

Spontaneous Human Combustion

Thoughts of a Forensic Biologist

Paranormal proponents and popular articles are quick to attribute certain dramatic fire-death characteristics to an unknown or bizarre power source, but in all such deaths documented in forensic literature, there has been no need to resort to bizarre interpretations to account for the observed facts.

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Forensic scientists very rarely, if ever, mention the (alleged) phenomenon of spontaneous human combustion (SHC). After reading an article on the subject in *BILD*, Germany's most famous tabloid newspaper (circulation four million daily), I started to wonder about this.

I first contacted the chief of our local police department, who is responsible for fire accidents, arson, and other fire-related incidents. After a few minutes of conversation, he recalled having heard about cases of spontaneous combustion, although he had never been an eyewitness to any such cases. He later sent me an article (*Feuer unbekannten Ursprungs* c. 1990), which was a collection of case reports of alleged spontaneous combustion cases. The cases had received worldwide coverage in newspapers and magazines, and the article seems to be one of the major sources of information for Germans interested in the phenomenon. Further

research led me to several accounts of SHC in the popular press (e.g., an account by a physicist in a German rock magazine [Czerny 1996]), novels (e.g., Charles Dickens's novel *Bleak House*, thought to have been inspired by the death of countess Cornelia Bandi in 1731), early reports (Hünefeld 1830), and magazines such as the *Fortean Times* (e.g., Simmons 1996; Arnold 1996) and *The X Factor* (e.g., Burning question 1996). From such sources, it is obvious that a significant percentage of the public believes in SHC.

The Expert Sources

To my knowledge, no scientific book or article written by a chemist, physicist, biologist, or doctor has ever reported bodies suddenly igniting through some internal but unknown mechanism. The two alleged expert eyewitnesses cited in the collection of case reports—"Dr. B. H. Hartwell" and "a certain Dr. David Price"—have never been found. Nevertheless, for the forensic biologist it is worth thinking about the possible evidence that may be found in photographs taken at scenes of alleged SHC. For this reason, I will focus on the evidence that may be gained from a detailed examination of photographs of unusual death by burning found in the forensic and medical literature, and that have been cited as proof of SHC by proponents of the phenomenon.

In many forensic cases that could be claimed to be SHC, we have as resources (1) the photographer, (2) the pathologist, forensic doctor, or medical examiner consulted, and (3) the police report for the case. I will restrict my observations to the facts as given by these expert sources because the speculations on causes of alleged SHC in popular articles are, in my opinion, nonscientific. Such speculations include: ignition of cellular oxygen and hydrogen (Heymer 1996), "Pyroton particles" (Arnold 1995), and maser (microwave amplification by stimulated emission of radiation) induction (Czerny 1996). Other nonscientific theories involve geomagnetism, kundalini (a form of mystic body heating), and electrostatics. Even the *Fortean Times* has been critical of two recent books on SHC: "He [Heymer 1996] seems to be under the illusion that [hydrogen and oxygen] exist as gases in the cell and are thus vulnerable to ignition, which is, in fact, not the case. Arnold proposes a new subatomic particle, the Pyroton, which inter-

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Figure 1: Corpse of a woman with Parkinson's disease who accidentally caught fire by a burning cigarette. From Gresham 1977, p. 181.



Figure 2: Corpse of a woman who fell into a fireplace after a heart attack. From Gresham 1977, p. 183.

acts with cells and causes catastrophic combustion. There is, however, no independent evidence for such a particle and just inventing it to explain SHC is not really a runner" (Simmons 1996; see also Nickell 1996). As for masers, no such portable device capable of producing SHC exists, and it is unlikely such an apparatus will be constructed in the near future.

Characteristics of Burned Corpses

In popular articles, the characteristic sign of SHC is said to be the complete combustion of a body with the exception of the extremities—legs, hands, or head—with only an ashlike substance left in the thoracic and abdominal areas. At the same time, little or no destruction of the surroundings (beds, chairs, and so on) is observed. Frequently, however, a brown oily residue is deposited on the furniture and walls. These signs are present in Figures 1 and 2. The exact date of death is not given in the book from which the photographs are taken, but each is the original photograph taken at the scene of death.

Proponents of SHC attribute such unusual scenes to an unknown or bizarre power source, but in all such deaths documented in forensic literature, there has been no need to resort to bizarre explanations to account for the observed facts. It was determined for the case shown in Figure 1 that an elderly woman, suffering severely from Parkinson's disease, could not control her hand movements while smoking and dropped her



Figure 3: Top part of the corpse shown in Figure 1. Lungs and heart are visible from the back, which was burned away together with the back parts of the ribs and spinal column. Maximum heat developed on the woman's back. From Gresham 1977, p. 185.

glowing cigarette. Additional matches and cigarettes were found on the floor next to the woman's remains (Gresham 1977). For Figure 2, investigators determined that an elderly woman fell into a fireplace after having a heart attack (Gresham 1977). In both cases, a thorough criminal investigation was carried out by experienced staff.

The main objection that supporters of SHC have to such ordinary explanations is that they doubt that the course of an event can be demonstrated in retrospect, especially in cases of burning. This is not true. Forensic examination of charred remains will reveal many clues. Forensic scientists, medical examiners, pathologists, and police experts are able to deduce a great deal of information from very severely burnt bodies, even from ashes and the remains left after cremation (e.g., Marples and Browning 1994; Merkel 1932).

Consider, for example, Figures 1 and 3. Figure 3 displays the top part of the body shown in Figure 1. (Paramedics had removed this part of the body *before* the photographs were taken [Gresham 1977] which explains why the torso is missing in Figure 1.) The organs, as seen in Figure 3, are still clearly visible. This is the typical appearance of a person who died by burning. The medical examiner and the forensic pathologist were able to conclude from the autopsy that the woman's hair first started to burn, the fire then spread to her back, followed by the rest of the upper part of her body (Gresham 1977). Presumably she wore clothing and the fire spread along the material (Pescod 1996).

Because of the good condition of the organs, it is possible (in most cases) to determine with great accuracy the cause of death, especially in cases involving poisoning, strangulation, heart attack, and brain damage.

In contrast to the first impression conveyed of gross destruction of the whole body, internal organs are frequently not essentially changed. If they are, it is in a known, reproducible manner. Even intestines, stomach, liver, heart, uterus, bladder, etc., are often well preserved (see Figure 4). The high temperature of the outer parts of the burning body is not maintained internally, where fluids in the various organs and cavities help prevent their incineration. (For an overview on

the temperature gradient, see Masuth 1978.) This effect is not commonly known, and even first-year medical students express surprise when shown burned corpses containing intact organs.

The temperature gradient is the reason some body parts, such as legs, do not burn, while neighboring parts do. Pictures of "just legs" can be explained by the rapidly decreasing temperature from the top of a sitting person to the bottom. (Or sometimes the upper body parts have simply been removed before the picture was taken, as in the case cited earlier, Figures 1 and 3.) Even a match will often stop burning if it is held with the flame pointing upward.

Another theory, the *multiple wick effect theory*, predicts that only body parts covered by clothing will burn, whereas body parts not covered by clothing will remain intact (Pescod 1996). Items of clothing act as multiple wicks and support burning over a long time because the body fat in subcutaneous layers changes into a liquid form. O. Prokop, Germany's major authority in forensic medicine for more than thirty years, wrote: "The liquefied [body] fat of the subcutaneous layer can soak into the clothing, causing it to act like a wick which maintains the fire. Only this mechanism can explain the most severe combustions which are observed in persons who, for example, fall asleep whilst smoking" (Prokop 1960). Ignition, in that case, always starts with the clothing (Masuth 1978). Furthermore, 40 percent of all seventy-five people who died by fire in closed rooms between 1964 and 1973 in Cologne had a blood alcohol level of more than one part per thousand (Masuth 1978), and 54 percent of all eighty-seven fire victims who died in Oslo had a blood alcohol level of more than one part per thousand (Teige 1977). These observations support that many people who die in fire accidents are under the influence of alcohol, which explains why (1) people fall asleep while smoking and (2) why they do not wake up immediately after the fire starts. Furthermore, elderly people often cannot move fast enough to extinguish the fire, as in the case of the woman with Parkinson's disease discussed above (Figure 1).

Another example of an elderly person's not taking action soon enough is the case of a seventy-year-old woman who was found standing, dead, "lifeless and rigid," with burning clothes, in a doorway between two rooms (Figure 5, Bschor 1965). Found next to her was a newspaper, folded lengthwise to light an oven fire, and partially burned at the top. The oven



Figure 4: A severely burned corpse. Note that the heart and intestines are well preserved. From Prokop and Radam 1987, p. 192.



Figure 5: Seventy-year-old woman standing dead rigid in a doorway after her clothes burned. Redrawn by Benecke, after Bschor 1965, p. 33.

was filled with wood that was not kindled.

Effect of Heat on Human Bodies

Articles arguing for SHC often state that local temperatures in excess of 1,500°C are necessary to produce the "typical picture" of alleged SHC. Again, this is not true. Burkhard Madea, a German forensic scientist, collected much of the information available in this field. He states (Madea 1992) that corpses of children (age not given) can be completely destroyed at 500°C in two hours (except for small pieces of calcined bone), and that corpses of adults, as a rule, burn down to less than 1 kg (other sources say 2.25 kg) of a crumbly substance at 800–

1,000°C within one hour. Richards (1977) reports his observations on corpses of adults cremated at around 680°C: the arms are heavily charred after 10 minutes; the legs are heavily charred after 14 minutes; and the skull and bones of the upper arm are visible after 15 minutes. If no external source of fire is present, the layer of fat under the skin is known to promote burning (Gresham 1977; Evans 1963). (The average amount of fat in an adult body equals 15.4 kg [Evans 1963]). The body will in fact reach temperatures of around 500–600°C (dark red glow), especially if a person is wearing highly flammable clothing or, as is more frequently the case, if another person intensifies the fire by pouring flammable liquids over the corpse to make the death look like an accident (Eckert et al. 1988).

The presence of alcohol in the body is commonly thought to be responsible for rapid and intense combustion (e.g., Feuer unbekannter Ursprungs c. 1990). This is a misunderstanding. The concentration of alcohol in a body would be much too low (try to ignite beer with a conventional flame). Diluted alcohol will neither burn nor spontaneously explode. Oxygen has to be present to allow ignition and combustion. For example, at room temperature the only way to make gasoline explode with a conventional flame is to let it vaporize in a closed container and then set the gas on fire. In a human body, an explosion, or perhaps even fast burning due to flammable liquids, is impossible. In 1850, the chemist Justus von Liebig showed that even tissue soaked with diluted alcohol would not burn to ashes, not even with the application of an external flame.

In forensic practice, there are no known cases in which internal organs of a burned corpse were damaged more severely than the outer parts (see Figure 6). This practical observation is further proof that combustion never starts from inside a human body.

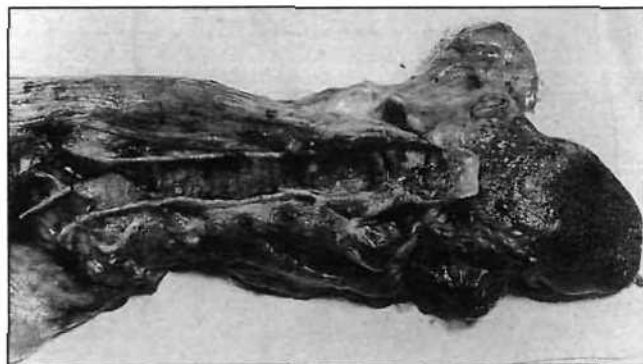


Figure 6: Here, tongue and trachea of a victim are visible (picture taken after dissection). Soot inside the trachea indicates that the person was living during the fire and inhaled sooty air. From Prokop and Radam 1987, p. 185.

Concluding Remarks

Many photographs of alleged SHC appear to have fooled observers by not showing the complete remains of the bodies as found *in situ* (again, as with Figures 1 and 3). However, there are cases in which human bodies are reported to have burned fiercely. This is confirmed by routine forensic and police procedure (e.g., Madea 1992) and does not require further explanation. Sometimes inconspicuous initial fire sources, like cigarettes, together with relatively low burning temperatures developing subsequently, and the presence of subcutaneous body fat, can be sufficient to reduce a body by burning. In many cases, one also has to consider the role of individuals who may wish to cover up evidence of a crime.

The pictures and reports published on SHC up to now can be explained by well-known and understood mechanisms that are regularly found at the sites of burning. There is no need to invent bizarre chemical reactions or paranormal activities to explain what is mistakenly called "spontaneous combustion."

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