

Faked DNA evidence

Catching the Wrong Wrongdoer?

Israeli scientists recently showed that DNA evidence can easily be faked, developed an assay to unveil such forgery and founded a company to sell it.

Ever since British geneticist Alec Jeffreys had his “eureka moment” with an (putatively!) unimportant Southern blot experiment on 10th September 1984, genetic fingerprinting has revolutionised forensic science. Three years later, the first criminal was convicted of murder due to Jeffrey’s invention, DNA evidence. Today, DNA fingerprinting is to replace its “analogue” ancestor, the classical dactylogramme, as the gold standard, not least because of its often cited high reliability.

However, this reliability could be illusory. The criminal identification of individuals using their respective DNA profiles leaves the doors wide open for abuse, claim Israeli scientists. In a new paper, published online on 17th July 2009 in *Forensic Science International: Genetics*, they describe how DNA evidence can be faked in an alarmingly simple way. Dan Frumkin and colleagues showed that, “standard molecular biology techniques [...] enable anyone with basic equipment and know-how to produce practically unlimited amounts of *in vitro* synthesized [...] DNA with any desired genetic

profile. This artificial DNA can then be applied to surfaces of objects or incorporated into genuine human tissues and planted in crime scenes.”

Can insidious scientists dupe the police?

Frumkin *et al.* add that current forensic procedure, “fails to distinguish between such samples of blood, saliva, and touched surfaces with artificial DNA, and corresponding samples with natural DNA”. To prove their claims, they showed that every skilled molecular biologist with access to a genetic database (or a single person’s specific DNA profile) would be able to construct faked samples of DNA to match that profile, without obtaining any tissue from the person.

As an alternative approach, Frumkin *et al.* constructed faked DNA blood samples, based on real tissue sources, using whole genome amplification technology. They took blood from a woman and removed the white cells by centrifugation. Then they added DNA that had been amplified from a man’s hair, to the remaining (now

DNA-free) blood. A leading forensic laboratory’s analysis arrived at the conclusion that the material in the blood sample was from a man.

“You can just engineer a crime scene,” Frumkin told the *New York Times*.

Admittedly, presently there is no risk that criminal DNA profiling will become unsustainable. While the findings described above indicate that DNA is, in fact, much easier to plant at a crime scene than fingerprints, ordinary criminals without biological background would struggle to do so.

Building a business plan in Tel Aviv

Frumkin, a biological chemist who got his PhD at the Israeli Weizmann Institute of Science, is a co-founder of Nucleix Ltd., a Tel Aviv-based small-scale enterprise that specialises in forensic DNA analysis. The four start-up entrepreneurs around Frumkin and bioinformatics specialist Adam Wasserstrom (see picture left), have developed an assay to distinguish genuine from artificial DNA, based on its methylation state (in contrast to natural DNA, where some loci are methylated, artificial DNA is completely unmethylated).

On their web page, the Israelis underline the importance of their authentication assay as part of the forensic procedure, “for maintaining the high credibility of DNA evidence in the judiciary system”.

They may be right with this opinion. To sell as many as possible of these authentication assays, however, is crucial for their small company’s continuity. Nucleix, founded in 2008, has no additional product to offer its customers, nor any distributor in Europe and the USA, so far.

WINFRIED KOEPPELLE



Photo: Nucleix

Caught in the lab: Adam Wasserstrom (left) and Dan Frumkin from Nucleix, Tel Aviv, have developed a sophisticated method that unveils if a DNA trace has been faked.