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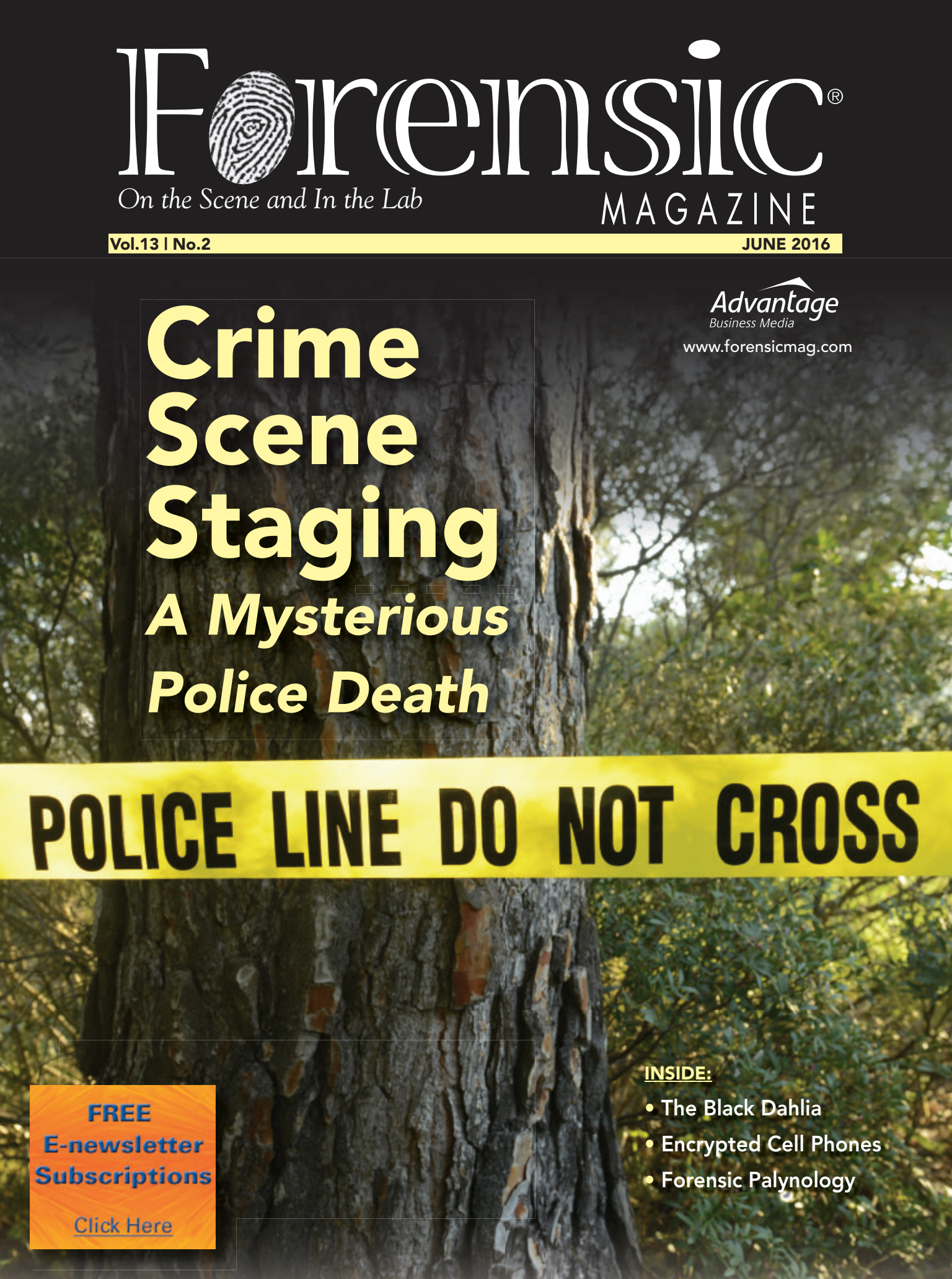
Crime Scene Staging

A Mysterious Police Death



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from the
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The Hidden Cost of the Rape-Kit Backlog

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The White House recently reminded us that our rape-kit problem is going nowhere fast. Four hundred thousand kits and counting stacked on evidence-room shelves are potentially hoarding powerful DNA evidence that could lock up dangerous sexual predators nationwide. Sounds straightforward enough—pay to test the kits, enter the DNA profiles into CODIS, and investigate the hits. But, like most things in life, the problem is in the funding.

The Obama administration recently announced a grant program to fund testing and improve investigations. Last year's Sexual Assault Kit Initiative awarded $41 million to 20 jurisdictions, which was a well-needed shot in the arm. The 2016 SAKI program will award $45 million. But as the years pass and the problem continues to grow, how much will America's rape-kit problem cost?

"The real cost is in the legwork."

Last year, the City of Houston announced a $6 million initiative to test all its kits dating back to the 1980s. The city only paid $453 per kit, which is a basement-bottom price (most experts estimate the cost of testing a kit at over $1,000). At that price, testing the nation's backlog would cost around $180 million, well within the government's $600 million authorized in the Debbie Smith Act through 2019.

But, the real problem is in the legwork. Once the results are in, labs still have to examine and analyze the results. Then, law enforcement agencies have to find the resources to mount full investigations. Those expenditures can cost much more than the testing itself. Ramit Plushnick-Masti, of the Houston Forensic Science Center, said finding the funding was a major stumbling block. "You're not only providing for the cost of testing the kits," she said, "but the cost of having the resources internally to take cases to the next level and that's where there was a lot of expense."

What we do know is that testing the backlog keeps criminals off the streets. A court in Ohio sentenced serial rapist Dwayne Wilson to life last year. Already a known pedophile, Wilson was convicted of seven counts of rape after his DNA matched rape kit evidence relating to assaults on four women in Cleveland in the 1990s. The judge called Wilson "the worst of the worst." The most shocking part of the story: when Wilson was initially indicted, he was just days away from being released from prison, where he was serving five years for sexual battery. Evidence from a decades-old rape kit prevented a convicted pedophile from walking back onto the same streets where he physically forced women and young girls into his car and raped them at knifepoint.

While we don't know what the ultimate cost of testing all America's rape kits will be, we do know that it saves lives. What we may never know—and the true value of these programs—is how many innocent women and children have already been saved.

One-Step Fluorescent Fuming

Jeremy Malinge, Ph.D.

Among the existing protocols used by law enforcements around the world for fingermarks development, ethyl cyanoacrylate fumigation is well adapted to reveal latent marks on non-porous or some semi-porous surfaces covering potential evidences. In practice, the object of interest is placed into a fuming chamber in which hygrometry is set at 80 percent. Cyanoacrylate is then heated up to 120 °C (250 °F) leading to its vaporization in the confined volume of the chamber. The latent traces, consisting of bodily fluids, contain nucleophiles which may act as polymerization initiators to form a white polymer picturing the marks. However, in the case of white or multicolored surfaces, a second development step is often required to enhance the contrast between the marks and its support. Conventional methods often involve a dye staining process to produce fluorescent marks. Such post-treatment is usually time-consuming, requires additional expensive safety equipment like fume hoods and drying cabinets, and chemical wastes management.

In 2011, a partnership between an emerging French company and the National Center for Academic Research created a one-step development for latent marks, directly yellow fluorescent (560nm) under conventional forensic lighting. The challenge was to design a new emissive molecule light enough to vaporize at the same temperature as the cyanoacrylate. Indeed, since the early 80's, many scientific efforts were devoted to the improvement of cyanoacrylate fuming protocols in order to obtain direct fluorescent fingerprints.[1] Many strategies were attempted to chemically modify the cyanoacrylate itself. However, the solutions either required high fumigation temperatures or a specific heating apparatus, in some cases producing highly toxic hydrogen cyanide gas.

To circumvent these technological issues, the consortium worked conjointly to develop a new emissive molecule that can be mixed with the cyanoacrylate and be vaporized at low temperatures. There are many known emissive molecules but almost all of them were too heavy to be vaporized at 120 °C (250 °F). Thanks to the expertise of CNRS, a novel emissive molecule, exhibiting a strong yellow fluorescence was synthesized.[2] As it stands, the fluorophore can be easily mixed with the cyanoacrylate and be vaporized at 120 °C (250 °F). Before reaching the market, many tests were performed by forensic forces all around France, and since 2015, all the French forensic forces are using the technology on every day caseworks. The traditional process involving both fumigation and coloration steps has been abandoned. Indeed, since the dye vaporizes with the cyanoacrylate, the subsequent polymer fibers picturing the latent are directly fluorescent with a high resolution. While the coloration step was sometimes providing poor resolution (coloration of both the print and its support) and was damaging the evidence (washing with solvent required), this new fuming technology affords reproductive results rapidly without altering the evidence.

The new fluorescent cyanoacrylate formulation allows direct fumigation at low temperature, meaning that no modification of pre-existing fuming chamber is necessary. In addition, the intrinsic properties of the chosen emissive molecule, allows prints visualization under a wide range of light source (325 nm and 470 to 530 nm) already used by forensic technicians worldwide. Finally, the selected dye is fully compatible with DNA, meaning that both papillary and genetic identifications are possible on a single latent mark. For the first time in the forensic history, it is now possible to fume an entire room or vehicle and observe fluorescent marks with forensic lightings allowing new perspectives and saving time: just like watching CSI TV show!

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