Office Of The Prosecuting Attorney

Lake County Crime Laboratory

Lake County, Ohio

SERVICE – INTEGRITY – TRUTH

440/350-2793 www.lakecountyprosecutor.org/crimelab

The advent of new technology and the success of television shows like CSI have made forensic science more popular than ever. But the science of solving crimes is never as simple as television screens imply. Behind these doors, sophisticated science and modern technology merge under the guiding hands of skilled scientists to unravel the mysteries of crime.

This is where a blood test can determine if a driver, who plowed into a child crossing the street for an ice cream cone, was drunk. And, were the bloody fingerprints left in a Willoughby bedroom, where the victim was stabbed to death with the phone still clutched in her hand as she dialed 9-1-1, really those of a Wickliffe man?

Founded in 1973, the Lake County Crime Laboratory is funded by a countywide tax levy. The Lake County Crime Laboratory is accredited by the American Society of Crime Laboratory Directors--Laboratory Accreditation Board, assuring that it adheres to stringent policies and that its' scientists are skillfully trained in state-of-the-art technology. The Laboratory serves Lake County law enforcement agencies at no cost and assesses a fee for out of county police agencies.

The Laboratory has earned recognition for its prompt crime scene analysis, evidence examination and courtroom testimony. This brochure provides a peek behind the doors, to view the amazing technology and near miracles that have created a safer community.

Helping Law Enforcement Uncover The Truth Since 1973

Whether you watch television or read newspapers, DNA is bantered about as the miracle crime solver. In some ways it is.

DNA is the genetic coding that is unique in every individual. It is the combination of genes that determines such things as the color of our hair and our eyes. Scientists can test the smallest fragment of the ladder-like DNA molecule to determine if a known suspect was at a crime scene. A tiny drop of blood, a sweaty cloth or a fragment of skin under a fingernail, may all contain the unique DNA of a suspect.

Newer technology like the fluorescent multiplex STR, allows Lake County Crime Laboratory scientists to find DNA strands in places never before visible. These modern tests can even decipher decades old samples that before could not be tested due to decomposition.

The Lake County Crime Laboratory is a member of the Combined DNA Index System (CODIS) maintained by the FBI and U.S. Department of Justice. The federal partnership allows local DNA swabs to be matched against millions of samples taken from violent offenders all across the country. This allows Police to arrest criminals for committing a series of crimes, across several jurisdictions, after DNA is matched to a sample in the national data base.

DNA ANALYSIS

The Technology…

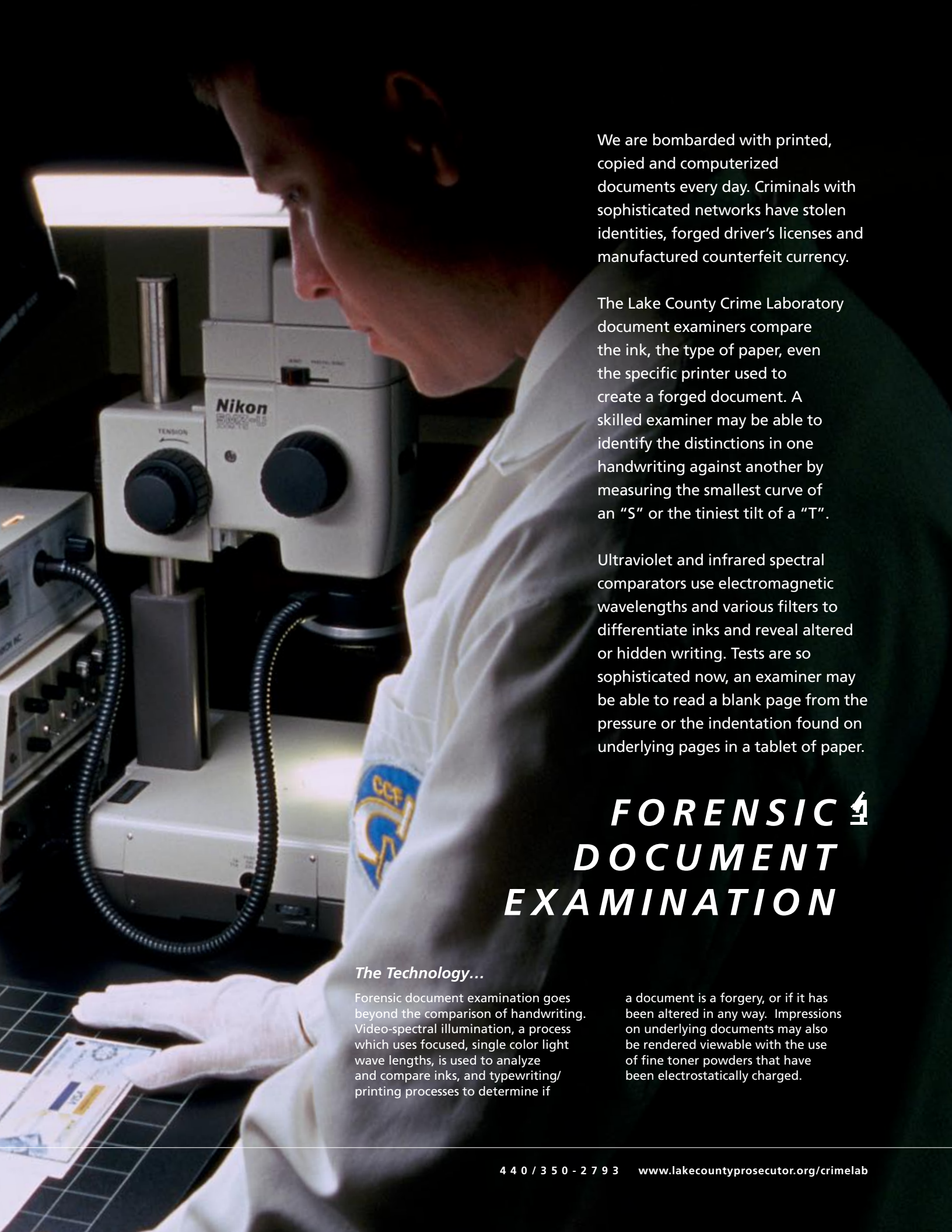
The DNA Section uses state of the art fluorescent multiplex Short Tandem Repeat (STR) technology, an extremely powerful and sensitive identification tool which enables the contributor of a typical evidentiary DNA sample to be positively identified. Sixteen genetic loci (15 STR loci plus amelogenin, which indicates the gender of the contributor) are amplified simultaneously with the Promega Powerplex 16 system, and genotyped on an Applied Biosystems 310 Genetic Analyzer. The Lake County Crime Laboratory is also part of the Combined DNA Index System (CODIS), enabling crimes to be solved by comparing DNA profiles of unknown source to large state and national databases containing both forensic profiles from other laboratories' cases and known profiles from convicted offenders.

DRUG AND TOXICOLOGY ANALYSIS

Many of us have had first hand experience with the drugs that forensic chemists test every day. That bottle of beer, that mixed drink or two that you had at the corner bar, can easily be detected in your blood and urine and tell whether you are over the legal limit. The blood alcohol tests are a minute portion of the testing done here at the Lake County Crime Laboratory. Illegal drugs and deadly toxins hidden in blood droplets or liver tissues can be discovered by our laboratory chemists. The Laboratory can identify more than prescription drugs and common narcotics, such as cocaine and heroin, but also other toxic cocktails, including ecstasy and date rape drugs.

The Technology…

Gas Chromatography / Mass Spectrometry (GCMS) is a state-of-the-art technique used for the positive identification of drugs. The principle of GCMS states that drugs will fragment reproducibly and predictably when subjected to bombardment by electrons or small ions in a vacuum. The fragmentation patterns, or spectra, reveal the masses of the various fragments and their relative intensities. The mass spectrum of an unknown sample is compared to a spectral library of known drug standards. Identification is made by comparison of the relative intensity and positions of major ion peaks in the unknown sample to the known drug standard.



We are bombarded with printed, copied and computerized documents every day. Criminals with sophisticated networks have stolen identities, forged driver's licenses and manufactured counterfeit currency.

The Lake County Crime Laboratory document examiners compare the ink, the type of paper, even the specific printer used to create a forged document. A skilled examiner may be able to identify the distinctions in one handwriting against another by measuring the smallest curve of an "S" or the tiniest tilt of a "T".

Ultraviolet and infrared spectral comparators use electromagnetic wavelengths and various filters to differentiate inks and reveal altered or hidden writing. Tests are so sophisticated now, an examiner may be able to read a blank page from the pressure or the indentation found on underlying pages in a tablet of paper.

FORENSIC DOCUMENT EXAMINATION

The Technology…

Forensic document examination goes beyond the comparison of handwriting. Video-spectral illumination, a process which uses focused, single color light wave lengths, is used to analyze and compare inks, and typewriting/ printing processes to determine if a document is a forgery, or if it has been altered in any way. Impressions on underlying documents may also be rendered viewable with the use of fine toner powders that have been electrostatically charged.

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When a bullet blasts through a gun barrel, the microscopic grooves and scrapings left on the projectile are the key to matching a bullet to a specific gun. Each firearm, whether mass manufactured or hand made, has its own unique tool markings that leave distinct grooves on the fired bullet and shell casing. Tool markings are as unique as a fingerprint. Examiners use microscopic comparisons to identify and catalog tool marks and match them. Lake County Crime Laboratory partners with the U.S. Bureau of Alcohol, Tobacco, Firearms and Explosives in its National Integrated Ballistic Network (NIBIN) to link crimes and identify gun owners across the country. Weapons experts at the Lake County Crime Laboratory have more than 20 years experience matching bullets and spent casings found at a crime scene to a particular gun.

FIREARMS ANALYSIS

The Technology…

The firearms manufacturing process employs various cutting tools, such as drills, reamers, and broaches. These tools leave distinct marks on the inside of a gun barrel, breach face, and firing pin. When a firearm is discharged, these tool marks, which are unique to that firearm, are transferred to the bullet and cartridge case. Microscopic comparisons of these tool marks on bullets found at a crime scene, and test fired bullets and cartridge cases, allows for a positive identification.

Technology today is so advanced that digital micro comparisons and computerized identification systems installed in over 200 locations across the nation can match projectiles and shell casings in a national data base. Information that once was impossible to obtain can now be gathered in minutes.

The tiny swirls and curves, thinner than a strand of hair, linger at the edge of our fingertips creating a unique pattern. The analysis of those patterns has come a long way from the black powdery smudges sprinkled around crime scenes. Now infrared cameras and adhesives lift finger prints off many surfaces. Once a print has been located, it can be digitized and cataloged into the Automated Fingerprint Identification System (AFIS) capable of comparing 15,000 prints per second. The Laboratory is electronically networked with the State of Ohio's Bureau of Identification and Investigation database thereby allowing for near instantaneous statewide search capabilities.

FINGERPRINT COMPARISON

The Technology…

Super glue fuming and dye stain techniques have supplemented the traditional use of dusting powders to identify latent fingerprints. Using alternate light sources, ranging from ultraviolet to infrared wave lengths, will also illuminate many latent fingerprints that cannot be seen under ordinary light. Latent prints can be digitally photographed and computer enhanced, allowing previously unusable latent prints to become identifiable. Computer enhancement merely makes the ridge detail of a print more visible, it never alters or changes the print. Automatic fingerprint identification computers can store and search criminal fingerprint records, not only in data bases located at the Lake County Crime Laboratory, but also the State of Ohio databases at the Ohio Bureau of Criminal Identification and Investigation. Technology currently being developed will allow future searches of national fingerprint data bases at the Federal Bureau of Investigation.

TRACE EVIDENCE ANALYSIS

There is rarely a perfect crime. No matter how careful, a suspect may leave behind a trail. A hair, a fiber, skin cells, shoe print or tire tracks can lead experts to a killer's door. The Lake County Crime Laboratory's trace evidence section has modern instrumentation that can enhance the smallest fragment and the tiniest traces. A paint chip embedded in a bumper, a shoe print impacted in the snow, a tire tread embedded in the mud, or the slightest vapors from an arson fire may be detected with the right equipment. Scientists gather the fragments and fabric and analyze them for their composition. Paint fragments can be traced to a specific manufacturer and then to a vehicle.

The Technology…

Manufacturers of items such as paint and glass will vary the types of organic and inorganic materials used in the composition of their products based on availability of a material. This fact allows a trace evidence examiner to utilize chemistry involving identification of inorganic items, and the ratio of those elements present in the samples utilizing x-ray fluorescence. Identification of organic material can be determined utilizing fourier transform infrared spectrophotometry or gas chromatography/mass spectrometry techniques of analysis which then assists an examiner in comparing a sample detected at the scene to a known standard. The fact that strict quality control regarding composition of materials in the manufacturing process is not generally followed, allows these "contaminants" to be detected in the items produced which allows a trace evidence examiner to potentially identify a glass or paint sample as having originated from a particular source.

Like the jagged pieces of a puzzle, the components of a crime need to be gathered together to solve the mystery. Lake County Crime Laboratory provides its own crime scene investigators to help local law enforcement seek out the evidence. Specially trained teams with proper equipment can even detect blood stains cleaned with detergents, as in the case of a teen who tried to wash away his girlfriend's blood from a carpet, or a man who thought he had thoroughly cleaned his bloody knife.

Serious crimes require fast action. The Lake County Crime Laboratory responds in minutes with trained personnel ready to collect and preserve evidence for future examination.

CRIME SCENE ANALYSIS

The Technology…

All of the Crime Laboratory's technologies can be used at crime scenes, to search for evidence or to reconstruct the events that occurred. By taking accurate measurements of blood spatter, and using trigonometry, the angle of impact and the point of origin of blood stains can be determined. Shoe prints and tire tracks are photographed, to document the evidence found at the crime scene, and then molds are made of the shoe prints and tire tracks for comparison and analysis. Crime scenes are also processed to collect any fingerprints, body fluids, hairs, fibers, and/or tool marks which may be found. All evidence items are carefully logged, packaged and labeled at the crime scene, and brought back to the Lake County Crime Laboratory for thorough examination.

COURTROOM TESTIMONY

Cutting edge technology allows the Lake County Crime Laboratory scientists to provide juries, attorneys, and judges with scientific facts in a clear and easy to understand format. Providing oral testimony is only part of the Courtroom responsibilities the Crime Laboratory Scientists provide. Presentation materials are prepared to make even the most complex analysis understandable and interesting.

TRAINING

Arriving at the crime scene first, the Police Officer may be the most integral part of the crime scene team. The Lake County Crime Laboratory provides periodic training to local law enforcement agencies, to insure the proper collection and preservation of evidence.

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