

OMAHA'S "CSI" UNLOCKS HIDDEN CLUES

by TOM O'CONNOR

Within the darkened lab, Mellissa Helligso waves the crime scene scope over size 6 floral panties that have been laid flat on the table.

She's looking for semen on yet another sexual assault case. More than 700 similar cases were reported in Omaha last year.

Helligso, an analyst with UNMC's Human DNA Identification Laboratory, knows body fluids glow under the UV light. All except blood.

"The evidence doesn't lie," Helligso says, turning to look at the mug shots of 24 murderers and rapists who are now behind bars, thanks to evidence found in that very lab.

"DNA is foolproof," she said.

Hours earlier, Helligso logged the evidence, wondering if this case will be one of the few that actually goes to trial. Nonetheless, she assigns a three-digit number to track the clothing as it makes its way through the laboratory, which is part of UNMC's Molecular Diagnostics Laboratory.

Omaha's version of the popular TV show, "CSI," plays out daily here as police detectives bring manila envelopes, sealed with red evidence tape, into the laboratory. Helligso empties the contents onto a freshly bleached laboratory bench. Then, wearing a white lab coat and sterile gloves, she grabs the crime scene scope.

Nearby, colleagues do tissue typing for transplant patients, as well as clinical tests on HIV, tumors, viruses and for paternity.



Focused on the clothing, Helligso swabs the area to extract the DNA and runs it through a battery of tests that result in a unique profile, which may, or may not, connect the suspect to the crime.

Deoxyribonucleic acid, or DNA, is the genetic code of all humans. Found in every cell throughout the body, it determines such human traits as eye and hair color, stature and bone density. No two people – with the exception of identical twins – have the same DNA blueprint.

Left at a crime scene, that distinct signature has sent suspects to prison; it also has provided those wrongly accused with a “get out of jail free” card.

Within a week, Helligso will complete testing on all the evidence, as well as prepare a report of the forensic findings for police.

The UNMC laboratory – one of two academic health science centers in the country to house a forensics lab – also is one of two DNA labs in Nebraska. The other is at the Nebraska State Patrol offices in Lincoln.

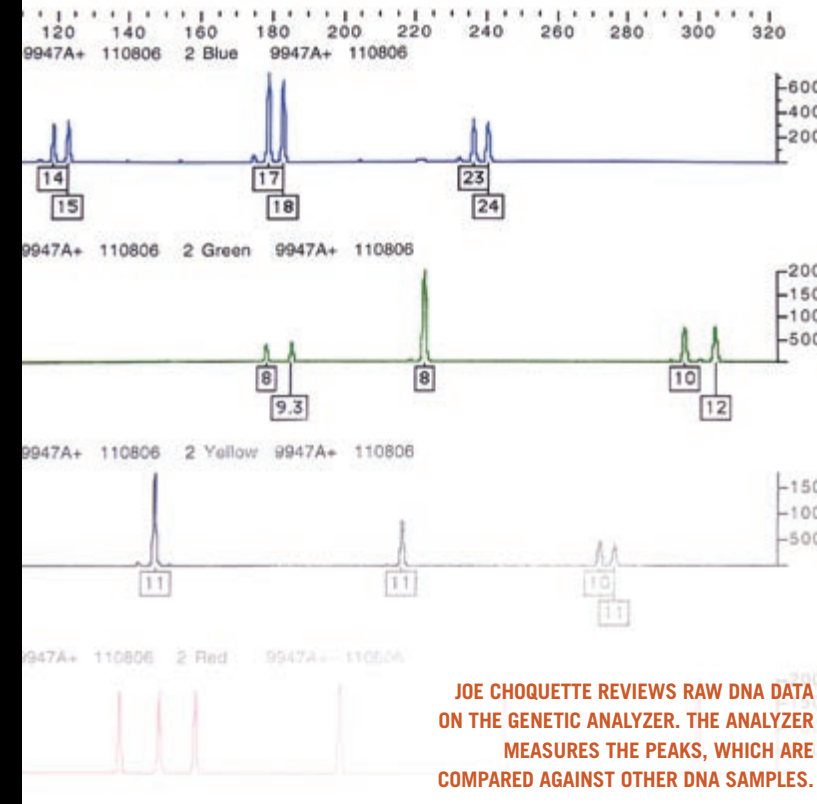
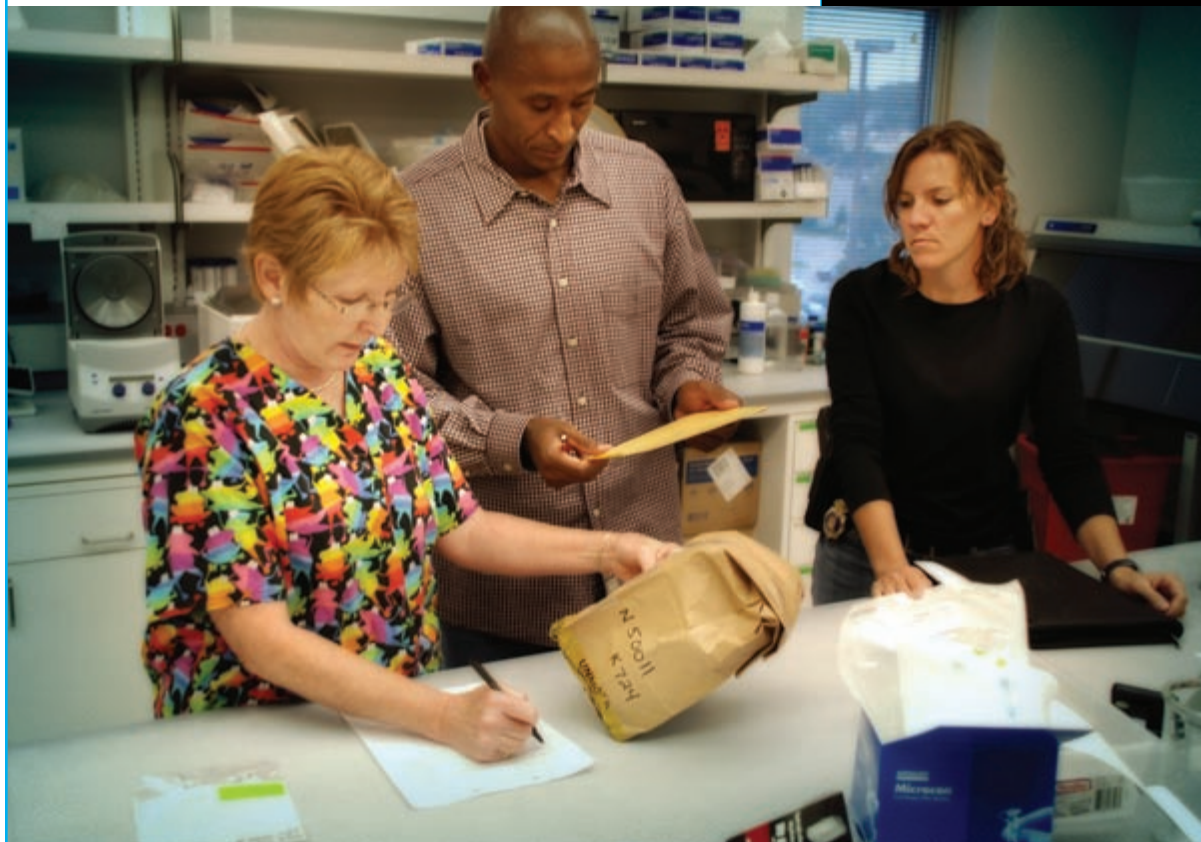
UNMC established the DNA laboratory with its hospital partner, The Nebraska Medical Center, in 1996 in response to the needs of the Douglas County Attorney's Office.

At the time, DNA forensic analysis was done at a limited number of places around the country. When necessary to make its case, the Douglas County

DNA PROFILES ARE SO UNIQUE THAT ODDS ARE GREATER THAN 1 IN 1 QUADRILLION THAT A DNA SAMPLE FROM ONE PERSON WOULD MATCH ANOTHER'S.

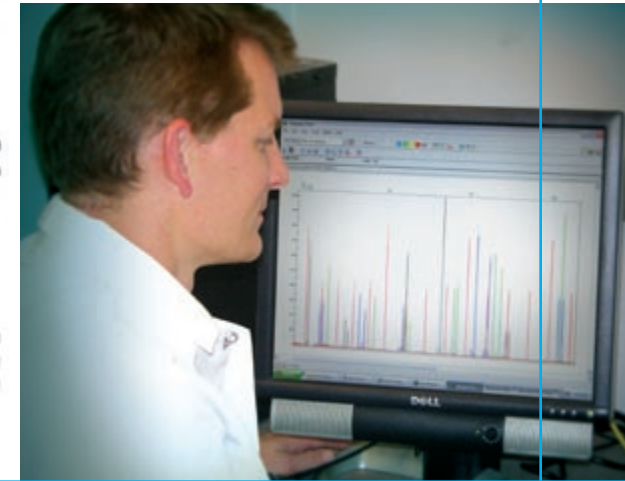
1 in 1,000,000,000,000,000

DNA ANALYST KAYE SHEPARD, LEFT, LOGS IN EVIDENCE BROUGHT BY OMAHA POLICE DETECTIVE ROBERT BUTLER AND SERGEANT STACI WITKOWSKI.



JOE CHOQUETTE REVIEWS RAW DNA DATA ON THE GENETIC ANALYZER. THE ANALYZER MEASURES THE PEAKS, WHICH ARE COMPARED AGAINST OTHER DNA SAMPLES.

DNA FOUND AT CRIME SCENE IS MATCHED TO A SAMPLE FROM A SUSPECT. NO TWO PEOPLE – WITH THE EXCEPTION OF IDENTICAL TWINS – HAVE THE SAME DNA BLUEPRINT.



Attorney's Office would send DNA evidence to a lab in California, go there to take depositions, then fly the DNA experts to Omaha to testify at the trial.

“This was very expensive,” said Jim Wisecarver, M.D., Ph.D., professor of pathology and microbiology and director of the Human DNA Identification Laboratory. “We were approached by Jim Jansen (then Douglas County Attorney) and Don Kleine (then chief deputy) about creating our own DNA forensic testing lab at UNMC. It would save Douglas County lots of money, and it would provide attorneys with much easier access to DNA experts.”

Kleine, who is now the Douglas County Attorney, said his office relies on UNMC for help in most of its high-profile murder cases. “The DNA laboratory at UNMC gives us a facility that is recognized by people in the community as the gold standard,” he said.

“People view UNMC as a leader in the medical arena. They use the same DNA testing process for people undergoing bone marrow transplants. It lends complete credibility to our DNA evidence. It's tremendous to have this kind of expertise at the local level.”

In addition to its credible reputation, Kleine said UNMC's DNA lab brings neutrality – just as important in a court of law. “The fact that UNMC is a non-law enforcement agency is critical. They will test DNA for anybody,” he said.

“We're just there to report the facts,” Dr. Wisecarver said.

The DNA lab has processed evidence for nearly 800 cases in the past 11 years. In 2000, the lab received forensic accreditation from

the American Society of Crime Laboratory Directors. Dr. Wisecarver estimates that probably 70 percent of the lab's work today is now involved in forensic testing.

While it's an impressive workload, the lab also performs hundreds of tests for patients at The Nebraska Medical Center.

“Our main focus is still patient care – that's the mission of the university,” he said. “Our goal with the DNA testing is simply to help out the various law enforcement agencies that come to us.”

As its workload has increased, the DNA lab has grown to include two full-time analysts – Joe Choquette and Lloyd Halsell – and two part-timers, Helligso and Kaye Shepard.

The lab more than pays for itself, Dr. Wisecarver said, noting the \$500 charge for each DNA specimen that is tested. “Unlike health care, where you are working on discounts, forensics pays dollar for dollar. This helps our patients and the citizens of Nebraska.”

The Nebraska State Patrol in Lincoln, meanwhile, offers free testing, which has resulted in a nine-month backlog of cases, Helligso said, noting, “police appreciate that we can give them results quickly.”

Although “CSI” has given forensic medicine a glamorous image, the majority of cases are more routine and involve requests from the public.

“We do receive some odd requests,” Dr. Wisecarver said. “Once we were contacted by an individual who suspected that someone had urinated in his coffee cup, and he wanted us to test for it.”

UNMISTAKABLE EVIDENCE

Proving a murder case without a dead body is no small feat.

That was the task the Douglas County Attorney's Office faced earlier this year when a 19-year-old Omaha woman, Jessica O'Grady, went missing May 10, 2006.

Police investigators on the case focused their attention on O'Grady's boyfriend, Christopher Edwards, as the leading suspect.

In the course of the investigation, the police searched Edwards' bedroom and car and found excessive amounts of DNA evidence. O'Grady's blood was found on a sword recovered from Edwards' residence as well as on a headboard, mattress and the ceiling of Edwards' bedroom.

The DNA evidence was taken to the UNMC Human DNA Identification Laboratory for processing. "Because they didn't have a body, the county attorney's office wanted all the DNA evidence it could possibly find," said Jim Wisecarver, M.D., Ph.D., lab director. "They wanted to build an ironclad case."

The evidence was unmistakable — all the blood samples belonged to O'Grady, who was a student at the University of Nebraska at Omaha. Edwards' mattress had been turned over when investigators reached the scene. It was covered with a huge pool of dried blood. The bedroom walls had been freshly cleaned, but investigators were still able to retrieve blood samples from the walls.

Douglas County Attorney Don Kleine built his case on the DNA evidence, and during the two-week trial, both Dr. Wisecarver and analyst Mellissa Helligso were asked to testify. The DNA evidence was compelling, and Edwards was found guilty of the murder in March, 2007. It was the first time in Nebraska history that a jury had rendered a guilty verdict in a murder trial in which the body had not been found.

"Trying someone for murder without a body is a unique situation," Kleine said. "It doesn't happen very often. I relied on the DNA evidence. Jim and Mellissa did a great job of explaining what DNA is and the scientific process involved in analyzing DNA."

"You can't create DNA. You're not going to get false results. That's why it's so powerful."

In his closing argument at the trial, Kleine held up a sign with a large number containing 18 zeroes. He wanted to make the point that there is no disputing DNA evidence. "There was no question (the blood belonged to O'Grady). The probability that it could have been someone else's blood was like 1 in a quintillion — 10 to the 18th power."

"The other side will always try to attack the credibility of DNA evidence, but UNMC's lab stands with any in the country. It has the credentials, background and expertise," Kleine said. "I've talked to juries afterwards. They always say they found the DNA evidence to be very credible...they have no issue with it. That speaks volumes."

It only takes a small quantity of DNA — between 15 and 20 cells — to establish a profile. "We can make a profile from saliva left on a cigarette butt, a licked envelope or postage stamp, or skin cells left on a firearms cartridge, beverage can or bottle," he said.

English scientist Alec Jeffreys first proposed DNA analysis in 1985. By the late 1980s, it was being performed by law enforcement agencies, including the Federal Bureau of Investigation and by commercial

"WE CAN MAKE A PROFILE FROM SALIVA LEFT ON A CIGARETTE BUTT, A LICKED ENVELOPE OR POSTAGE STAMP, OR SKIN CELLS LEFT ON A FIREARMS CARTRIDGE, BEVERAGE CAN OR BOTTLE,"

JIM WISECARVER, M.D., PH.D.



MEMBERS OF UNMC'S HUMAN DNA IDENTIFICATION LABORATORY TEAM ARE, FROM LEFT, MELLISSA HELLIGSO, LLOYD HALSELL, DR. JIM WISECARVER, JOE CHOQUETTE AND KAYE SHEPARD.

laboratories. It consists of comparing selected segments of DNA molecules from different individuals. Because a DNA molecule is made up of billions of segments, only a small portion of an individual's entire genetic code is analyzed.

"Over the years, DNA testing has become much more sophisticated," Dr. Wisecarver said. "Today, it's all done via computer. We look for the number of repeating units on the chromosome, and we test 16 different spots (or loci) on the DNA. When you get a match, it's pretty much a lock." 