

Sci-Tech

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Globe staff graphic/Deborah Perup

GENETICS

Genetic trails lead to Argentina's missing children

Paula Lavallen was abducted when she was 22 months old. When she was returned to her grandmother's house more than 6 years later, she walked straight to her old bedroom and asked where her doll was.



By Simson L. Garfinkel
Special to the Globe

When Paula Lavallen showed up with her birth certificate and medical documents for her first day of Argentine kindergarten, something was plainly wrong.

Although her parents were not poor, the documents indicated that no medical personnel had been present at her birth. And the birth certificate was signed by a military doctor who had visited her home several hours after Paula's birth.

"The birth certificate was obviously phony," said American geneticist Mary-Claire King, who was called to Argentina to investigate the case. Other data looked equally suspicious, King said; for example, Paula's health had been excellent at birth, even though she had allegedly received no prenatal or postpartum care, and she seemed much older than what her documents reported.

The director of Paula's kindergarten turned the information over to the Abuelas de la Plaza de Mayo (Grandmothers of the Plaza de

Mayo), a human rights group made up of mothers of young men and women who had "disappeared," along with their small children, between 1976 and 1983, during the rule of Argentina's brutal military dictatorship. In 1984, a government commission documented 8,961 such disappearances.

Many of the disappeared were in their early 20s, said King, a professor of epidemiology at the University of California at Berkeley. Many were women, perhaps a third of them pregnant. Often kidnapped mothers were killed after they gave birth. Other women were kidnapped with infant children in their arms.

Whenever the Grandmothers learned of a child who was suspected of being a kidnap victim — perhaps from an attending midwife, or a witness to a kidnapping — they put the information into their files and waited. Today, they say they know of 208 children who disappeared during the military regime. Although some of the children were abandoned, they say, many were adopted by military families, sometimes by the people who had tortured and murdered their biological parents.

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MISSING

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 Since the fall of the military regime, the Grandmothers have been trying to locate the children, using a combination of molecular biology and old-fashioned detective work. And in the near future, they hope to employ a new genetic technique based on analyzing DNA inside the mitochondria of cells, a technique, King said, that can establish identity with nearly absolute precision.

To speed the search, the National Commission on Disappeared Persons, joined by the Grandmothers, contacted the American Association for the Advancement of Science in 1984 to find out if modern genetic methods could be used to help identify the stolen children and return them to their biological families.

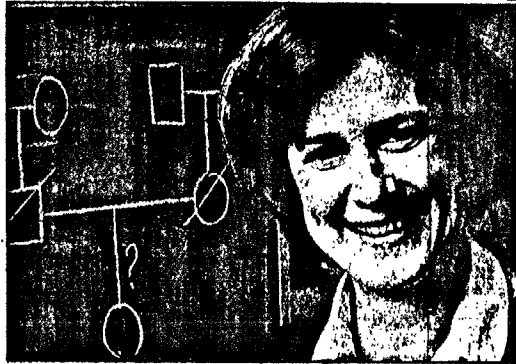
"The idea that the Grandmothers had, and it was their idea, was to use genetics to confirm circumstantial evidence," said Cristian Orrego, then a member of the AAAS Committee on Scientific Freedom and Responsibility, which handled the request. If they could confirm a child's true identity, the Grandmothers had reasoned, the biological family could sue for custody of the child in an Argentine court.

That June, the AAAS sent to Argentina a delegation consisting of five forensic scientists, along with King and Orrego, who heads the evolutionary genetics laboratory at the Museum of Vertebrate Zoology in Berkeley, Calif.

The majority of the delegation was assigned to identifying the bodies in hundreds of unmarked graves. King, meanwhile, was asked to help develop a system for matching children who had been located with their biological families. Although Argentine courts have the power to force children to submit blood samples for genetic screening, King said, existing paternity tests were worthless, because in most cases the parents of the kidnapped children were missing and presumed dead.

What the Grandmothers needed was a test of grandpaternity.

The Grandmothers introduced King to Dr. Ana Maria DiLorenzo, head of the Immunology Unit at the Durand Hospital in Buenos Aires. Together, they developed a "grandpaternity index," based on a highly specific set of genetic markers called histocompatibility antigens, or HLA, in the DNA of all humans. The test compares



Geneticist Mary-Claire King of the University of California. *Globe photo/Jane Scherr*

after his daughter was kidnapped. To reconstruct his HLA type, the team had to type his surviving daughters and sons, and from that deduce his type. Using the data from that analysis and from the surviving grandparents, Orrego said, the group calculated there was a 99.8 percent chance Paula was actually the daughter of Claudio Logares and Monica Grinson, who had been abducted by armed men in civilian clothes on May 18, 1978, with their 22-month old child.

"You've never seen such a happy group of geneticists in your life," said King. Ruben Luis Lavalen, the policeman who claimed to be Paula's father, and his companion, Raquel Teresa Leyro, refused to provide blood samples — as have all others who have custody of children suspected of being kidnapped, said Orrego.

The next question was what would be best for Paula: The eight-year-old girl had only been 22 months old when she was kidnapped, and there was no evidence she had been mistreated by her adoptive family.

The adoptive family said the child should remain with the only family she had ever known. The Grandmothers insisted, King said, that Paula be returned because she "might have memories of the kidnapping" and because "kidnapping is a crime."

Additionally, they said, it would be less traumatic for Paula to change families as a child than to grow up and one day learn she had been raised by people who had been accused of involvement in the torture of her biological par-

where her doll was. It had disappeared with her the day she and her parents had been kidnapped.

To date, DiLorenzo said, 58 of the stolen children have been located, and 15 have been returned to their families with the aid of HLA testing. In the other cases, the courts have been willing to accept circumstantial evidence alone. The use of genetic information has been disputed by the adoptive family twice, she said, but in both cases the court decided for the Grandmothers. There are another 60 children who have been typed but for whom no match has been found.

HLA typing is not without its limitations, however. Some HLA types are very common and cannot prove beyond a reasonable doubt that a child is not with its real family. In other cases, there are not enough surviving members of the biological family to construct the grandpaternity index. "Cristian [Orrego] wanted something that would always work," King said.

To do that, King and Orrego have turned away from HLA typing — away, in fact, from genetic traits associated with the nucleus of the cell itself — and looked instead at the cell's power plant: the mitochondria. Inside each cell in the body are thousands of mitochondria, long rounded objects that convert oxygen into a form of energy useful to the cell.

Mitochondria contain their own DNA and reproduce themselves when the cell divides. Because a fertilized cell receives all its mitochondria from its mother, the sequence of DNA in the child's mitochondria is identical to the sequence in the mother. "You have to think about mitochondrial DNA very differently," King said. "It's passed from mothers to children. One has identical mitochondrial DNA to one's mother, one's maternal grandmother, and all one's [maternal] brothers and sisters."

Orrego confined his study to a region of the mitochondrial DNA, called the displacement loop, that tends to vary greatly among people. Based on a preliminary population study, Orrego said, if two people have an identical displacement loop, or D loop, there is a 99.9 percent chance they are maternally related. But the real power of the mitochondrial matching technique isn't its accuracy — it is the fact that samples are needed only from the child and one maternal or grand-maternal relative, instead of from all four grandparents.

DiLorenzo said her group plans to begin using mitochondrial DNA soon but has had problems funding the equipment and importing the machines.

There are three pending cases of children for whom HLA typing is useless because there are not enough living relatives, but which could conceivably be solved with mitochondrial DNA sequencing.

Orrego said. However, he noted, the use of such evidence has not yet been tried in the courts.

The identification techniques developed in mitochondrial DNA have implications far beyond finding stolen children in Argentina. "Essentially, the ability to impersonate anyone is over," King said, since all that is needed is two blood samples to determine with a thousand-to-one accuracy whether two people are maternally related.

In most cases, the courts have decided what was best for chil-

dren identified by the team. In one case, the courts opted for joint custody between the adoptive parents and the biological family; in another, the adoptive mother had been incorporated into the biological family as benefactor.

Although the American scientists have left, the work is continuing. "There are 150 children still out there," King said with a tremor in her voice. "We don't know where they are, but we will find them all."

Stinson Garfinkel is freelance writer who lives in Cambridge.

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the Durand Hospital in Buenos Aires. Together, they developed a "grandpaternity index," based on a highly specific set of genetic markers called histocompatibility antigens, or HLA, in the DNA of all humans. The test compares the odds that a given person is the grandchild of a particular set of four grandparents, taking into account the genetic types of each individual and the distribution of those same genes in the general population.

A person's HLA type is determined by three principal sets of genes, which are inherited equally from the mother and father. The genes can be identified by a simple blood test that examines the proteins on the surface of cells. Because there are tens of thousands of HLA types, they are a very powerful tool for determining identity. Argentine courts would not accept the genetic evidence unless the typing tests were performed in Argentine laboratories, King said. Fortunately, DiLeonardo's laboratory had been doing HLA typing for years for organ transplants and research on immune system diseases, DiLeonardo said in a telephone interview.

Working with the court-ordered blood samples from Paula and three samples from people the Grandmothers thought to be Paula's biological grandparents, the geneticists set to work. There were complications. One of the grandfathers had died just

before she was born, they said, it would be less traumatic for Paula to change families as a child than to grow up and one day learn she had been raised by people who in the torture of her biological parents.

The Argentine courts agreed, and in December 1984 Paula Logares was placed in the custody of her grandmother, Elsa Beatriz Pavon, who had searched for her for more than five years.

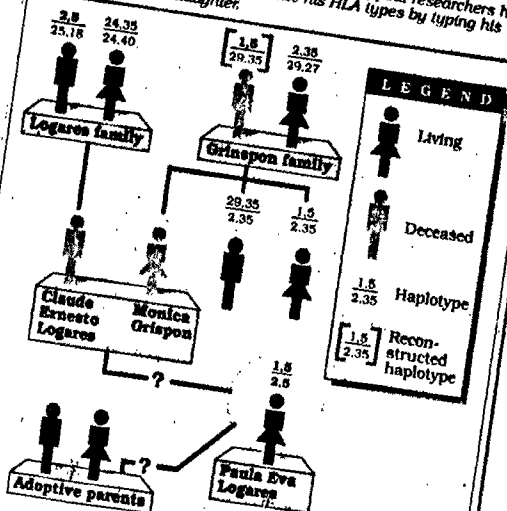
If any doubts remained, they vanished the day Paula went to Pavon's home. She walked quickly to her old bedroom and asked



Geneticist Cristian Orrego

How Paula Logares' Identity was traced

This family tree shows Paula Logares' genealogical heritage. The pairs of numbers over her name represent HLA types (haplotypes) that she inherited from her maternal grandfather (1,5) and paternal grandfather (2,5). Because Paula's maternal grandfather died shortly after she and her parents were kidnapped, researchers had no blood sample and had to deduce his HLA types by typing his surviving son and daughter.



Source: Mary-Claire King
Globe staff chart/Neil C. Fuchs

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