THE Forgery MURDERS

by Christine M. Plummer

The most esoteric information can emerge during a murder investigation. For instance, George Throckmorton learned that old inks often contained nut gall extract. "The extract came," he says, "only from oak trees which form galls when invaded by a particular type of wasp." Throckmorton was the Utah State Forensic Document Examiner when he set out to make nut gall ink by a 200-year-old recipe. He hoped that chemicals in the ink would prove that a large number of historic documents were forgeries and that their previous owner, a man named Mark Hofmann, had committed two horrific murders.

Mark Hofmann began creating forgeries as a teenager in the 1970s. He took coins and filed the series letters in a way to make them appear to be rarities. Later, he became a dealer in rare and historic documents of the mid-to late-1800s. By the 1980s, Hofmann was a trusted document dealer known to professionals throughout the United States, who specialized in documents related to Mormon history. George Throckmorton and others believe that at some point, Mark Hofmann became disillusioned with the Mormon Church (Church of Jesus Christ of Latter-day Saints) but continued as an active member. In addition to making money, Hofmann may have intended from the beginning to create false Mormon history to discredit the church.

Hofmann seemed to be the luckiest document dealer in America. He could go into a bookstore in New York, for instance, and emerge with a rare manuscript worth thousands of dollars or stumble across a historic Mormon letter in an old Bible. In fact, Hofmann was not lucky but was a thorough and arrogant forger. In some cases, he would create a whole body of forged materials, plant them for others to find and profit from, then create a new related document that experts would authenticate by comparing with his own earlier forgeries! Hofmann read books on how famous forgeries were accomplished and frequently asked experts how forgeries were detected. He learned how the forensic laboratory techniques had made the forger's task more difficult. Modern analytical techniques can distinguish old paper from new by analyzing the filler chemicals that are added to wood fibers when the paper is made. Likewise, the age of the lampblack (carbon soot) used in old inks can be determined by "carbon dating." Other ingredients in ink change color as they react with oxygen over the decades. To fool the document scientists, Hofmann bought old books, cut out the blank pages, and wrote his phony letters on this genuine paper. He made his own ink, following an old recipe. Instead of buying lampblack (carbon soot) for his ink, he burned old paper so the lampblack would pass a carbon-dating test. To "age" his documents, Hofmann ironed them and baked them. To oxidize the ink, he applied various household chemicals. He reasoned that if the paper was old, the lampblack was old, and the ink was oxidized, no one could tell when the ink was actually applied to the paper. But Hofmann had overlooked some key chemical details.

Masterpieces of deception

Like most "successful" criminals, Hofmann became greedy. In the mid-1980s, Hofmann created his final two "masterpieces." One was a tract entitled "Oath of a Freeman" that was not handwritten, but printed on a printing press. It appeared to be the first document to be printed in North America—a distinction that would make it immensely valuable. The second masterpiece was a handwritten letter, known as the "Salamander Letter," which suggested that the founder of the Mormon Church was a con man. After he quietly sold this letter to a bishop of the Mormon Church, Hofmann made its contents public to embarrass church leaders.

The Library of Congress was considering purchasing "Oath of a Freeman" for $1.5 million dollars. Confident of his usual success, Hofmann began spending the money—more than a million dollars—before the sale was completed. Hofmann had still another scam going that involved several groups of people investing in another collection of documents, called the McLellin papers. This collection simply did not exist.

The whole house of cards began to collapse. The Library of Congress wanted to negotiate the price; some of the investors demanded either the McLellin documents or their money back. Hofmann wrote bad checks, avoided the investors, and started to panic. George Throckmorton believes that Hofmann then tried to buy himself some time through murder.

Two killed

On the morning of October 15, 1985, a package bomb exploded in an office building in downtown Salt Lake City killing Steve Christensen. Less than two hours later, a similar bomb exploded in the suburbs killing Kathy Sheets, wife of Christensen's former business partner, Gary Sheets. As Hofmann predicted, authorities began their investigation thinking the deaths might be related to the men's failed investment company.

The next day, another package bomb went off accidentally, this one in Mark Hofmann's car. Hofmann was badly injured and was rushed to the hospital. He told police officers that when he opened his car door, a package had fallen onto the floor and exploded. But

Alcohol, Tobacco, and Firearms agent Jerry Taylor knew that Hofmann's injuries could only occur if Hofmann were in the car when the bomb exploded. This single lie led ultimately to the unraveling of all Hofmann's schemes and crimes.

Salt Lake City detectives Jim Bell and Ken Farnsworth worked on the case for months. They accumulated evidence linking Hofmann to the bombings. But the prosecutor's office refused to bring an indictment, partly because no one could come up with a motive for the murders. Hofmann was out of the hospital and a free man.

The police were frustrated, but so was George Throckmorton, Utah State Forensic Document Examiner. Knowing that Hofmann was suspected of murder, Throckmorton couldn't believe that no one had scientifically examined the large number of historic documents that Hofmann had sold over the years to see if they might provide a motive. No one in Salt Lake City or elsewhere, seemed interested in the State Document Examiner's suspicions of document fraud. Finally, Throckmorton was able to convince the detectives and agents that it was highly unusual for one dealer to have unearthed as many valuable documents as were credited to Hofmann.

Alligatored ink

Once Throckmorton had permission to examine some of the documents, he called William Flynn, a document examiner in Phoenix, Arizona. They first examined documents from the archives of the Mormon Church. At first glance, all of the documents appeared authentic, although some emitted a puzzling blue haze under ultraviolet light. Then they noticed something odd about the ink. Under magnification, some of the ink had a peculiar cracked surface. They divided the documents into those that had "alligatored" ink and those that didn't; they then asked church officials about the origin of each document. Some of the cracked-ink documents had been purchased directly from Hofmann, whereas the others had originated with Hofmann. It was too perfect to be a coincidence. Had Hofmann somehow caused the alligatoring of the ink? Throckmorton and Flynn went in search of old ink recipes and documents they could experiment on.

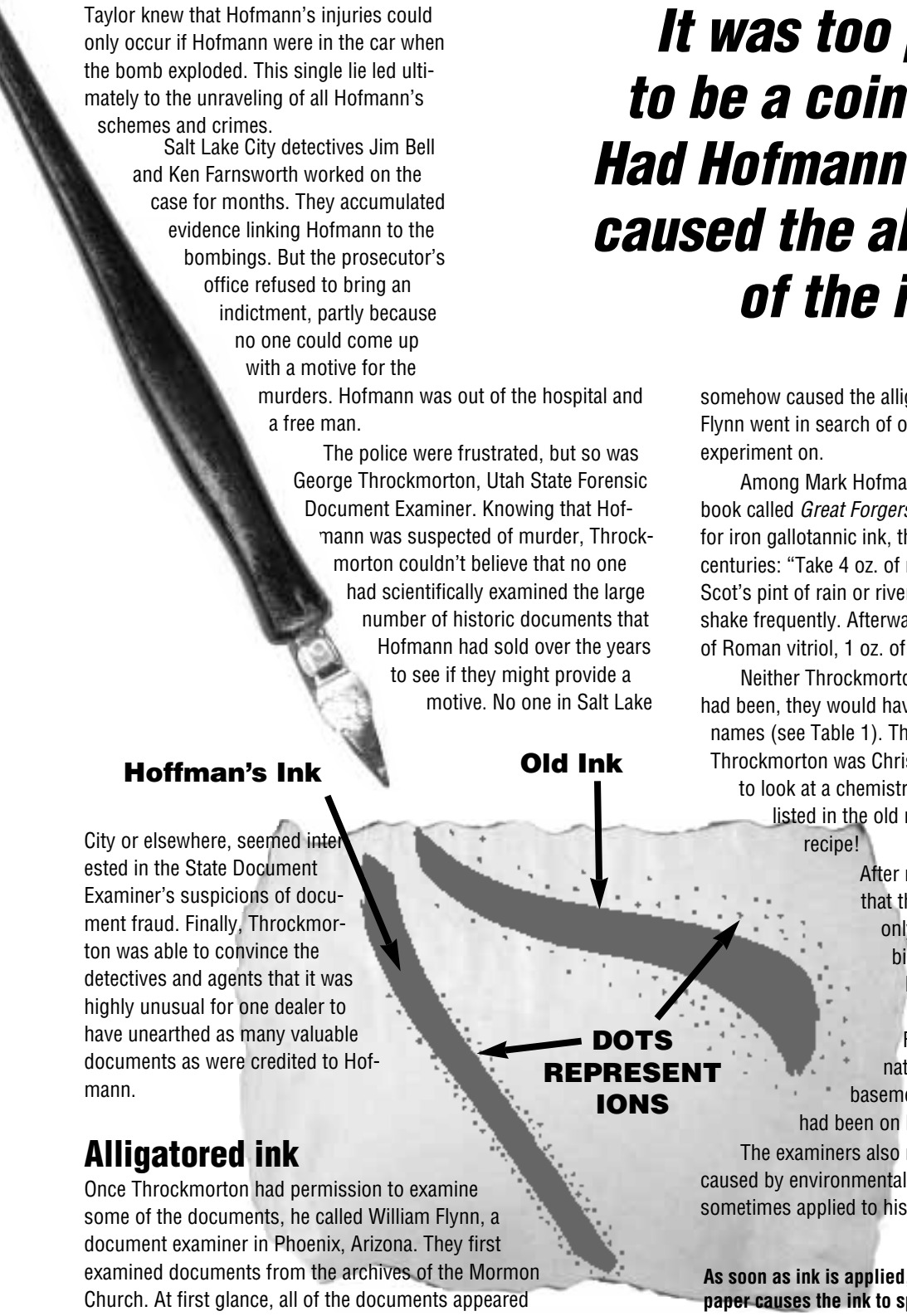
It was too perfect to be a coincidence. Had Hofmann somehow caused the alligatoring of the ink?

Among Mark Hofmann's possessions, investigators found a book called *Great Forgers and Famous Fakes.* It contained a recipe for iron gallotannic ink, the most common ink in the 18th & 19th centuries: "Take 4 oz. of nut galls, beaten and infused a week in one Scot's pint of rain or river water. Set in the sun or near the fire and shake frequently. Afterward add l/2 oz. of green copperas and l/4 oz. of Roman vitriol, 1 oz. of gum Arabic and a few specs of logwood."

Neither Throckmorton nor Flynn was a chemist, and even if they had been, they would have been hard-pressed to interpret such old names (see Table 1). Then came a stroke of good luck. While Throckmorton was Christmas shopping in a toy store, he happened to look at a chemistry set. There were most of the ingredients listed in the old recipe and another iron gallotannic ink recipe!

After many experiments, the investigators found that they could produce the strange alligatoring only when gum Arabic was used as the ink binder and the finished manuscript was bathed in ammonia (ammonium hydroxide, NH_4OH) and hydrogen peroxide (H_2O_2). From the beginning, they had used combinations of ingredients found in Hofmann's basement workshop, and ammonia and peroxide had been on his worktable.

The examiners also made sure that the cracking couldn't be caused by environmental factors or by preservation techniques sometimes applied to historic documents. And even though their



As soon as ink is applied, the capillary action of the fibers in the paper causes the ink to spread to the sides, beyond the original ink trail (left). After the ink is dry, some ions continue to spread sideways at a very slow rate. Iron ions, which are not visible to the eye, reach their limit of migration after about 22 years.

The scanning auger microscope gives not only a magnified picture of the ink but also a maps the location of the ions. In Hofmann's "historical" documents, the iron ions had moved only a short distance. This indicated that the ink had been applied to the paper, not 100 years ago as Hoffman claimed, but within the past few years.

experiments seemed to prove Mark Hofmann was a forger, they asked Roderick J. McNeil to examine some Hofmann documents under the scanning auger microscope, a relatively new instrument at the time. This method of microscopy not only produces a magnified image of the paper, but can also detect and map the location of many elements. The technique is believed accurate on paper, parchment, and vellum when metal-based inks are used. Tests of Hofmann's documents showed that the ink had been applied recently.

The ink Hofmann used, known as an iron gallotannic ink, was common until the 20th century. Over time, the iron is oxidized, changing the deep black ink to a blackish-brown color. Gum Arabic, the gluelike sap of the Acacia tree, binds the other ingredients to the paper. When Hofmann bathed forged documents in ammonium hydroxide and hydrogen peroxide, the ink changed to look aged. However, the treatment also raised the pH of the ink rapidly and briefly, and this may have caused a structural change in the gum Arabic, leading to the cracking.

Eventually, Throckmorton and Flynn would find proof of forgery in more than 100 of Hofmann's documents. Armed with the forensic evidence, the detectives were able to confirm Hofmann's forgeries and fraudulent schemes, connect him to the purchase of materials to make the bombs, and even confirm his presence at both bomb sites. Unfortunately, Mark Hofmann never went to trial for his crimes. After a preliminary hearing during which the evidence presented was nearly overwhelmingly against Hofmann, the prosecutor's office agreed to a plea bargain in exchange for Hofmann agreeing to answer questions about the murders and the forgeries. "The problem," says Throckmorton, "is that Mark Hofmann is a pathological liar. Despite 16 recorded hours of testimony, there is no telling which of his statements were true and which were more of his lies."

Hofmann was given concurrent sentences of 1 to 15 years for the murders of Steve Christensen and Kathy Sheets and on each count of theft by deception. He entered Utah State Prison on January 23, 1987. One year later, a routine meeting was held with the Board of Pardons to decide whether he should ever be considered for parole. The board vote determined that Hofmann will not be eligible for parole until at least the year 2007.

Table 1. Ingredients in iron gallotannic ink

OLD NAME	MODERN NAME	FORMULA
nut galls infusion	nut galls extract	mixed organic acids
green copperas	iron (II) sulfate	$FeSO_4$
Roman vitriol	copper (II) sulfate	$CuSO_4$
gum Arabic	gum Arabic	complex sugar polymers

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FOR FURTHER INFORMATION

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