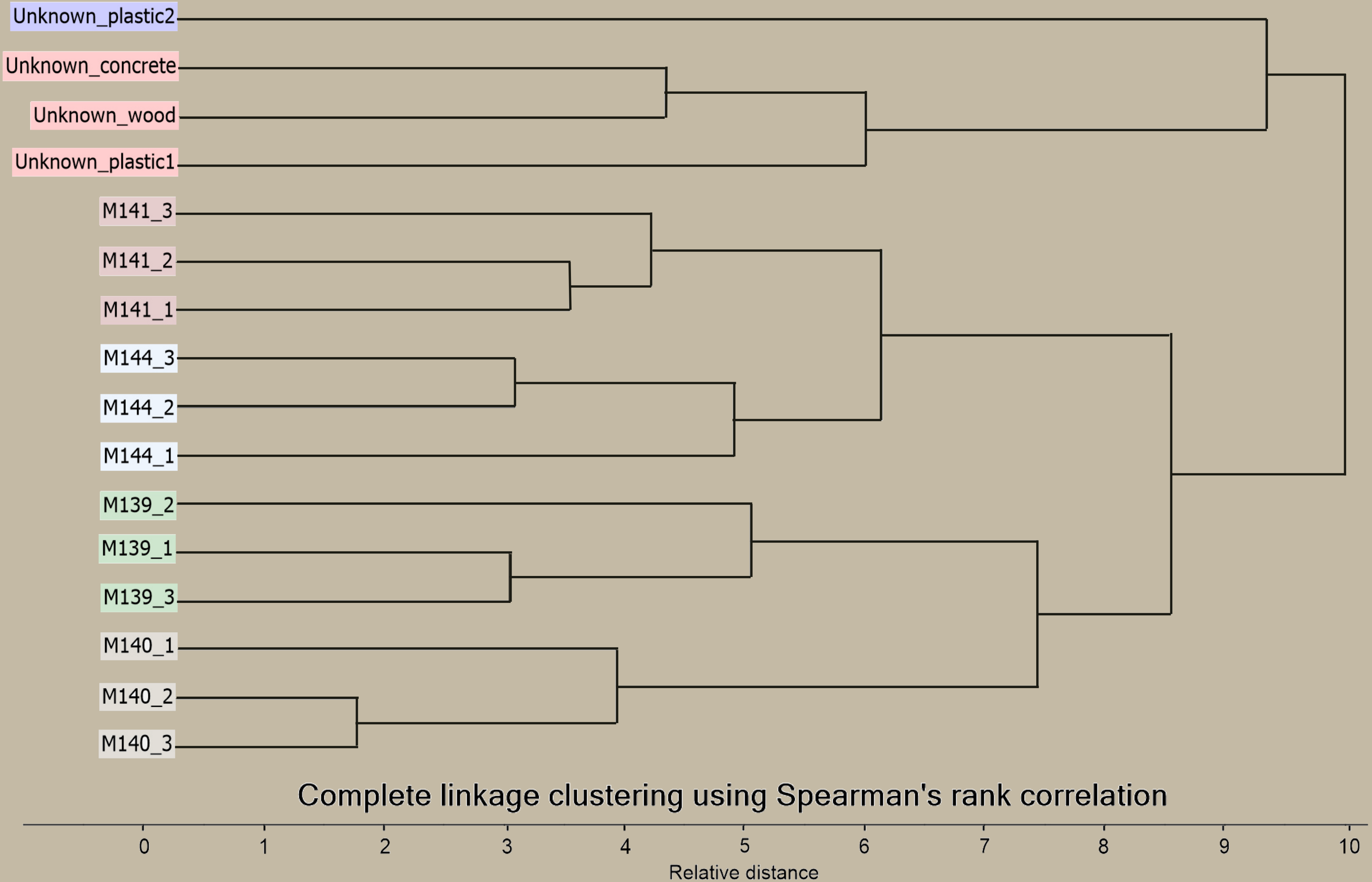


# DATA processing



- data aligned through **Kovats** retention indexes (chosen peaks evenly distributed through first and second dimension)
- substances at least on **one** unknown cartridge case sample
- substances at least on **75%** of all samples from the volunteers
- the resulting comparison parameter → **area ratios**
- area ratios ordered by increasing statistical variance – only the **first 150** used

**Cluster analysis of the scent samples from the volunteers and the unknown samples from the cartridge cases collected on the simulated crime scene from different surfaces.**



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# Results and conclusions

- ability to distinguish each volunteer sampled on the glass beads
- analogous samples were successfully compared by the trained police canines
- surface (plastic sheet, wooden palette and concrete floor) on the crime scene seems not significant for the identification

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# Future

- equalizing the parameters on glass beads and cartridge cases
- shortening the time of adsorbing the scent on cartridges
- enable the scent and dactyloscopy analysis on the same trace
- more volunteers, various types of gun, ammunition etc.

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6 **ANALYSIS OF THE HUMAN SCENT ON FIRED CARTRIDGE**  
7 **CASES FROM A SIMULATED CRIME SCENE**  
8  
9

10 Ulrika Malá\*<sup>a</sup>, Václav Vokálek<sup>b</sup>, Pavel Vrbka<sup>c</sup>, Jana Čechová<sup>a</sup>, Petra Pojmanová<sup>a</sup>, Oleksii Kaminskyi<sup>a</sup>  
11 Veronika Škeříková<sup>a</sup>, and Štěpán Urban<sup>a</sup>  
12

13 AUTHOR ADDRESSES <sup>a</sup>University of Chemistry and Technology in Prague, Faculty of Chemical Engineering, Depart-  
14 ment of Analytical Chemistry, Technická 5, 160 00, Prague, Czech Republic

15 <sup>b</sup> Regional Group for Cynology and Hippology, Odorology Section for Brno, Police of the Czech Republic

16 <sup>c</sup> University of Chemistry and Technology in Prague, Faculty of Chemical Engineering, Department of Physical Chemistry, Technická 5,  
17 160 00, Prague, Czech Republic

18 **ABSTRACT:** Fired cartridge cases are often found on crime scenes connected with a shooting and their punctual analysis can be  
19 very useful for the police investigation. In addition to dactyloscopy (fingerprints) that tend to be more or less damaged on the car-  
20 tridges and often are not adequate for individual identification, there are also scent traces on the fired cartridges that are not fully  
21 destroyed by gun's being fired. In this pilot study, we compare the human scent remaining on cartridge cases after firing with scent  
22 samples from different volunteers to find out who loaded the gun before it was shot. In this experiment, a simulated crime scene  
23 was prepared and one of our volunteers loaded the weapon. Analysis of the scent remains on cartridge cases was carried out using  
24 two different methods, namely olfactronics and olfactorics.  
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# FORENSIC OLFACTRONIC

The 2<sup>nd</sup> International workshop on



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