

**THE DNA  
DETECTIVES**

Federal Bureau of Investigation  
Laboratory Division

November 10, 1993

Ms. Millie Johnson  
The Virginian-Pilot  
and The Ledger-Star  
150 West Brambleton Avenue  
Norfolk, Virginia 23510

Dear Ms. Johnson:

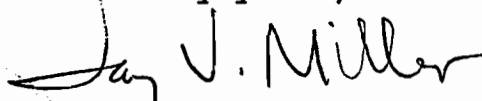
Thank you for granting permission to the FBI to reprint your paper's article, "The DNA Detectives", dated August 15, 1993. As we discussed yesterday, I am enclosing two copies.

Lynn Waltz's article is the best exposition we've seen to date that ties together all elements of DNA technology's promise as a crime-solving tool for forensic science. We plan to distribute reprints to members of Congress and their staffers who are involved in deliberating the "DNA Identification Act of 1993", now being considered as part of the Federal Crime Bill.

If Lynn Waltz or anyone else at your paper wants more information on the "DNA Identification Act" or the FBI Laboratory's program to build a national DNA index system linking crime laboratories, please call write or call me at (202) 324-4531.

Again, thank you for your cooperation.

Sincerely yours,

  
Jay V. Miller  
Administrative Officer

Copies to: Dr. Paul Ferrara  
State Director  
Division of Forensic Science  
1 North 14th Street  
Richmond, Virginia 23208

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Illinois State Police  
Division of Forensic Services  
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# THE DNA DETECTIVES

## GENETIC DATA CRACKS CASES ONCE UNSOLVABLE

**V**irginia and seven other states are on the brink of a nationwide revolution in criminal justice that promises to do in the 21st century what fingerprint data bases did in this century. Laboratory detectives studying human DNA patterns on computer screens have begun solving crimes where there are no clues and no suspects - only DNA "fingerprints" taken at crime scenes and from convicted felons. So far, three crimes have been solved in the United States using the new technique, the most recent a murder-rape in Illinois, a state with a program similar to Virginia's. Here is the story of how DNA matching led to the capture of a suspect who allegedly murdered a man and raped his wife in the hamlet of Ritchie, Illinois.

Jeffrey Stephens was killed and his wife, Heather, was raped in November 1991 in their farmhouse in Ritchie, Ill.

**O**n two-lane rural Highway 102 in Ritchie, Ill., between Wilmington and Kankakee, there's a blue-gray clapboard farmhouse with a for-sale sign in the yard.

Once the fixer-upper dream home of newlyweds Jeffrey and Heather Stephens, the century-old house is now at the mercy of the elements: the baking heat and humidity of a stalled summer weather system.

But it was what happened on a November morning in 1991, when a bitter wind whipped across the fields behind the two-story house, that makes the locals slow down and look when they drive past.



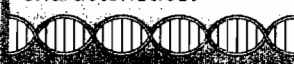
That morning launched a series of events that drew the attention of forensic scientists as far away as Richmond, Va., and Berkeley, Calif., — events that promise to make this remote farmhouse a landmark in a law enforcement revolution.

There's another house in town that people are curious about, too — where Arthur Dale Hickey lived with his family before he was arrested. Walk about three-quarters of a mile through the field behind the Stephens' house, across a gravel road and another field, and you'll come to it.

You'll see the rusting hulks of cars and old appliances sitting in the high

**WHAT IS DNA?**

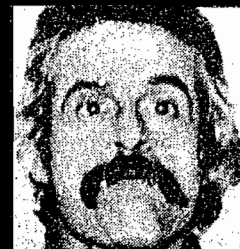
● DNA, or deoxyribonucleic acid, is the genetic blueprint shared by all living organisms and determines individual hereditary characteristics.



weeds and wildflowers outside the bunkerlike home, which looks as if someone built a cinder-block basement foundation, then just stopped and put a roof on it.

Ritchie is no more than a wide spot in the road on the east banks of the Kankakee River. There are fewer than 200 residents: a mix of city people drawn by comfortable homes overlooking the water and the rural folks who have been there forever.

It's the kind of place where everybody knew everybody else's dirty little secrets, except one. Who killed Jeffrey Stephens and raped his wife?



Arthur Dale Hickey was charged with the crimes in June of this year, after DNA "fingerprints" tied him to the crime scene.

## **PART ONE** WHAT IS A DNA FINGERPRINT?

● A DNA "fingerprint," based on a person's unique genetic code, is a series of black lines that resembles a supermarket bar code. Each fingerprint is unique and can be used to determine whether a certain person committed a crime.

## **PART TWO** WHAT IS A DNA DATA BANK?

● Since the early 1990s, eight states, including Virginia, have required convicted criminals to submit blood samples when they go to prison. The DNA fingerprints obtained from these samples are entered into a computer data bank similar to standard fingerprint files kept by the FBI.

Before Hickey was arrested for the crime, people swore he was the best road grader Wesley Township had ever seen. He was even better known for his annual pig roast that most everybody in those parts went to — except the Stephenses.

They were newlyweds, high school sweethearts who had been in the house only about three months and ran in different circles than Hickey. Heather, 21, was a secretary. Jeffrey, 24, worked at a nearby chemical plant.

Hickey, 42, didn't have a regular paycheck. He worked odd jobs instead. He liked to stop by the The Corner bar when he got into Wilmington. Otherwise, he'd walk over to the Rivals Club on the banks of the Kankakee at the end of a road off 102 in Ritchie.

Locals call the club "downtown Ritchie." The only other thing resembling a business is the grain elevator down the road, and folks don't even know if it works.

Hickey had buddies at both watering holes, fellows who'd stop in most every day, any time of the day.

Some there say Hickey met his wife in Texas and got an instant family — nearly a half-dozen kids — when they married. Some say he's from Louisiana originally. Some say he's lived in Ritchie for more than 30 years.

But folks all over Ritchie have been talking about him since the last week of June, when he was arrested for allegedly killing Jeffrey Stephens execution-style, then raping Stephens' wife and shooting her in the face.

Scientists in criminal forensic labs all over the country are also talking about Arthur Hickey. But they're talking about how he was caught by a new-fangled, high-tech snare — a DNA "fingerprint" data bank.

Hickey, they say, left his DNA in two places: in a vial of blood collected by Illinois for their state DNA data bank of convicted sex offenders, and at the crime scene when he raped Heather Stephens.

**On Monday, Nov. 25, 1991,** Jeffrey and Heather Stephens were just rousing. It was dark and bitterly cold outside the two-story house they'd owned for three months.

They didn't know that the phone wires had been cut already.

About 6 a.m., when Jeffrey stepped outside the house to go to work, a short man with light brown hair stopped him. There was a loud

conversation. Then the man put a .25-caliber pistol above Jeffrey's left ear and fired once.

The man, who by this time had covered his face with a mask, stepped inside and went upstairs. He overpowered Heather in her bedroom, tying her hands to the bed with a construction-type rope. Then he went back downstairs and pulled Jeffrey inside through the front door and locked it.

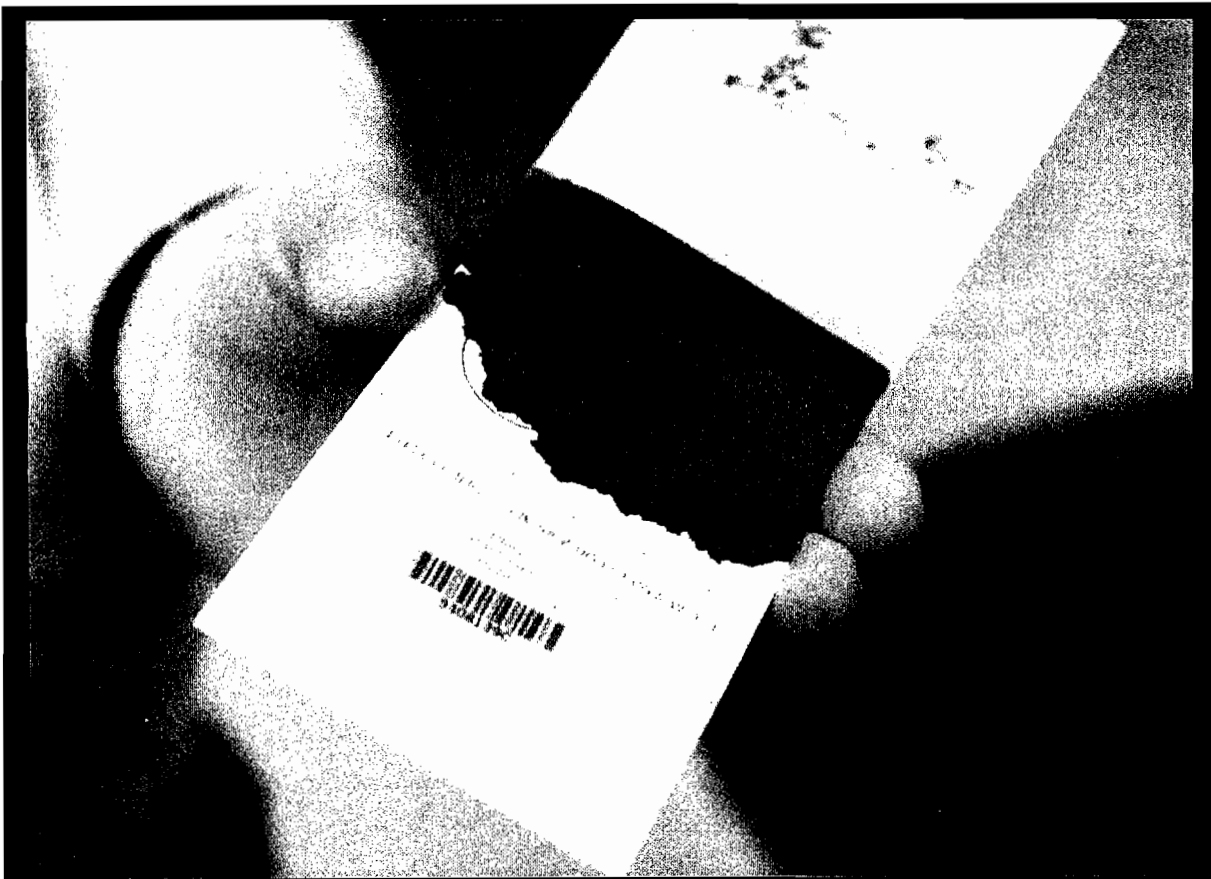
Once back upstairs, he raped Heather and asked her for money. He took \$60 and the keys to her car and left.

He came back upstairs to ask her how to cut off the alarm on her red 1990 Plymouth Laser. He told her to turn her head. Then he fired one bullet into her face. It struck a molar and stopped.

Feigning death, she waited until she heard the man drive off in her car, then wriggled free and got up. Then she heard him turn the car around and come back. The car door opened. He was at the front door.

Terrified, Heather got back into bed, put her hands in the ropes and again pretended to be dead.

But the man had only returned



The state hopes to save space in storage of blood samples from convicts by putting the samples on stain cards like this one, rather than in vials. The cards are put in frozen storage until DNA can be extracted.

to shut the front door, which he had left wide open. When he pulled away again, Heather got up, went into the bathroom, spit out the bullet and the tooth, dressed and went next door to call police.

She tried to give police a description, but it was vague and general. It had been dark. She wasn't wearing her glasses. Her attacker's face had been covered.

Investigators questioned just about everyone in Ritchie — including Hickey. They figured the attacker was from the area. It was hard to imagine a drifter huddled outside the Stephenses' house in the pre-dawn cold, someone who just happened to choose that family at that time.

Besides, the killer left Heather's car in a shopping center parking lot in Wilmington about four miles away. No other cars were stolen from the area that day, so he must have walked or hitched a ride home.

Hickey was not a suspect at that time, the sheriff would later say.

**On Dec. 7**, less than two weeks after the murder and rape at the Stephenses' home, Hickey raped a 17-year-old girl. She identified him,

and he was arrested in March. The following November, Hickey pleaded guilty and was sentenced to four years.

But before he was packed off to prison, a nurse stuck a needle in his arm and took a vial of blood. It was sent to Springfield, where the state had begun assembling a DNA data bank for convicted sex offenders. It was the same lab where semen recovered from rape victim Heather Stephens had arrived months earlier.

Lab technicians entered the DNA profile from the crime scenes into the data bank. There it could be compared to DNA profiles of convicted sex offenders that were also being entered.

It was a new program, part of a national data bank being coordinated by the FBI. At that point, only 600 DNA profiles from criminals were in the data bank.

The odds were not good, but maybe there would be a match. Maybe the man who raped Heather Stephens had raped someone else. Maybe his blood had been collected and his DNA was already in the computer.

The first time forensic scientists

ran the evidence through the computer matching program was in January of this year. There was no match.

Hickey's blood was entered into the data bank at the end of February. The next time they would run the matching program was in April.

**On the morning of April 6**, David Metzger came to work at the forensics lab in Springfield. After 20 years in the business, Metzger, 44, had witnessed a revolution in DNA technology in crime fighting.

On this Tuesday morning, he was about to make history.

He sat down with a partner in front of the computer screen and ran the software program developed by the FBI to match criminals' DNA to DNA recovered at a crime scene. He was looking at pictures of small black bands, stacked one on top of the other.

The bands were pictures of tiny sections of radioactive DNA on X-ray film. Each series of bands represents the results of a single "probe" that tags sections of DNA that are likely to vary from person to person.

The first probe is matched with

others to see whether the patterns are the same. If a probe yields a match between a sample from a convict and a sample from a crime scene, other probes are studied, each increasing the likelihood that a suspect has been found.

Most states conduct three or four probes. By the time they take a DNA case to court, they may do as many as 10.

Since the Illinois program was in its infancy, with only five evidence profiles to compare with the 600 convict profiles, technicians weren't expecting success for months, maybe years.

Metzger was conducting a routine search, so he and his partner didn't really think much when the computer spit back two possible matches after they entered the value of the first probe from the crime scene into the data bank. It had happened before. Matching only one probe is not that unusual.

Still, they pulled up the two suspects' DNA fingerprints and began to take a closer look.

After comparing two probes, they immediately ruled out one match. But in the other, the two probes matched.

The scientists exchanged glances. This was getting interesting.

Then they pulled up the third probe. They looked at the dark bands on the screen: first the evidence profile taken from semen left by a rapist, then the convict profile, taken from a prisoner's blood.

They looked at each other again. They didn't say a word. They didn't have to. They knew what it meant. They didn't know who the people were; each profile is identified only by number. But they were now almost certain that the man who gave this blood sample was the same man who raped this woman.

They went to the freezer where the DNA from the blood of sex offenders was kept. They pulled out the vial that matched the computer file number.

When two more probes matched the evidence, they stopped. They knew they had their man.

They now had the names of a victim, Heather Stephens, and the man who likely raped her, Arthur Hickey. They phoned investigator Gloria DeLeon.

**Someone in Ritchie** believes Arthur Hickey killed Jeffrey Stephens, and believed it before any DNA tests had been made. The March after Hickey was arrested for raping the 17-year-old, the person started writing letters and calling the county sheriff's department, saying Hickey was also the culprit in the Stephens case.

But an anonymous tip is not good enough to make an arrest or get a search warrant. It was, however, enough to include his picture in a photo lineup for Heather Stephens.

But she'd never seen her attacker's face. She couldn't pick anyone out.

When DeLeon got the call in April, she was surprised, though not stunned.

Metzger asked her how her investigation was going.

It's not, she told him.

Then you'll be glad to hear from me today, Metzger said. I have some good news. We've developed a suspect — Arthur Hickey.

DeLeon was silent for a moment, then asked, Arthur Dale Hickey?

Three suspects had been eliminated by DNA typing in the original investigation, but after that DeLeon was stumped. Metzger's call was the first break in the case.

Using Hickey's DNA match as probable cause, DeLeon got a court order to take more blood from Hickey and to search his house for a murder weapon.

Forensics technicians used the new blood to run five more probes, all matching the evidence. With the odds at 1 in 40 billion that anyone but Hickey was the rapist, DeLeon got an arrest warrant.

On June 24, Hickey was charged with capital murder, attempted murder, aggravated battery with a firearm, home invasion and aggravated criminal sexual assault. He faces the death penalty if convicted.

It was the first time in Illinois, and the third time in the nation, that an arrest was made on the basis of a match in the new DNA data bank. The case will provide a weapon in the fight for more funding for the fledgling program in Illinois, and perhaps other states, including Virginia.

"Barring someone coming forward and saying he did it, the odds of catching him were fairly slim," said state attorney Chuck Bretz, who will prosecute the case. "It was only through this technological advancement in crime fighting we were able to do this."

For now, two questions remain about the Illinois case.

Who is the anonymous tipster in Ritchie, and what made them think Hickey killed Jeffrey Stephens and raped his bride?

And what was the killer's motive?

To answer the first question, investigators are advertising for the tipster to come forward. So far, no one has.

Bretz already has his own answer the second question.

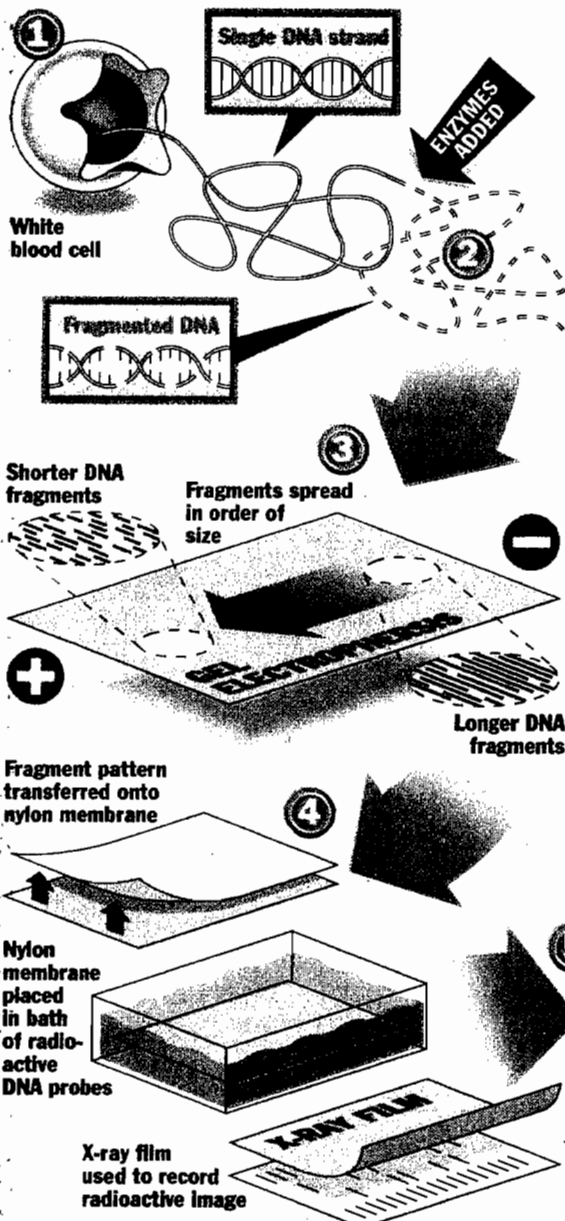
"Depravity of mankind."

# PART ONE

# HOW DO SCIENTISTS CREATE A DNA FINGERPRINT?

- Blood is drawn from felons, transferred onto stain cards and frozen. Scientists extract DNA from the blood.
- Then they isolate the sections of DNA most likely to vary from person to person. Each section consists of patterns of repeating genetic codes. Everyone has the same patterns, but the number of times the patterns repeat varies from person to person.
- The repeating patterns that each person has in his or her DNA becomes a unique marker or "fingerprint" for that person.

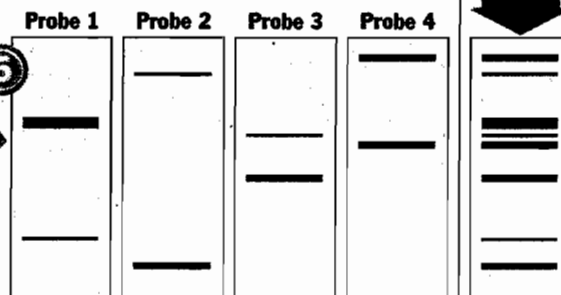
## HERE'S HOW DNA FINGERPRINTING WORKS



- ① White blood cells are burst open, releasing tangled strands of DNA.
- ② The DNA is cut into thousands of fragments of repeating patterns.
- ③ The DNA fragments, which have a negative charge, are put in a special gel and are attracted to a positive charge. The smaller, lighter fragments move farther through the gel. The result is thousands of fragments laid out in order of size and weight. The fragments are invisible to the human eye.
- ④ To see the pattern of the fragments, scientists tag them with radioactivity. Using X-ray film, they photograph the radioactive pattern. That image, which shows a series of horizontal bars resembling a bar code, can then be transferred into a computer image.
- ⑤ Once this has been done, scientists have completed a first "probe" of an individual's DNA fingerprint. Next, they conduct three more probes of other DNA material, producing a composite DNA fingerprint for an individual.

Each probe is designed to seek out a specific genetic code and tag it. The position of each bar reflects how many times that genetic code is repeated in the DNA strand.

Composite DNA fingerprint of all probes

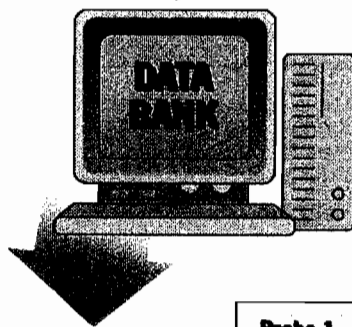
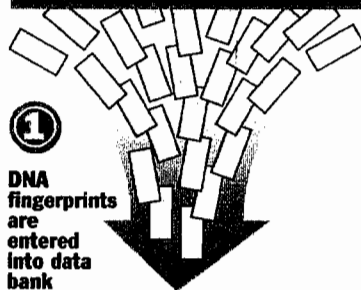


## MORE DNA INFORMATION ON PART TWO

# PART TWO HOW CAN A DNA FINGERPRINT BE USED TO FIND A CRIMINAL?

- There are 68,000 vials of blood from convicts waiting to be turned into DNA fingerprints for Virginia's data bank.
- As the number of fingerprints in the data bank increases, the odds of a cold hit increase as well.

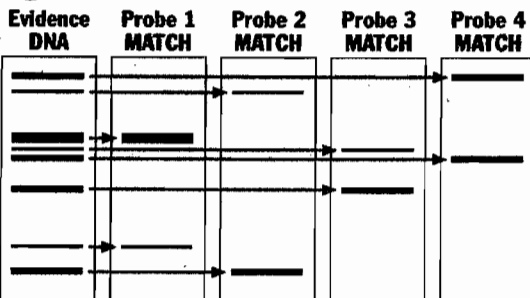
## HERE'S HOW THE DATA BANK WORKS



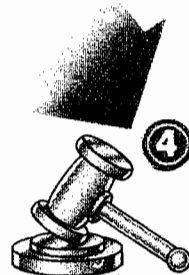
**2** Numerical values are assigned to each bar according to location in each probe. Four probes will result in four separate sets of numerical values.



**3**



- 1** The fingerprint image is scanned into the computer. Each fingerprint is the result of four probes, with each probe resulting in an image of dark bands or bars.
- 2** Numerical values are then assigned to the dark bands within each probe, corresponding to their position in the fingerprint. The process is the same for convict DNA and evidence DNA.
- 3** Then, a simple data-base program compares the numerical values of evidence fingerprints to convict fingerprints. If the numbers assigned to all four probes are the same, the odds that the convict committed the unsolved crime can be as high as several billion to one.
- 4** To protect the civil rights of the convict, additional blood is then taken and additional probes and comparisons are done in preparation for the court case.



SOURCES: Chicago Tribune, Cellmark Diagnostics, Lifecodes Corp., Cetus Corp., Dallas Morning News, KRT

Robert D. Voron/Staff