

CASE REPORT

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Investigation of a Murder Case Involving Arson

REFERENCE: Tsaroom S. Investigation of a murder case involving arson. *J Forensic Sci* 1996;41(6):1064–1067.

ABSTRACT: In some religious societies, the value of life seems to be different from that in western nonreligious societies. Violating the family honor could result in killing. This article presents a case in which a Moslem Israeli citizen killed his daughter. Professional field work, together with forensic laboratory examinations, led to life imprisonment of the father.

KEYWORDS: forensic science, criminalistics, arson investigation, murder, crime scene, laboratory examinations

In June 1991, a message was received in a local fire station in the northern district of Israel about a burning vehicle with a woman inside. When they arrived, the fire fighters found a van on fire. During the extinguishing work, they noticed a burned body of a woman and a body of an infant protruding out of her split stomach.

The initial information came from the owner of the van, a 67-year-old farmer, a Moslem Israeli citizen, the father of 12 children. While he was driving his van in his orchard, his daughter (19 years old) was with him. Suddenly he noticed "smoke coming out of the engine compartment," he stopped the van and barely escaped. A heavy smoke rapidly reached the driver's compartment. He fell out of the van but his daughter remained inside while massive flames spread into the driver's compartment. He couldn't help her, so he ran to the nearest road and asked for help.

After preliminary investigation work had been done and the scene photographed with a video camera, the van was removed to the nearest police station for further examination.

This article describes one of the most exciting arson cases we have ever experienced. Laboratory examinations were made during the investigation as well as during the court hearings.

Examinations and Investigations

The Van—The next day, we, as the national arson investigation team, arrived at the police station and at the scene. The burned vehicle was a 1982 Peugeot van. The front passenger compartment was totally burned (Fig. 1). The engine compartment, mainly in the upper part, and the two front wheels were extensively burned.

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Received for publication 5 Sept. 1995; revised manuscript received 27 Nov. 1995 and 25 March 1996; accepted for publication 27 March 1996.



FIG. 1—The front passenger compartment of the van was found burned.

There was nothing left of the dashboard except the metal frame. The padding of the seat was totally burned. The van roof was sunken mainly at the right side. Charred patterns were found all over the driver's compartment from the floor up. All the windows were broken. Pieces of melted glass from the windows were found with pieces of melted aluminum. The handle for the handbrake was not set.

The rear part of the van wasn't burned except a slight charring in the bed. Some broken glass pieces from the rear window of the driver's compartment were found there. Nothing happened to the rear wheels. The fuel tank is located under the bed of the vehicle, behind the right side of the driver's compartment. The tank and the fuel line to the engine compartment were only slightly burned, even the rubber connector between the tank and the copper fuel line was still there.

Video Tape—The scene had been photographed by a video tape on the day of the incident. We noticed the massive damage and deep charring of the daughter's dead body (1). The baby's body that was protruded out of the split stomach was slightly burned (Fig. 2).

The Scene—The van was found burning near an olive tree in the orchard. This tree grew on the left side of the road which intersects the orchard (see diagram). The tree was badly burned. On the ground under that tree, there were still some charred residues left from the van. The previous olive tree, on the same side of the



FIG. 2—The burned body of the woman with an infant protruded out of her stomach.

road was only partly burned and the third tree on this side was slightly burned. The other trees on that side of the road (the left side) were not affected by the fire. On the opposite side of the road (the right side), about six meters away from the third charred olive tree, there were four more trees that were charred. The first was slightly burned and the last one was more damaged by the fire compared with the other trees on this side. On the ground along this road, there were some pieces of burned plastic that probably fell from the engine compartment and broken glass from the right side mirror of the van (see diagram Fig. 3). About 90 meters away from the place where the van had been found, there were a small clean piece of glass and tire tracks on the ground coming out of the orchard. During further searching, we found a large amount of clean broken small pieces of glass.

At this point, we reached several conclusions that were important to the initial police investigation: The van had been deliberately set on fire, probably by using a flammable liquid in the passenger compartment and on the engine hood. On the road there were a lot of vehicle tracks from the fire brigade and police vehicles. We reconstructed the van movement based on exhibits and the charring on the trees. It appeared that some violent action took place in the orchard, at the point where we found the large amount of the broken glass. The van was moved onto the road, and then it was set on fire near the first charred tree on the right side of the road. Based on the presumable route of the van (see diagram), we noticed that the van had moved from the right to the left side of the road for a short distance (six meters) and then continued straight ahead. The ground in this place was without any particular obstacles, such as stones, grades, or holes. We also knew that the van was on fire during that time, so we assumed that somebody had to steer the van from the outside. The movement from the right to the left side of the road, probably happened when that person was injured by the flames. At that time, we, the fire investigators, didn't know that the father had some burns on his hands.

Tests and Results

Charred residues were collected from the floor of the van cabin, both from the right and from the left side from both the left and the right sides. The suspect's (the father) clothes and his wrist watch with a leather watchband were also sent to the laboratory. The head space samples from all those exhibits were injected into

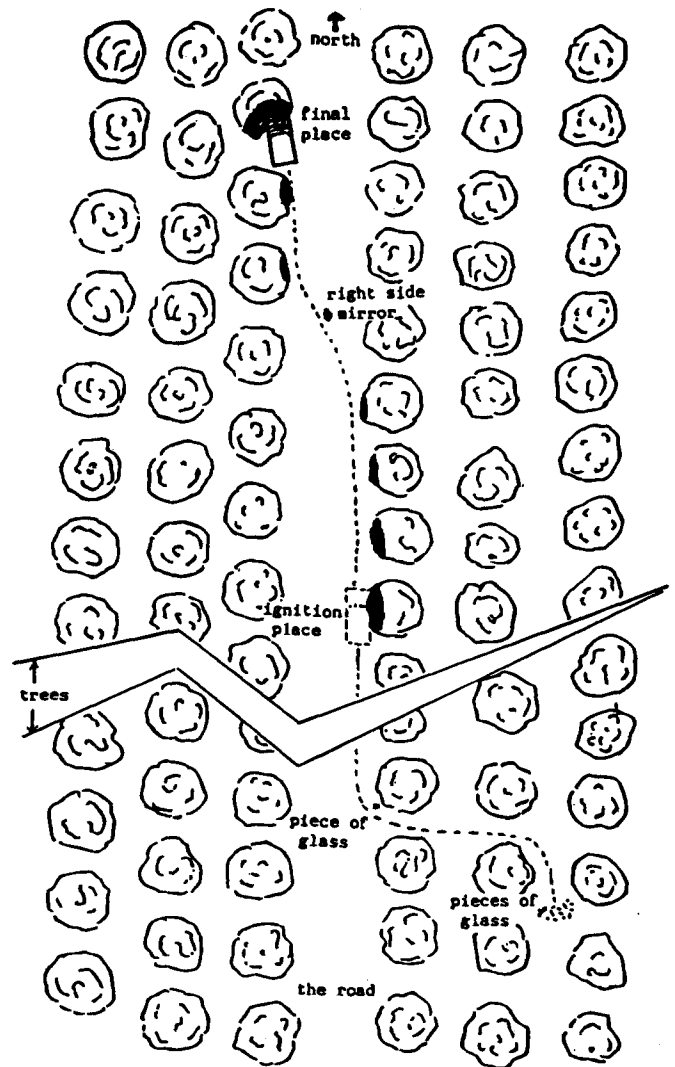


DIAGRAM OF THE SCENE

FIG. 3—Scene diagram.

a Perkin Elmer 8310B, gas chromatograph connected to an F.I.D. We used a 25-m fused silica capillary column (Methyl silicon column, programmed from 50°C to 250°C at 5°C/min). Gasoline residues were identified on the charred exhibits from both sides of the cabin (2) and also on the suspect's watch.

Several broken, clean and unburned pieces of glass that had been found in the orchard (the large group) were collected for laboratory examinations. Several pieces of burned glass were taken from the driver's compartment. The suspect's clothes were carefully shaken in the laboratory and two tiny pieces of glass were found (each about 1 mm²). The comparison tests included visual examination, microscopic examination, ultraviolet fluorescence, thickness measurements, refractive index measurements, and X-ray spectroscopy.

The pieces of glass on the ground of the orchard and those that were found on the suspect's clothes were similar in all parameters except the thickness. The pieces of glass from the burned vehicle were similar to the glass from the orchard in all parameters except the refractive index. They were also similar to the glass from the suspect's clothes except for the thickness and the refractive index. The tests were slightly complicated because the refractive index

of glass could be influenced by the thermal history of the glass. The laboratory examiner had to compare clean unburned glass with burned glass from the van. The refractive indexes of the glass exhibits were as follows:

- glass from the orchard: 1.51811 ± 0.00007 ,
- glass from the suspect's clothes: 1.51828 ± 0.00017 ,
- burned glass from the vehicle: 1.51922 ± 0.00009 .

The standard deviation in every case was calculated from ten measurements. The examiner put the glass from all three exhibits in an oven, heated them to 590°C and slowly cooled them to room temperature. The refractive indexes after the heating experiment were as follows:

- glass from the orchard: 1.51965 ± 0.00007 ,
- glass from the suspect's clothes: 1.51964 ± 0.00013 ,
- burned glass from the vehicle: 1.51960 ± 0.00005 .

The conclusion from these tests was that "it was possible" that the glass pieces found on the ground in the orchard, the glass pieces found on the suspect's clothing, and the burned glass pieces from the van, all came from the same source.

During the court hearings, further examinations had been performed. Based on incorrect quotations of the literature (3,4), the defense presented a theory that the fire had started on the surface of the fuel tank after the gasoline had flowed out of the tank, and then an ignition occurred by an electrical spark.

There was only one electrical wire connected to the fuel tank (the wire that comes from the fuel gauge of the dashboard and is connected to its detector of the fuel tank). We examined this wire under a microscope especially near the fuel tank end. We used a Wild M3Z microscope with a Panasonic F15 camera and Sony monitor and printer. Although it was burned, there were no signs of damage or melted spots on the wire and the connector (Fig. 4). We also washed the wire with 5% hydrochloric acid in an ultrasonic mixer and photographed it once again (Fig. 5).

It was also seen that the individual strands of the wire were separated from each other, and thus, no internal heating was involved (Fig. 6). As a control, we used an electrical wire (of the same kind), and we induced an electrical spark by using a 12-V

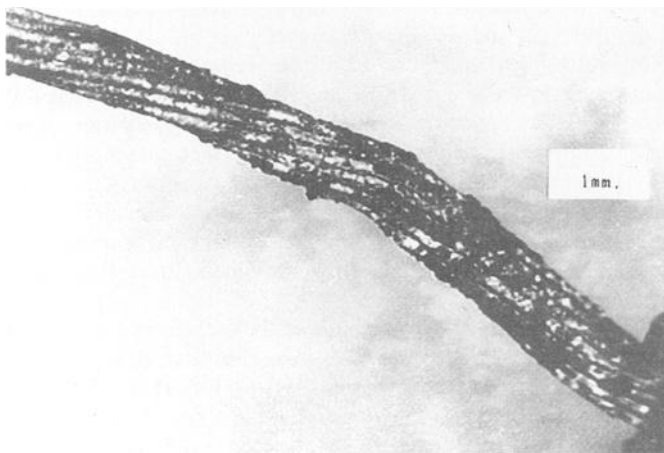


FIG. 4—An 1-mm electrical wire end (near the connector), magnified 15 times.

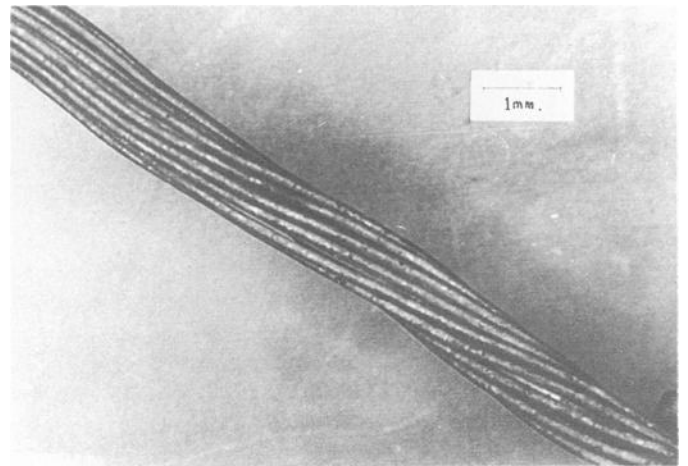


FIG. 5—The same part of the wire as in Fig. 3 after acid treatment.

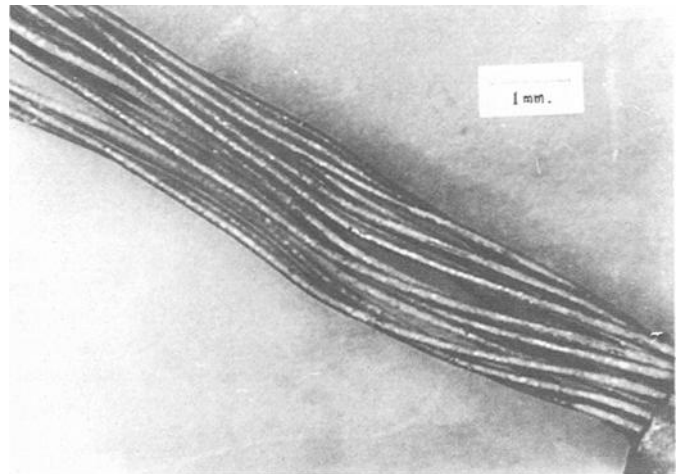


FIG. 6—The strands of the wire were separated from each other.

source from a vehicle and striking it onto the vehicle body (5). In the latter case, the damage was quite apparent (Fig. 7).

To prove that there is a possibility to start the motor from the outside and steer the van from outside, we took a Peugeot van and did some tests that were photographed using a video camera.

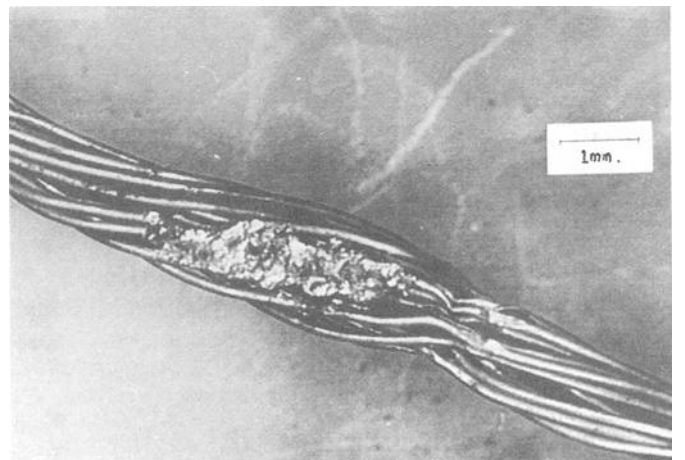


FIG. 7—Reference wire after an electrical spark.

While the engine was turned off and the gear box handle was in first gear, one could start the engine and steer the van from outside. It also has been proved that it was possible to change gears while the engine was running without using the clutch.

The pathological examination was difficult because the daughter's body was severely damaged. The forensic pathologist reported that the cause of death was burning and carbon monoxide poisoning. He found 17% of carboxyhemoglobin in the victim's blood. The results led him to the conclusion that the victim was alive at the time of the fire.

Summary

Based on our scene investigation and laboratory examinations, the case that was presented by the prosecution in court was as follows: The father (with burns on his hands, pieces of glass on his clothes, and gasoline residues on his wrist watch), was accompanied by his pregnant, unmarried daughter in his van. While they were at the orchard, a struggle took place during which the van's window was broken (where large pieces of broken glass fragments were found on the ground) and the daughter was injured, but was not killed in the struggle (according to the pathology report, she was still alive during the fire). Then he drove the van with the broken window to the orchard road (where another piece of the glass was found). He stopped the van near one of the trees on the right side of the road (the tree that was the most severely damaged by the fire). He then set the van on fire by using gasoline that he poured inside the van (gasoline residues were found inside the van). He also poured the gasoline on his daughter (severely burned body) and on the hood of the engine to make it appear that the fire was a result of an engine accident.

While the engine was still running, he moved the van forward by engaging the transmission and steering the van from outside

(tests proved it was possible to do so). The van moved only several meters during which time his hands were injured by the flames in the van. At this point, he turned the steering wheel twice so that the van moved from the right to the left side of the road. The van continued to move until it reached the olive tree and stopped. The proposed motive in this case was violating the family honor, which is a common phenomenon in the religious Islamic society—the family found that the daughter became pregnant although she was still unmarried. The suspect, the father, was found guilty and sentenced to life imprisonment.

Acknowledgments

I would like to express my thanks to superintendents A. Gorski, E. Landau, R. Shelef, P. Brauner, and M. Ravreby of the Division of Identification and Forensic Science for their help in preparing the manuscript.

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