

## **Limits of Traces – The Phantom of Heilbronn**

DNA is supposed to be the No.1 evidence in criminalistics. DNA profiles are “a powerful tool in identifying offenders and in their prosecution” (INTERPOL 2001) and in the investigation of crimes. The improved sensitivity of DNA technology has meant that profiles can now be obtained from contact traces even after minimal contact between a person and the object. The potential for recovering DNA trace evidence must be borne in mind when investigating all incidents of criminal activity, but also the pitfalls and possible misleading, caused by this “overwhelming” kind of evidence. The short article discusses a case in Germany, where contaminated DNA-swaps have been used, resulted in false investigations and intensive discussions in public.

### **The story**

The “Phantom of Heilbronn”, alternatively the “Woman Without a Face”, describes a unknown serial killer whose existence was concluded from DNA traces found at 40 crime scenes (six murders) in Austria, France and Germany since 1993. In April 2007, a 22-year-old female police officer died after a shooting in Germany. 3500 traces were collected in this case only. The „Phantom of Heilbronn“ was one of Germany's most-wanted criminals. As the traces were connected to a female offender, “she” was suspected having committed an series of different crimes (murders, break-ins, theft) across Germany over more than 15 years. Tests showed her DNA at 40 different crime scenes. The only connection between the crimes was this DNA trace. Investigators admitted that they were stumped – but they did not think the “unthinkable”: that the traces were not taken at the crime scenes, but stem from a female worker at the production line of the cotton swabs or “Q-Tips”. Finally in March 2009, investigators came to the conclusion that the “Phantom” criminal did not exist, and the DNA traces from the crime scenes had already been present on the cotton swabs used for collecting DNA samples. But the existence of the “Phantom” had already been doubted earlier: Already in December 2008 the State Office of Criminal Investigation in Stuttgart has been informed by police officers that very likely the Phantom does not exist and the DNA-Traces are a result of “contaminated Q-Tips”.

### **Investigation**

Investigators assumed that the person was homeless or a drug addict, as most of the committed burglaries could be characterized as drug-related crimes. An analysis of the DNA in Austria<sup>1</sup> showed, that the characteristics are often found in Eastern Europe and neighboring Russia. Investigators were increasingly baffled by the case. A reward of € 300,000 for evidence leading to her arrest was offered, without result. The police even released a photo-picture in 2008 (see picture at the end), showing a man, which lead to some speculation that the killer might be transsexual. When in March 2009 investigators discovered the DNA sequence on the burned body of a male asylum-seeker in France, even more doubts came up, since the sequence was of a female. The investigators finally

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<sup>1</sup> In Germany, the analysis of DNA may not be used in criminal proceedings to determine personal attributes of a suspect other than sex.

came to the conclusion that the mysterious criminal did not exist and the laboratory results were due to contamination of the cotton buds used for DNA probing. The cotton swabs used by many state police departments were found to have been contaminated before shipping. The swabs all came from the same factory, which employs several Eastern European women who fit the type the DNA was assumed to match. Furthermore, Bavaria, a region central to these crimes, got their swabs from a different factory and subsequently had no reports of crimes committed by the Phantom. Although sterile, the swabs are not certified for human DNA collection.

## Consequences

To rule out the possibility of incorrect analysis due to contamination, the German Union of Criminal Investigators (BDK) called for the introduction of a "DNA quality seal". Manufacturers should include data about the DNA of the employees who handled the products in the packaging. That would allow their DNA to be excluded from the investigation. A similar system is already in use with fingerprint evidence to prevent police from accidentally launching a search for their colleagues. In July 2009, the Home Office of Baden-Württemberg decided that only Q-tips sterilized with ethylene oxide are allowed for collection of forensic evidence.

Days before another case showed the limits of DNA profiling: German police were forced to release identical twins who were suspected of pulling off a spectacular jewel heist after the DNA sample found at the crime scene could not be pinned conclusively on either man, whose DNA is indistinguishable under current methods. And on October 23, 2009, another offender was sentenced „not guilty“ after having served 11 years in prison. In this case, the defense could prove that traces have been not been secured properly. To quote the defense counsel: „*The detectives run through the apartment like a herd of elephants*“. The crime scene was not sealed; there was a tremendous hurly-burly all around and especially with traces.

But more important is that this case is an example for the steadfast faith in science and „objective“ pieces of evidence. DNA-traces look easy, obvious, and scientific. This kind of “scientific conditioning of criminal traces” must lead to even more accuracy, and especially self-criticism of detectives and crime-labs. We know that statistical geneticists, working to identify victims of the September 11 attacks in the US, found DNA matching using relatives problematic. Nearly 3000 victims had to be identified from 15,000 body parts. With so large a set of victims, coincidental similarities between non-relatives abound. DNA samples from several relatives were needed to establish the identity of a victim. Scientists suggest that as many as 50 DNA markers need to be tested to distinguish half-siblings from completely unrelated people. The public pressure, when media and public are asking for fast answers, solutions, and a suspect, too often leads to (too) fast reactions by police representatives, and politicians. The deep rooted trust in material evidence might be a consequence of our „Age of Technology“ and the fading relevance of witness testimony in investigations, proceedings, and in court. But we need to accept, that a 100%-certainty is never possible and DNA-traces and tests are not the „queen of evidence“ or No.1 evidence in criminalistics. „One-Way-Investigation“ as a general problem of police investigations is endorsed or even caused by such „scientific evidence“. Sometimes the media discover „traces“, and the police has to follow. With the role of defense counsel becoming more and more difficult and may be fading, the police has to take over more responsibility for the proper quality of evidence. Traces alone are never evidence enough. Traces are hints, not more.

