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SARAH PAYNE

After 17 months of painstaking forensic work ending in a trial lasting more than three weeks, Roy Whiting was found guilty of the murder and kidnapping of Sarah Payne following evidence of fibers and a single hair.

Eight-year-old Sarah went missing on 1 July 2000 while visiting her grandparents in Kingston Gorse in Sussex. A massive search was started and Sussex Police asked for help from FSS specialist adviser Ray Fysh.

A local man on the sex offenders’ register soon became a suspect, his van seized and exhibits sent for forensic examination. On 17 July Sarah’s decomposing body was found.

Following a targeted approach, the first breakthrough came in December 2000 when a link was made from fibers on Sarah’s shoe to Roy Whiting’s red sweatshirt. Further work was able to provide more evidence. This included fibers from items in Whiting’s van, in Sarah’s hair at the grave site and DNA tests proving that a hair found on the red sweatshirt was Sarah’s.

A total of more than 500 items were submitted for forensic analysis. Over 20 forensic experts were employed during the inquiry in the fields of entomology, pathology, geology, archaeology, environmental profiling and oil/lubricant analysis. The whole investigation involved a thousand personnel and cost more than £2 million.

The forensic evidence in Operation Maple rested on a combination of DNA and fibers work. When Sarah’s body was found 17 days after she disappeared, she had no wounds from an assault and her body was badly decomposed making identification difficult. A full DNA profile was obtained from muscle and matched to a full profile obtained from a milk tooth saved by Sarah’s mother.

The van

Shortly after Sarah had disappeared, her brother Lee noticed a white transit-type van passing along the lane. Roy Whiting bought a white Fiat Ducato van a week before Sarah disappeared. When police seized it they removed all the contents which included a red sweatshirt, a pair of socks, a checked shirt, a clown-patterned curtain and a petrol receipt showing that Whiting had been only a few miles from where Sarah’s body was found.

They also found that plywood paneling installed by the previous owner in the back had been removed and the rear doors changed. The passenger and driver’s seat were made of different fabrics which was also significant.

The shoe

The only piece of Sarah’s clothing to be found was a black shoe with a Velcro strap which had trapped 350 fibers. Evidence that it was Sarah’s shoe came from blue polyester and cotton fibers found on it that matched her school sweatshirt. All the fibers were picked off one by one under a low-power microscope with a pair of fine forceps and retained under Sellotape.

Later when a scientist was looking at the tapings from the red sweatshirt and the clown curtain she realized that

the constituent sweatshirt fibers were unusually dark red and that they shed very readily. She then examined the fibers that had been picked off the Velcro of the shoe and saw four dark red fibers.

After mounting a sample from the sweatshirt and comparing them under a high-power microscope, they were found to match and this was the first tangible evidence to link Sarah to the van.

After finding these matching fibers all the fair hairs from the curtain and the sweatshirt were sent for DNA testing. From 40 hairs found, only one gave a result - a full profile matching Sarah.

The sweatshirt

A red sweatshirt was found on the front seat of Whiting's van. The garment was taped for fibers and hairs and screened for body fluids (blood, semen and saliva).

The tapings taken from the sweatshirt were examined for blue fibers of the type that it was speculated Sarah's missing dress was made of. All the fair hairs from the tapings were prepared for DNA testing using FSS SGMplus™. The collar and cuffs were also tested and gave a full profile matching Whiting.

How fiber examinations are carried out

The initial examination is done under a microscope to determine the fiber type, for example cotton or wool. Next it's looked at for colors. Then it's checked for physical features such as cross-sectional shape. The width of the fiber is examined. The fiber is examined to see if it contains any delustrant - this is used by manufacturers to determine how bright and shiny a finished garment is.

Then the fiber can be looked at under ultraviolet and blue light. All this has to be achieved before it can be said that fibers match. The next stage is microspectrophotometry which sends beams of light through the fibers. This enables a computer to detect how much light passes through to obtain the constituents of color. If the fiber is large enough the color can be extracted from it and a thin-layer chromatography test can be done to identify the dyes mixed by the manufacturer to give the fiber its finished color and hue. For manmade fibers an infra red spectrophotometry can be done - a chemical analysis to tell whether the fiber is made of polyester, nylon or acrylic, for example.

Between December 2000 and November 2001 an FSS team carried out 461 microspectrophotometry tests, 23 infrared spectroscopy tests and 128 thin layer chromatography tests.

The clown curtain

This was also found on the front seat of the van. An appeal was made on BBC TV's Crimewatch programme for other sources of this clown material. It was fairly unusual, as it had been manufactured in four colors - but there were only 1,500 meters in this particular color that had been used by Boots the Chemist as curtains for branches that had baby changing rooms. Although there were other samples of clown-patterned material, none of them matched. The fibers were teased out to mount on slides. A single multi-colored cotton fiber on the shoe was found to match the clown curtain.

The hair

Two balls of Sarah's hair were retrieved from the burial site. A number of fibers were retrieved from them and from the body bag. From one of them, fibers were found matching the red sweatshirt and a pair of Whiting's

socks. In the second clump there were fibers matching the sweatshirt, socks, and one fiber from the passenger seat of the van. One sock fiber and one from the driver's seat of the van were also found in the body bag.

**Extraneous links**

During the fibers' examinations a number of different blue polyester cotton fibers were found on several items. Although a source was never found to give a 'control' fiber, it's thought they may have come from Sarah's dress. Sarah's friend had the same dress that Sarah was wearing the day she went missing but in green. Examination of fibers from the green dress showed similarities to the blue polyester cotton fibers. A total of 25 patchy blue polyester fibers were found on Sarah's silver jacket - known to have been worn over the missing dress - and these matched nine fibers found on the red sweatshirt. Similar fibers were found in one of the hair masses, the body bag and in the pocket of Whiting's jeans. Three textured blue polyester fibers were found on the sweatshirt, matching a similar number in Sarah's hair. A few examples of a third fiber type, light blue polyesters, were also found on both the sweatshirt and the hair.

**Contamination**

During the trial the defense barrister tried to discredit the forensic evidence in a number of ways. She claimed:

• The sweatshirt had been contaminated during its first examination.

Two hairbrushes taken from the Payne family home had been sent to the lab. A Sussex Police scenes of crime officer had put them in a tube and then in a bag on the floor. Although the seal was intact, some of the orange adhesive was exposed and human and animal hairs from the Payne's carpet were found stuck to it. During cross-examination the defense argued that as a result of this, a 23cm hair belonging to Sarah had first transferred onto the bag containing the sweatshirt and then onto the sweatshirt itself when it was taken out of the bag for the first examination. But this examination had been completed before the hairbrushes were taken out of the exhibits store and no orange adhesive was found in Sarah's hair when tested. While giving evidence in court, an FSS scientist told the jury it was unlikely that contamination had occurred in the manner suggested.

• Doing work on exhibits from both the victim and the suspect provided opportunities for cross-contamination

- even though normal rigorous procedures were followed and examinations relating to victim and suspect were carried out on different floors of the lab.

• The fibers evidence wasn't important.

The defense argued there were few fibers and that the tests aren't as discriminating as DNA tests. Our scientist pointed out that although each fiber type on its own may not be rare, taken together the combination of fibers could provide extremely strong evidence, in the same way that 20 common alleles combined to give a very rare DNA profile.

In December 2001 Roy Whiting was found guilty and sentenced to life imprisonment. Trial judge Mr Justice Richard Curtis said it was a rare case when he would recommend that a life sentence should mean life.