THE NATION'S NEWSPAPER

Collegiate Case Study

USA TODAY

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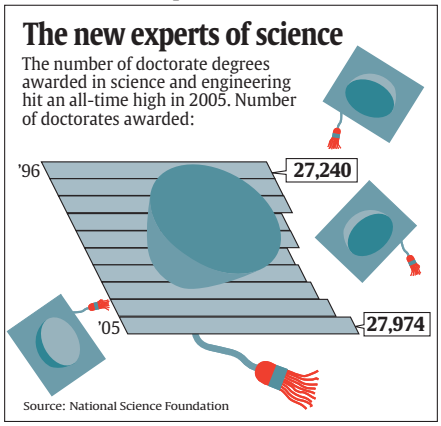

By David Stuckey and Adrienne Lewis, USA TODAY

Forensic Science

On television CSI detectives solve their crimes quickly and easily, always catching the villain by the end of each episode. In real life, forensic science, which is any type of science used in the courts or for purposes of law, involves much more work. With advances in technology, especially those surrounding DNA, the science of crime solving has been transformed in recent years. This case study focuses on the new ways in which DNA is being used to solve crimes and highlights and explores the legal and ethical issues that have arisen with these scientific advances.

Students clue into forensic science

TV piques interest in college programs

By Laura Parker
USA TODAY

Outside Hollywood, the work of a crime lab technician is known for two things: tedium and less-than-lucrative pay. Yet, thanks in part to an abundance of TV crime lab dramas, the field of forensic science is one of the hottest new majors on college campuses.

At West Virginia University, with one of the largest programs, forensic science ranks second in popularity to Spanish.

This fall, the anthropology department at Eastern New Mexico University joins colleges in Texas, Nebraska, Montana and New York in adding forensic science as a major.

Since the new major was announced at Eastern New Mexico, "my phone has been ringing off the hook," says Kathy Durand, chairwoman of the anthropology department.

More than 130 forensics programs are being taught at colleges and universities across the USA, although only 16 programs at 14 universities are

By Michael Dunlap, *The* (Monroe, La.) *News-Star*

Searching: Student Caroline Meyers at a simulated crime scene in Monroe, La.

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accredited by the American Academy of Forensic Sciences, says Jim Hurley, director of accreditation. He expects the number to rise as more programs adopt the rigid science course work required.

Although no one seems to know why, the field is increasingly dominated by women. At Indiana University-Purdue University Indianapolis, 90% of the forensic science students are female.

At Metropolitan State College in Denver, which is one of the smallest programs, 13 of 15 students are women.

"I don't know why," says Charles Tindall, who directs Metropolitan's forensic science program. "When you ask them, they say: 'I've always wanted to do this.' Like they were born to it. None of them will say they watch CSI."

Starting pay for beginning forensic scientists averages $35,000-$45,000 a year, according to industry estimates.

Durand sold the idea of a forensics major to colleagues last December, after the Albuquerque Journal published several investigative stories detailing a 10-year backlog of cases awaiting DNA analysis in the state crime lab.

The stories prompted New Mexico Gov. Bill Richardson to ask legislators to increase the lab's budget by $751,000 and approve construction of a $350 million lab.

"Labs are really struggling. Prosecutors are having problems," Durand says.

The study of forensic science has only recently bloomed, largely as a result of expansion of DNA analysis as an investigative tool and the televising of big trials. Before 1980, when Jay Siegel set up one of the first programs at Michigan State University, "there were just a handful of people who could even tell you what forensic science was," he says.

By the time of O.J. Simpson's trial in 1995, the field had "exploded," Siegel says. "I've been waiting for the boom to level off and it hasn't."

Since the forensic science program launched in 2002 at West Virginia University, it has grown to 500 students from 35 countries, Director Keith Morris says.

Despite all that appeal, many of the programs have high dropout rates, Siegel says.

"We have a number of students who come in each year thinking they're going to crime scenes in Hummers and Armani suits and then find out there's a lot of science involved here," he says.

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USA TODAY

USA TODAY Life

AS SEEN IN USA TODAY'S LIFE SECTION, OCTOBER 10, 2007

This crime scene team exposes animal cruelty

Investigators apply human techniques

By Sharon Peters
Special for USA TODAY

Secrets lie in the bones — and in the tissue and in the shape of the wounds, and the severity and type of injuries.

And these days, when investigators are poring over X-rays, bone fragments, bullet trajectories or other details, it may be to establish whether a crime was committed against an animal.

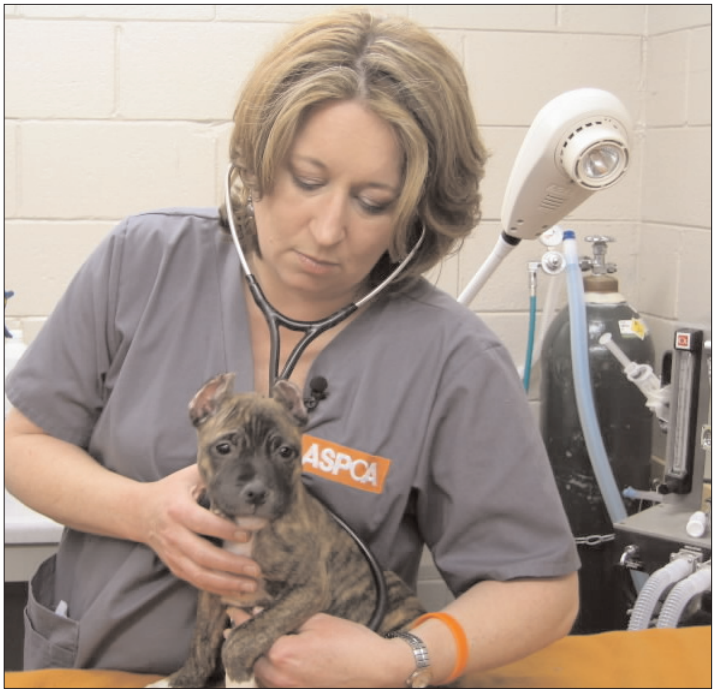
Forensic crime-scene investigations are no longer limited to human victims. Many of the very same techniques brought to public awareness by the popular CSI television series are being used to make cases against those who have harmed or killed cats, dogs, horses and other animals.

Applying forensic science to animal victims is a specialty still so new that it's fairly rare. But two self-taught experts who make up the recently formed Veterinary Forensics unit of the American Society for the Prevention of Cruelty to Animals are writing book and chapter (three how-to books so far) and sharing their knowledge almost as quickly as they develop it.

Melinda Merck is a veterinarian who ran an Atlanta-area cat clinic for years before becoming intrigued with forensic science in the '90s. Randall Lockwood has a doctorate in psychology and has developed expertise in cruelty and violence. They travel the country to investigate crimes against animals (including the Michael Vick dogfighting case and a notorious Atlanta puppy-torture case last year).

They're regularly called on to offer expert testimony in court (they're tracking toward 60 this year); and by the end of December, they will have spoken at nearly 100 conventions and conferences to instruct veterinarians and law enforcement officials who might someday find themselves in the midst of a cruelty investigation or court case.

"Animal cases are similar to crimes against young children who can't speak for themselves," Merck says. "You have to use every resource and every investigative tool to attempt to put together the pieces of the puzzle."



By Shonali Burke, ASPCA

Cruelty: Melinda Merck examines a puppy that was found on the side of a road in Georgia. It had "home-done" cropped ears, probably for dogfighting. The puppy was later adopted through a local rescue group.

Helping 'range of responders'

Although stronger animal cruelty laws and heightened public awareness of animal cruelty have spurred greater interest in punishing offenders, most officials have no experience in putting together a rock-solid case.

"We're looking to give assistance and guidance to the whole range of responders to animal cruelty, from the public who report it, to the police who investigate it, to the prosecutors who prosecute it, to the veterinarians who want to be good witnesses, to judges who take this seriously," Lockwood says.

By year's end, the ASPCA will roll out another forensics first: the nation's only animal crime-scene van. The $250,000 forensic mobile unit, equipped with X-ray machines,

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USA TODAY

USA TODAY Life

AS SEEN IN USA TODAY'S LIFE SECTION, OCTOBER 10, 2007

Photos by Shonali Burke, ASPCA

Skeletal remains: Merck's forensic tool kit includes a collection of normal bones to compare with bones from possible cruelty cases.

computers, examination tables, and cameras and video equipment for documenting evidence, will travel when requested by local officials to wherever there are multiple cases of abuse or cruelty. Those will most often be dogfighting operations, puppy mills or animal hoarding situations, "cases where there is a lot of evidence," Lockwood says.

Very often, Merck says, she's called to assist in rural areas, or in late-night Drug Enforcement Administration raids,

Her tools: Merck uses evidence markers, collection bags and testing equipment to investigate.

because drug dealing and dogfighting correlate pretty highly. Lighting is terrible, there's no easy way to contain the still-living animals, and preserving evidence is tough. She might be miles from a place where X-rays can be taken or blood samples run, and sometimes animals and investigators are enduring raging heat, bitter cold or pounding rain. The van will help ensure that important evidence is collected, preserved and efficiently processed, she says, and will make it easier to care for the animals.

When Merck's interest in veterinary forensics began budding years ago, she searched for a veterinarian who could mentor new learning. No luck. So she turned to medical examiners and textbooks in human forensics.

She and Lockwood have built knowledge "strongly rooted in science," says Lockwood, by determining "what human literature applies and what doesn't." For example, about 99% of how to interpret animal wounds is the same as on humans, they now know, but the other 1% is vital to understand: "Animals don't bleed and bruise like humans," Merck says.

Lockwood and Merck spend much of their time instructing veterinarians, because vets are often the first to discover animal abuse. "Battered pet" is a recognized condition applied to an animal subjected to the same types of brutality leveled against humans in domestic violence situations, Lockwood says.

Thousands of dollars well spent

Every state has different animal cruelty laws, Lockwood says, but in many cases of neglect, hoarding and puppy-mill breeding, first offenders can sometimes avoid jail time on plea agreements that include surrendering the animals. However, he says, jail time is common in cases that involve "torture or wanton cruelty or dogfighting."

It costs the ASPCA several hundred thousand dollars a year to support this initiative, says ASPCA president Ed Sayres, but he believes it's money well spent. "I believe that tackling animal cruelty is the 'next frontier,' as it were, for our field, in terms of new developments." In fact, he has earmarked an additional $100,000 to support new training and materials related solely to the matter of dogfighting.

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USA TODAY

USA TODAY News

AS SEEN IN USA TODAY'S NEWS SECTION ON OCTOBER 20, 2006

Thefts solved by DNA analysis

Usage expands in non-violent crime

By Richard Willing
USA TODAY

The national database of criminals' DNA, designed by the FBI to help solve rapes and murders, increasingly is being used to identify suspects in unsolved burglaries and other property crimes, a USA TODAY review of state crime lab records shows.

In 10 states — Alabama, Florida, Indiana, Michigan, Missouri, New Mexico, Ohio, Oregon, Virginia and Wisconsin -- the total number of DNA matches in property-crime cases has exceeded the number of matches in violent crimes, the review indicates. Other states also are reporting increases in property-crime matches: Of Georgia's first 171 matches, only 13 involved DNA from the scenes of unsolved burglaries. Of the 300 matches that followed, 79 were in burglary cases.

Oregon state police DNA analyst Brian Ostrom says there are many reasons for the rise in property-crime matches. DNA testing has become more sophisticated, he says, allowing analysts to draw genetic profiles from evidence left at burglary scenes — palm prints, cigarette butts, sweat stains on gloves and masks — nearly as easily as they can get profiles from blood or semen at the scenes of violent crimes. And government grants for testing evidence, initially limited to violent crimes, now can be used to analyze DNA from property crimes.

Since 1990, the states, the federal government and the military have collected DNA from those convicted of felonies —serious crimes punishable by more than a year in prison — and stored the genetic profiles in computer databases. Several states collect DNA from those convicted of misdemeanors, such as minor assaults. With FBI software, the profiles are compared with DNA from crimes. The system was designed to "solve violent crimes," its mission statement says.

The database contains DNA profiles from about 3.5 million people and has scored matches in about 38,000 cases, FBI scientist Thomas Callaghan says. The system adds about 25,000 profiles a month.

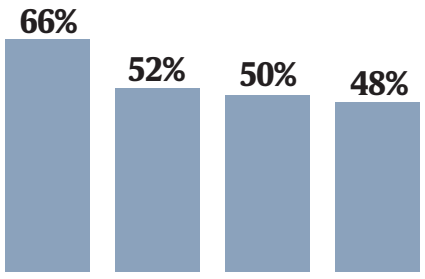
The FBI does not keep track of the types of crimes for which the system scores DNA matches, nor does it track how many matches produce arrests or convictions. USA TODAY compiled statistics on matches by reviewing records in the 20 states that account for about 85% of the system's matches.

Critics say using DNA to solve non-violent crimes could raise privacy concerns by dramatically expanding the database. Some question spending millions of dollars to probe such crimes. "For what it does in terms of cost, and in threats to civil liberties, (the database) has to justify itself much better," University of Minnesota political science professor Jay Aronson says.

Backers of expanded DNA testing say burglars often go on to commit more serious crimes. In Alabama, about 80% of the rapes solved via DNA databasing in the past five years were linked to criminals whose DNA was taken after a burglary conviction, state forensic biology chief Angelo Della Manna says.

DNA arrests

Percentage of DNA matches that have involved burglaries:



Source: USA TODAY reporting

By Karl Gelles, USA TODAY

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USA TODAY

USA TODAY News

AS SEEN IN USA TODAY'S NEWS SECTION ON MARCH 26, 2007

Authorities find more uses for DNA databases

Courts conflict on legality of new crime-fighting methods

By Richard Willing
USA TODAY

When Brooklyn cab driver Owen Midgley was acquitted of rape in 1997, his lawyer persuaded the judge to seal the case file.

Without telling Midgley, technicians at New York City's medical examiner's laboratory tested his DNA and added his genetic profile to their database of former suspects, arrestees and others never convicted of a crime.

Four years later, Midgley's DNA was matched to an unrelated case — the sexual assault and abduction of a 15-year-old schoolgirl. Midgley was convicted of rape, despite his protests that the match violated his privacy.

Local prosecutors and crime labs are using more databases, such as the one that helped catch Midgley. Such tools — called "suspect" or "linkage" databases by crime labs and "rogue" databases by groups such as the Innocence Project — are among several devices that have expanded the reach of DNA-based crime fighting and opened it to criticism from privacy advocates.

These databases are in five states: New York, Florida, California, Missouri and Illinois. Virginia started a smaller pilot program using autopsies.

Among the new uses to which DNA databases are being put:

▸ **Suspect searches.** Crime labs in New York have matched DNA taken from at least 2,200 crime suspects or individuals of interest in an investigation to more than four dozen unrelated crimes committed later. In New York, which like most states has no law that authorizes or forbids such collection, at least eight public crime labs maintain suspect databases, according to documents obtained by the New York City-based Innocence Project through a Freedom of Information request. The project specializes in cases involving DNA evidence.

▸ **Autopsy profiles.** In Illinois, a proposed state law would allow police to take DNA from autopsies performed on crime victims and those whose deaths were unexplained and compare it to unsolved crimes. The premise: People who die violent deaths may have committed crimes themselves.

In Virginia two years ago, DNA profiles from about 200 autopsies were compared with DNA from convicted offenders and unsolved cases on the state's official database.

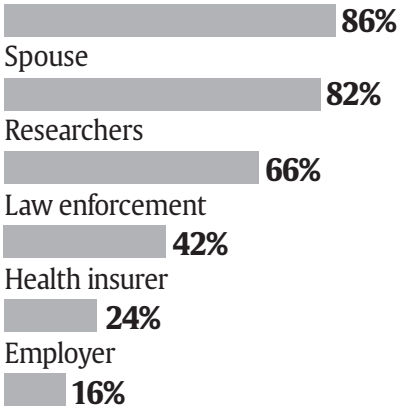
Even though dead people can't be prosecuted for crimes, the state's chief medical examiner, Marcella Fierro, says making matches can close criminal cases and "help the family of some poor murder victim." The autopsy database did not score any matches.

▸ **Crime prevention.** Beginning later this year, individuals who wish to plead guilty to misdemeanors in Orange County, Calif., will be required to give a DNA sample. The samples, District Attorney Tony Rackauckas says, will be stored in a specially created local database to deter the offenders from committing more serious crimes. California law prohibits such DNA from being stored in the state's official database. Rackauckas says he's also building a local database of DNA from various lesser crimes to catch criminals before they commit more serious offenses.

William Thompson, a criminology professor at the University of California-

Matter of trust

Although 91% of people support law enforcement personnel's use of DNA to solve crimes, far fewer trust police with their own genetic material. Whom people trust with access to their DNA profiles:



Source: Genetics and Public Policy Center, Johns Hopkins University survey of 1,199 adults, Feb. 27-March 4. Margin of error: ±3 percentage points.

By Julie Snider, USA TODAY

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Irvine and a critic of lax laboratory procedures, says storing DNA in prevention databases "substantially raises the risk of errors and frame-ups."

Joseph Lentol, a Democratic New York state assemblyman, is author of a bill that would ban the databases in his state. Using DNA taken during one investigation to solve another crime, he says, is "just wrong."

Police should at least be forced to tell suspects who give their DNA voluntarily that it may be used against them, he says.

The databases exist in a legal gray area. Most states neither authorize nor forbid them, says Lisa Hurst, who maintains the website dnaresource.com for Gordon Thomas Honeywell Governmental Affairs, a Tacoma, Wash., firm.

The few courts that have ruled on the issue have given conflicting opinions.

In March 2003, a trial court judge in Brooklyn upheld Midgley's rape indictment after he was caught with the help of a New York City database.

A week later, a different Brooklyn judge ruled the same database was not authorized by state law. He ordered authorities to return a rape suspect's DNA profile without including it in the database.

Last year, the American Bar Association recommended that suspect databases be banned and that labs that use them be prosecuted.

In Florida, a 2000 opinion from the state crime lab's counsel says suspect databases are legal because they use DNA that was "voluntarily and freely" obtained, even if it was given in an unrelated case.

In Brooklyn in 2004, Troy Hendrix sought a court order to prevent DNA he gave during a murder, torture and rape investigation from being added to the suspect database. He was ultimately convicted of rape and murder, but not before he and a co-defendant sneaked sharpened plastic sticks into the courtroom and stabbed a lawyer and a court officer in an unsuccessful attempt to escape.

"I told my colleagues 'Hey look, here's our client on the news,'" recalls Beth Haroules, a New York Civil Liberties Union attorney who helped Hendrix seek the court order. "It was pretty disturbing, but I still think we were right" to oppose the suspect database.

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USA TODAY

USA TODAY News

AS SEEN IN USA TODAY'S NEWS SECTION ON APRIL 10, 2007

Expert introduces forensic techniques

Briton tries to sharpen Iraqi investigative skills

By Rick Jervis
USA TODAY

It's not easy setting up a crime lab in Iraq.

Crime scene investigators are often shot at. There is no nationwide DNA database. Some Iraqi police who grew up under Saddam Hussein would rather beat a confession out of suspects than take their fingerprints.

And even if a criminal is identified, how do police track him down?

Bob Lamburne is giving it a try. The 30-year veteran of the British police recently helped open the National Forensics Institute in Baghdad and six crime labs across the country.

Most of his day-to-day work involves breaking old habits.

"(Iraqis) didn't have an investigative culture," said Lamburne, director of forensics at the British Embassy here. "In America, we were introducing neighborhood watch. Saddam was introducing 'watch your neighborhood.' People were arrested and held or tortured until they confessed. But (there was) not much in terms of investigations."

Using $6.5 million in U.S. funds, the labs are equipped with high-tech equipment reminiscent of the gadgets seen on the CBS television hit CSI. Microscopes compare ballistics on weapons. High-resolution photographic equipment helps find fingerprints, Lamburne said.

Until the labs opened in October, the U.S. military performed most of the forensic work in Iraq. U.S. officials have fingerprinted and performed retina scans on more than 18,000 prisoners in coalition detention facilities, said Maj. Gen. William Caldwell, the top U.S. military spokesman in Iraq.

Government officials in key security positions also are fingerprinted and scanned, he said.

Forensics helped the U.S. military locate Abu Musab al-Zarqawi, the leader of al-Qaeda in Iraq who was killed by a U.S. airstrike in June, Caldwell said. He declined to provide details.

Forensics are "absolutely critical," Caldwell said. "It's an invaluable tool."

Lamburne's intentions are more modest. For now, the institute in Baghdad teaches Iraqi police officers the basics of crime scene investigation: how to cordon off crime scenes, collect evidence, lift fingerprints and record statements. So far, 115 police officers have taken the four-week course, Lamburne said.

Using the techniques on Baghdad's violent streets has proved difficult, he said. Unlike more peaceful countries, where crime scene specialists spend hours meticulously combing through evidence at a scene, the technicians in Baghdad have less than an hour for fear of secondary explosions or firefights, Lamburne said.

In January, police Lt. Col. Amer Abbas, the institute's director, was shot and killed as he drove home from the institute, Lamburne said. Abbas' staff of trainers immediately quit, stalling the project.

"He was very skillful," Lamburne said of Abbas. "Now we're in a real hiatus."

The institute is developing a national computerized fingerprint database from the reams of paper fingerprint records left over from Saddam's regime. Lamburne said he has amassed nearly 1 million sets of prints from prisoners and members of Iraq's security forces.

Four Iraqi microbiologists are in the midst of a three-year course to learn how to analyze DNA samples, Lamburne said. Besides helping solve crimes, DNA technology could also help link victims of Baghdad's violence with their families.

About one in four bodies that come through the Baghdad morgue are not identified, Lamburne said. Some faces are distorted by gunshot or torture wounds, and bodies often lack identity cards. Bomb blast victims typically arrive in parts and are cremated without being identified. A DNA sampling from a relative could link the family with a body once a DNA database is created, Lamburne said.

"We're only in the early stages of that," he said. "But you could see the potential."

Another machine that will soon arrive to the morgue is a fluoroscope machine, an X-ray device that allows pathologists to quickly evaluate the location of bullet wounds, rather than perform a time-consuming dissection, Lamburne said.

More important than all the technology, Lamburne said, is the need to create a fundamental culture where police gather evidence and use it in court to prosecute criminals. The more police adhere to that practice, the less Lamburne will be needed in Iraq, he said.

"That's what Iraqi police need to learn to do," Lamburne said. "And when they do that, they'll gain the confidence of the public, and things will start to change here."

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CRITICAL INQUIRY

1. As seen in this case study, the use of DNA databases in criminal investigations has expanded greatly beyond the ability to pinpoint a suspect's specific identity. Get into groups of five. Assign each member one article from the case study. As individuals, list all the examples you can find in your article that illustrate how DNA databases are being used today. Then, as a group, compile your lists.

2. This case study mentions other kinds of DNA aside from human nuclear DNA. Explain how mitochondrial and animal DNA are currently being used to solve crimes. What are the limitations of each?

3. Although DNA and forensic science are important tools in crime solving, they are not always foolproof. What are some of the problems that have arisen in recent years with these tools? Write a one-page paper describing at least three examples. Conclude with a recommendation for avoiding such problems in the future.

4. Based on the articles in this case study, how would you say real-life forensic science compares to its portrayal in movies and on television? Within your class, form small groups (3-4 per group) and discuss. Brainstorm the similarities and differences and then pick someone in your group to share your findings with the rest of the class.

5. Labs have made egregious DNA testing or results interpretation errors, causing innocent men and women to go to prison for years. As a class, compile a list of suggests for ensuring that DNA forensic labs are more carefully regulated.

FUTURE IMPLICATIONS

1. Beyond the uses suggested in the case study articles, what other ways might DNA testing and DNA databases be used (future uses might not necessarily be in the forensic science field)?

2. Should local DNA databases of suspects or persons of interest be used to prevent crimes? If so, what legal limitations should be placed on database use in order to protect the rights of law-abiding citizens? Using evidence from the case study, as well as current issues of USA TODAY to support your opinion, you and a peer should prepare a sixty-second argument to present to your class.

3. Using a current issue of USA TODAY, find an example illustrating the use of forensic science that could be added to this case study. Does the example provide information on new advances in forensic science? Does it highlight potential pitfalls? Write a brief summary of the article and evaluate it in light of the issues discussed in this case study.

4. With the technological advances in forensic science, a host of legal and ethical issues has arisen. At what point does society's need to maintain order come into conflict with an individual's rights to privacy? What do you believe the future holds? Using USA TODAY to cite other examples of privacy issues in relation to advances of science and technology, write a one-page persuasive essay stating your opinion. When done, share your essay with the class as a whole and debate with those who hold differing opinions.

FUTURE IMPLICATIONS ... continued

5. Most states neither legislate for or against the DNA issues addressed in these case study articles. But with DNA testing taking on a more prominent role, states may need to legislate how DNA is tested, used in courts, and stored in databases. As a small group, select one of the following controversial DNA issues below, and discuss the legal and ethical ramifications of it. Take on the role of a state governor, and in a two-minute prepared speech, announce what stand you'll take on the issue and "next steps" you'll be taking to ensure that your state follows your recommended guidelines.

a. Local DNA databases
b. Animal DNA testing and its use in solving cases
c. Mitochondrial DNA and its use in solving cases
d. Finding suspects through a relative's DNA sample
e. Finding suspects through DNA samples of prior suspects or persons of interest
f. DNA testing and result interpretation procedures

Additional Resources

- American Academy of Forensic Sciences
  www.aafs.org/default.asp
- The FBI's Forensic Science Communications
  www.fbi.gov/hq/lab/fsc/current/index.htm
- Court TV's Forensics Glossary
  www.courttv.com/onair/shows/forensicfiles/glossary
- The Innocence Project
  www.innocenceproject.org