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CRITICAL FOCUS

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Solving the Mystery of Spontaneous Human Combustion

Last November, a 42-year-old man was standing outside a record store in Sweden, apparently waiting for someone. Suddenly fire appeared from his clothing and he burst into flames. He blazed from within and formed into a fireball as he fell to the ground. The man, who remains anonymous, narrowly escaped with his life. It was an astonishing and ghoulish episode — but it wasn't the first. There have been a number of reports of people catching fire, and most of them are almost completely destroyed in the conflagration. In the space of minutes, people have been consumed by fire, and all that remains is a heap of ash from which the legs protrude. It is a horrifying spectacle, which has been written about for centuries.

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The charred body of Madame Ginette Kazmierczak was discovered in her apartment in Uruffe, France, on May 12, 1977. All that remained were her legs, and they (like the furnishings nearby) were virtually unscathed. The coroner concluded that the case seemed to be one of spontaneous human combustion.

No reasonable explanation has ever been found — until now. At last we have an answer. The subject has always defied all previous investigators. Spontaneous human combustion (SHC) has been well documented, and television has sought to demonstrate an answer. But in the scientific world, there are many who insist that SHC does not exist. As long ago as 1861, J.L. Casper wrote in his *Handbook of the Practice of Forensic Medicine* that spontaneous human combustion was "a myth." In *Forensic Pathology: Principles and Practice* published in 2005 by Academic Press, David Dolinak and his colleagues similarly state that "spontaneous human combustion does not exist," and the same words appear in the National Fire Association's presentation, "Fire Investigator."

Dr. Floyd Clemens, the coroner who examined the death in 1885 of Mrs. Pat Rooney, did accept SHC as real, concluding that hers was a "classic case of spontaneous human combustion." But when Margaret Dewar reported on the burning of her sister Wilhelmina in 1908, the coro-

An elderly woman succumbed to spontaneous human combustion on March 4, 1980, in the Lancashire town of Chorley, England. The inquest concluded that it was "accidental death" after she had fallen head-first into the coal fire. Firefighter Tony McMunn was not convinced, and he later researched other well-documented cases.

Mary Reeser of St. Petersburg, Florida, was a victim of human combustion in 1951. Objects nearby were untouched by fire, and her remaining leg was virtually unmarked by the blaze. Prof. Wilton Krogman from the University of Pennsylvania said: "I find it hard to believe that a human body, once ignited, will literally consume itself, as does a candle wick, guttering in the last residual pool of melted wax ... this case still haunts me."

ner refused to accept her evidence and threatened her with perjury unless she returned to the stand and changed her story to eliminate any suggestion of SHC. In 1970, Dr. P.J. Bofin, the city coroner in Dublin, said that the death of Mrs. Margaret Hogan "would conform to what is called spontaneous combustion." However, when Jeannie Saffin died from SHC in London in 1982, the coroner said he could not record a verdict of spontaneous human combustion, "because there is no such thing."

A recent case involved 76-year-old Michael Faherty, who died at his home in Galway, Ireland, on Dec. 22, 2010. His charred corpse was found lying on his back with his head near the fireplace. There was little damage in the room, apart from the charred ceiling above the body and the burned floor beneath. In evidence, Dr. Mike Green, a professor of pathology, said he had examined one case of SHC and he had studied reports of others. "This is the picture which is described time and time again," he said, adding: "Even the most experienced rescue worker or forensic scientist takes a sharp intake of breath when they come across a case." The West Galway coroner, Dr. Ciaran McLoughlin, said it was the first time in 25 years of investigating deaths that he had been faced with such a case. He officially recorded the cause of death as spontaneous human combustion.

A classic case is that of Mary Reeser, who met her end on July 2, 1951. The previous evening she had settled down at home in St. Petersburg, Florida, and at around 8 p.m. her son and granddaughter had visited her. They found her comfortably seated in her armchair; she had taken a couple of sleeping pills and was looking forward to a peaceful night. Next morning a telegram arrived, and when her neighbor went to arouse her, she found the doorknob of Mrs. Reeser's apartment too hot to handle. Inside, they found the room was filled with smoke, and flames were still flickering on an overhead beam. In the middle of the room, where the armchair had stood, was a pile of ash from which a leg was protruding. That was all that they could see of Reeser.

The conclusion was that she had collapsed and had set fire to her clothing with a smoldering cigarette, and the waft of air currents produced by cooling fans in the apartment had boosted the flames so that the body was consumed by fire. The report was cited in an article for the *St. Petersburg Times* of August 9, 1951, by Jerry Blizen, and the case became a *cause célèbre*. W.S. Allen wrote about it in *True Detective*, December 1951. It was featured in *Fire and Arson Investigator* in June 1984, the *Skeptical Inquirer* in July 1987, and again in the Time-Life Library volume entitled *Curious and Unusual Facts*, published in 1991.

Police witnesses at the scene said there was enough black soot to clog the fly screen. Damage was confined to the area immediately around the body. Although the folding doors, like the drapes in the room, had been

blackened, they had not been scorched. Within a month of Mrs. Reeser's demise, the FBI reported on the case and concluded that — once a human body starts to burn — there is enough fat to support the process until there is "almost complete combustion of the body." This FBI document is dated July 31, 1951, and it remains one of the most detailed reports of SHC.

BLAME IT ON BOOZE?

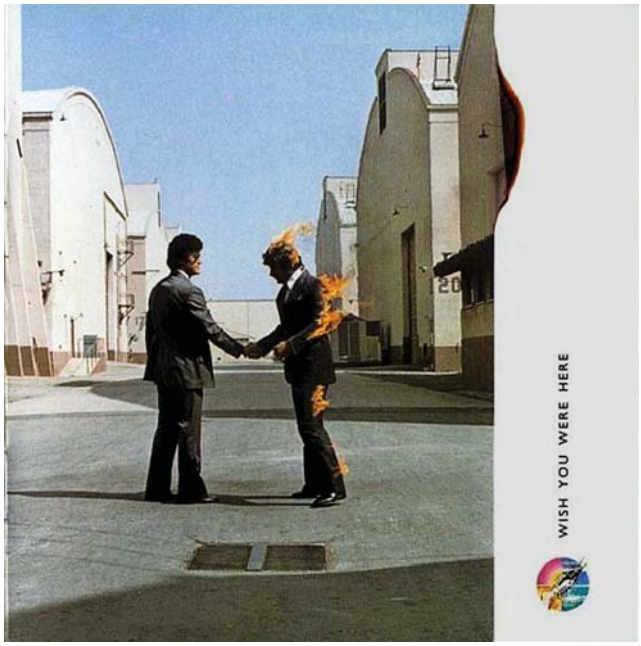
One early scientific record was by the noted microscopist Thomas Bartholin in 1663, who wrote how a woman in Paris was destroyed by fire while sleeping. He emphasized that the bed was largely untouched by the flames. Paul Rolli published a similar account in *Philosophical Transactions of the Royal Society* in 1745. He described how the 62-year-old Countess Cornelia Bandi of Ceséna, Italy, had said one evening that she felt "dull and heavy" after dining and went straight to bed. Next day, her maid could not rouse her so she entered the room and found a pile of ashes with two legs protruding from the smoldering remains.

The first book on the subject was *De Incendiis Corporis Humani Spontaneis* written by the French author Ionas Dupont and published in Leyden, Netherlands,in 1763. Pierre Lair published a pamphlet in 1806 that surveyed the whole subject, *An Essay on the Combustion of Humans*. The pamphlet's subtitle revealed the accepted explanation: *Products of the Abuse of Spirituous Liquors*. Popular interest continued to increase, and in 1832, the Victorian magazine *Notes and Queries* included a summary by Dr. Lindsley of 19 cases of SHC between 1692 and 1829. The individuals who had died, he said, were "habitually drunken" or "frequently indulged" in alcohol. The moral tone of the report laid the blame squarely on the victims.

This all skates round a key fact: The human body is not inflammable. It is full of water, and it will not burn. This key issue was examined in 1851 by J. von Liebig, who reviewed 50 reported cases. Liebig is known to modern scientists for his design of the chemical condenser. He was also the first person to isolate titanium. Liebig pointed out that anatomical specimens were typically preserved in 70% ethanol, yet cannot be set on fire. Drunkards did not have inflammable corpses. Liebig set fire to anatomical specimens soaked in alcohol, and showed that the spirit burned off, leaving the tissues unharmed. In a series of experiments of which we would be unlikely to approve today, he injected ethanol into rats over a prolonged period before trying to set them on fire but found that even the rats didn't burn.

Dr. John Irving Bentley was destroyed in a conflagration in the bathroom of his Pennsylvania home on Dec. 5, 1966. The floorboards beneath his body had burned through in the fierce heat, but his walking frame was largely untouched by the fire.

Liebig's clear-headed science stood little chance of acceptance when intemperate behavior seemed to be a more fitting explanation. The existence of SHC was accepted in 1888, when the *British Medical Journal* published a report from Dr. J.M. Booth that described the body of an elderly man who had been found burned to ashes. He had been sleeping in a hay loft. Both of his hands and his right leg had burned off and fallen through the charred and weakened floorboards to the stable below. Dr. Booth noted that hay stack nearby had not caught fire, even though the body had been consumed in the blaze, and he emphasized that the combustion process had apparently originated within the man's body, not from external causes. He pointed the finger at the same cause as so many earlier writers: "The victim was a pensioner of notoriously intemperate habits," he wrote, making it easy for readers to draw their own conclusions.



The British rock band Pink Floyd chose a burning human for the cover of their 1975 album "Wish You Were Here." Hollywood stuntman Ronnie Rondell (right) was set on fire as he shook hands with Danny Rogers. The image was an allusion to "getting burned" in the music industry by unscrupulous businessmen.

SHC IN LITERATURE

Novelists realized that the spontaneous combustion of a human being was good copy. Frederick Marryat featured a burning body in his novel *Jacob Faithful*, published in 1834. The eponymous hero finds the remains of his mother charred into a black mass in the form of an "unctuous pitchy cinder" that had him staggering from her cabin "in a state amounting to almost insanity." His fictitious character died, wrote Marryat, from "spontaneous combustion, an inflammation of the gases generated from the spirits absorbed into the system."

In his 1842 book *Dead Souls*, the Russian novelist Nikolai Gogol described how a drunken blacksmith burned to his death. He had caught fire, the author emphasized, solely through "too much drink." Herman Melville included a similar story in his novel *Redburn* of 1849 in which a drunken sailor was consumed by fire, this time with greenish flames issuing from his mouth as he died spectacularly. Mark Twain published a similar account in *Life on the Mississippi* (1883), where he writes: "Jimmy Finn died a natural death in a tan vat, of a combination of delirium tremens and spontaneous combustion. When I say natural death, it was a natural death for Jimmy Finn." Back in Russia, Emile Zola used the device in his 1893 novel *Le Docteur Pascal*.

The best known example from Victorian fiction was from Charles Dickens in *Bleak House*. A villain of the piece aptly named Mr. Krook is found burned to ashes. Dickens wrote that there was soot everywhere, with a smoldering and suffocating atmosphere in the room, and a small area of burned flooring on which lay the charred pile of ash. Krook, wrote Dickens, was "continual in liquor." When the book was published in 1852, Dickens was publicly challenged by a scientist colleague, George Henry Lewes, who did not accept that spontaneous human combustion had ever occurred, and argued that it was unprincipled for Dickens to incorporate unsubstantiated rumors into his novel. Dickens replied robustly, saying that he had based the account on his personal studies of some 30 well-documented cases.

A further example was invented by Jules Verne in his book of 1878, *Dick Sand, a Captain at Fifteen*. He describes the King of Kazounde: "The king had taken fire like a petroleum bonbon. This fire developed little heat, but it devoured nonetheless." He explained that "in bodies so thoroughly alcoholized, combustion only produces a light and bluish flame that water cannot extinguish. Even stifled outside, it would still continue to burn inwardly. When liquor has penetrated all the tissues, there exists no means of arresting the combustion."

In more recent times, the topic has spread to popular culture. To illustrate their 1975 album "Wish You Were Here," the British rock band Pink Floyd produced a posed image showing a suited man on fire. Two years later, the parody rock band Spinal Tap reported the demise by SHC of their drummer Peter Bond (nicknamed James, and played by Russ Kunkel). A filmed interview explained how the hapless musician exploded into a green conflagration, leaving nothing but a small green stain on his seat. The producers were over-enthusiastic in killing off another drummer through the same cause (Mick Shrimpton, portrayed by Ric Parnell), who was said to have exploded on stage during a tour of Japan in 1982.

UNEXPLAINED PHENONMENON

So much for fiction; what about fact? In England on March 2, 1773, the charred remains of Mary Clues, a 52-year-old resident of Coventry, were found by a neighbor. Her legs were protruding from the ashes and were largely unharmed, though the rest of her body had been reduced to ashes. In February 1779 in Aix-

en-Provence, France, the burned remains of Mary Ann Jauffret were found in her bedroom. Protruding from the mass of ashes were a hand and a foot. Nothing else in the fire-blackened room had caught fire.

In the modern world, cases continued to appear. On March 1, 1953, in Greenville, South Carolina, the charred body of Waymon Wood was found in the front seat of his automobile parked off Route 291. The gasoline in the fuel tank remained unburned, though the driver's windscreen had buckled and sagged in the heat from the burning body. And on Dec. 5, 1966, the charred remains of Dr. John Irving Bentley was found at his home in Coudersport, Pennsylvania, by a gas-meter reader named Don Gosnell. Dr. Bentley's feet (like the furnishings alongside) had been unharmed by the fire. On Jan. 8, 1988, in Southampton, England, the charred body of Alfred Ashton was found by neighbors who had been alerted by the smell of something burning. The body, and the floor on which it lay, had been reduced to ashes though the legs and feet were unscathed.

Well over 150 cases have been documented, yet the phenomenon has never been satisfactorily explained. To date, the best reasoned experiments remain those of Liebig in 1851, yet his important conclusions have been disregarded. More than a century later, two British writers, Jenny Randles and Peter Hough, decided to look analytically at a range of unexplained phenomena. They wrote a book entitled *Death by Supernatural Causes?* published in 1988 by Grafton Books in London. Their account included a chapter on SHC that seems to have caught the attention of a BBC producer named Teresa Hunt. Miss Hunt worked on a series entitled "QED," which set out to solve mysteries before a general audience. Spontaneous human combustion seemed ripe for re-examination, and the BBC decided to devote a program on the topic.

At the time, Randles and Hough were in the process of compiling their next book *Spontaneous Human Combustion*, to be published in 1992 by Robert Hale Ltd. in London, and in New York by Barnes & Noble the following year. It documented 111 incidents of SHC between 1613 and 1990, and with much new information being compiled for their book, they felt that it was sensible to decline the proposal to appear on the BBC. Miss Hunt pressed ahead with her program anyway, because she had an interviewee in mind who would provide the explanation for SHC. This was Dr. Dougal Drysdale from the University of Edinburgh, Scotland, who wanted to promote the "wick theory."

This had been put forward to explain the death on Dec. 28, 1987, of Barry Soudain, a 44-year-old baker from the seaside resort Folkestone in the English

This was all that remained of Helen Conway of Pennsylvania on Nov. 8, 1964, after she reportedly caught fire. The evidence stated that she was a heavy smoker, and the fire may have been caused by a cigarette or a match. Neither answers the critical question: How can a moist and non-inflammable human body catch fire?

county of Kent. He had lived alone in the flat and also worked as a janitor. He was known to drink, though he was not inebriated when he met neighbors shortly before he died. His remains were found as a pile of blackened ash on the floor of his kitchen with little damage done to the rest of the room by fire. Detective Sgt. Nigel Cruttenden reported that a nearby dustpan and brush made from polyethylene had not been melted in the conflagration. Hough and Randles found out that Soudain's blood alcohol level had been 268 mg/100 ml, which would have resulted in drunkenness for most people — though for a frequent drinker, as Mr. Soudain apparently was, the effects would have been muted.

A FAT CHANCE

Cruttenden claimed that fat in the body had liquefied in the conflagration and fueled the burning of the entire corpse. He wrote that the victim "had burnt like a candle from above and downwards." This was picked up by Dr. Drysdale and was publicized as a key finding of the "QED" documentary. "QED" was not the first BBC program to televise the theory, for that had already been undertaken by the "Newsnight" program in January 1986. At that time, the BBC's expert had been Dr. David Gee, emeritus professor of forensic medicine at the University of Leeds. He had demonstrated the wick effect on television two years before "QED" aired.

The BBC documentary "QED" claimed to have an answer for SHC. The commentary stated that this armchair had been burned "to its springs," while the scientist in charge said the chair had been "burned almost to completion," As these screen shots show, little damage was done to the chair even after burning for six hours. Both the program and the science were flawed.

The idea was even older. In 1961, Gavin Thurston published a paper, "Preternatural Combustibility of the Human Body" in the *Medico-Legal Journal* (Vol. 29, No. 4, pp 100–103). He claimed that although human body fat will combust only at temperatures above 250 °C, fat can — when melted to oil — burn on a wick in a room at 24 °C, which is well below body heat of 37 °C. Thurston manufactured a sausage-like roll of fat surrounded by gauze and showed how it could continue to burn for an hour as it was slowly consumed. This publication has been largely overlooked ever since, though it was the first demonstration of what we now call the "wick effect."

The phenomenon of SHC had a natural explanation, said the BBC. To prove it, viewers saw Dr. Drysdale set fire to a small fatty specimen wrapped in cloth, which continued to slowly combust until it was eventually reduced to cinders. This would not have been enough to destroy bone, and so, in a separate experiment, a bone was subjected to a temperature of 500 °C in a small muffle furnace. As the oven was switched on, Dr. Drysdale announced that he would return in six hours to show that the bone had been reduced to ash. When he was next seen, he stated that, in fact, eight hours had elapsed — yet the bone was still intact. Dr. Drysdale broke it up and suggested that perhaps 12 hours would be necessary for the bone to be reduced to powder. This is far longer than he had previously postulated and is not remotely compatible with the rapid consumption of a body by fire that had been recorded in previous cases of SHC. In any event, this 12-hour experiment was never undertaken, so the suggestion remains unproven as well as inapplicable.

The highlight of the "QED" program was an experiment by Stan Ames, of the British Fire Research Station. He demonstrated the destruction by fire of a wooden-framed armchair, which was intended to substitute for a human body. Said the voice-over: "The smoldering process could sustain itself long enough to reduce a body to ash — or in this case, an armchair to its springs." The chair was set on fire and left slowly to burn over a six-hour period. By the end, it remained largely intact with the charred seat and the backrest still in place; it had certainly not been reduced "to its springs." Those taking part in the program later said that it took most of the morning to set the chair on fire. It was not a helpful experiment. Setting fire to a combustible armchair is not the best comparison for the burning of a moist, incombustible body. Even though nothing in the program justified the conclusion, the BBC proudly announced their program had shown that the mystery of SHC "was finally over."

Dr. Drysdale's experiment with the fatty sample provided better evidence, though even he later admitted that it took a number of attempts (and a change of specimen) before it could be induced to burn at all. The "QED" program did not attempt to show whether a human body could be consumed by fire, though that experiment had been done a decade earlier in London by the Metropolitan Police. They had investigated how two murderers disposed of their victims who had been burned, piece by piece, in a fireplace. The police experimenters cut up a pig carcass weighing 150 pounds and fed portions into the suspects' fireplace, fueling the process by high-quality smokeless coal. It took 15 hours to dispose of it all and utilized a large quantity of coal. The lesson was that human flesh requires an external source of fuel before it can burn. No one had shown how a body could become inflammable.

The key experiments on burning bodies have been carried out by Dr. Wilton M. Krogman of the University of Pennsylvania. He has burned cadavers in a variety of ways, using coal and oil, gasoline, acetylene and lumber, in environments ranging from outdoor funeral pyres to the controlled environment of a crematorium furnace. Dr. Krogman observed a cadaver

incinerated for eight hours at 1,000 °C, only to find that all the major bones were intact and still recognizable. The amount of fuel consumed is remarkable — to dispose of a cadaver, a crematorium needs at least 30 cubic meters of gas and 600 cubic meters of pre-heated forced air per hour. Without the forced draft, the temperature needs to be at least 1,600 °C and takes many hours. Crematorium ovens do not explain spontaneous human combustion: Dr. Krogman considered the case of Mrs. Reeser and said it was "most amazing," adding: "As I review it, the short hairs on my neck bristle with vague fear."

COMMON FACTORS

Let us search for a common factor. Although some victims were habitual alcohol drinkers, like Mr. Ashton who died in Southampton, not all of them drank. That most celebrated recent victim, Mary Reeser, was not a drinker nor was Grace Pett, one of the earliest documented victims, whose charred remains were found at her home in Ipswich, England, on the night of April 9, 1744. Alcoholism must be ruled out as a cause. So where else can we turn for an answer to this puzzle? The great microscopist W.B. Carpenter suggested in his 1839 book *Principles of General and Comparative Physiology* that "the extraordinary phenomenon of spontaneous combustion" might be caused by the "combustion of phosphorus on the hand," but this can account for hardly any of the cases.

Methane has been cited as a cause, and those who have subsisted on a diet of beans while camping have long been advised not to stand with their backs to the fire. Even so, methane has never been shown to trigger the combustion of an entire person. Ammonia (detected in perspiration after a workout at the gym) has been proposed, though ammonia is not inflammable. Other writers have alleged that it results from ball lighting, luminescence, psychic energy, the Kirlian effect, telekinesis, malignant hyperthermia, bio-electricity, overactive mitochondria or poltergeists.

Most critics of SHC argue that ignition must come from somewhere — a stove, a cigarette, a fireplace — though to me this is prevarication. All ignition starts somewhere, true — but none of these factors matter next to the main problem: No matter how you try to set fire to a human, the body doesn't burn. Humans aren't inflammable. The mystery of SHC is not what initiates the burning, but what converts a watery specimen of non-combustible fat and flesh into a furnace. That is the core of the mystery, and it was this I set out to address.

THE ACETONE ANSWER

One factor has been overlooked by everyone. When the metabolism of cells is forced to change, new biochemical pathways emerge. When reviewing the victims of SHC, I discern a single factor that they might all have in common. Some (but not all) were alcoholics, some (but not all) were overweight, some (but not all) were old and enfeebled, some (but not all) smoked cigarettes — but they all seem to have been unwell. In many conditions, including alcoholism, blood glycogen levels become depleted. Cells can no longer rely upon conventional energy resources, and fat molecules are used instead as an energy source. Triacylglycerol lipids cleave to provide fatty acid chains and a glycerol molecule. The fatty acids are used as an alternative source of energy through beta-oxidation that gives rise to acetyl-CoA, which helps drive the Krebs cycle within the mitochondria. If the body's cells suffer starvation (which can occur during chronic illness and even during a workout at the gym) acetyl-CoA in the liver is translated into acetoacetate and this can decarboxylate into acetone.

Acetone is familiar as nail-polish remover and may seem to be an unusual compound to find in metabolic cycles, but it is always present in the body in small amounts, and it can be used as an energy source by living cells. The cells of the brain, for example, cannot access long-chain fatty acids as an energy source, but they can use ketone bodies (like acetone) instead. It is an essential emergency energy supply for the cells of the body. Acetone has other key properties: It is miscible with both water and lipids, and is, therefore, well placed to permeate throughout the tissues.

The odor of acetone can be detected on the breath. This poses an additional problem for today's youngsters, whose parents are regularly warned to be on the lookout for solvent abuse. The diagnostic signs, people are told, are a change of attitude and the scent of solvents on the breath. Many childhood ailments — from sore throats to erupting teeth — can lead to ketosis, and I sympathize with the thousands of teenagers whose parents have detected acetone on their breath and insisted that they had been sniffing solvents. They hadn't, of course — they were just unwell.

Acetone on the breath is natural. It isn't only present in the exhalations, for it lurks throughout the body. Acetone infuses layers of fat and collects in folds of clothing. All the while, acetone is highly inflammable. Static electricity, produced when removing garments made of synthetic fibers or when brushing one's hair, can discharge at 50,000 volts. Acetone vapor in

Initial experiments were with scale model skulls made from epoxy resin and covered with slivers of tissue as a model of a human head. A silicone mold was subsequently made for later experiments in which hollow plaster skulls could be cast. The tissue burned away rapidly from the conflagration beneath.

Subsequent experiments were recorded with a timer, obviating the need to use time code when calibrating the sequence of events. Within five minutes, much of the torso and upper extremities had been consumed with fire. As in the human cases in science literature, the lower extremities remained relatively unaffected.

air is liable to explode if exposed to a spark of this sort. Industrial bottles have a warning label to remind users to avoid any chance of a discharge of static electricity. Acetone will automatically ignite at 465 °C (alcohol at 362 °C). The flashpoint of alcohol is 13 °C, whereas acetone is at –17 °C. It seemed to me that acetone might offer an alternative theory for SHC. I published the proposal in *Laboratory News*, London, in their November 2011 edition (pp. 22–23), and the result was a resurgence of interest.

Although the principles were set out in my paper, there was no experimental science to substantiate the theory. Would fat absorb acetone? Does the combustion correspond to the recorded cases? We know that acetone can ignite at a concentration below 14%, and that it burns with a clear blue flame. The wick effect experiments showed combustion with a yellow, sometimes smoky, flame, but the cases of SHC involved blue flames, like those of burning acetone. In 1938, a 22-year-old woman, Phyllis Newcombe, burst into flames on a dance floor in Romford, England. The flames were described by numerous witnesses as blue.

Experimentation was clearly the next step. Decades ago we had in my laboratory human brains, hearts, eyes and kidneys, along with most of the organs of the human body (pancreas, ovary, testis and spleen) with several amputated limbs and a couple of skeletons. We could easily have reassembled a body. The organs were stored in 70% alcohol (with a few more in formaldehyde) so it would have been easy to submit samples to testing. Not any more; now one has to rely on substitute specimens, and so pig abdomen was chosen to model the system in humans. Portions of the specimens were cut to convenient shapes and have been left in contact with acetone to become infused.

TESTING THE THEORY

I have written about my theory without testing whether it works. All that I've done so far is to test a sample of tissue that had been soaked in ethanol for a week. It stubbornly failed to ignite, and therefore, this experiment disproves the "alcohol" theory. I have now taken time off to retrieve one of my specimens, a portion of porcine abdominal wall as thick as your finger and stored in acetone. It was secured in a makeshift "chair" cut from aluminum foil and a high-definition video camera was set to record. A small butane flame was held near the specimen. To my immense relief, it burst obligingly into flames. The predominately blue fire burned brightly and occasional flames jetted out laterally from the flesh. This was similar to the jets of flame that were seen spurting from the leg of Prof. Hamilton of Nashville University (though he quickly extinguished them and survived to tell the tale). And in the "Newsnight" program on BBC television in 1986, a victim of SHC was described by fire officer Jack Stacey as having blue flames jetting out from the skin "like a blowlamp." This is exactly what we observed with this first trial. The sight was exhilarating, yet macabre. The specimen burned for some four minutes, and then the flames died down. What remained in the aluminum cradle was a small, blackened mass of ash. Photographs were taken

during the combustion, which show how fierce was the fire. The experiment was a resounding success. Indeed, I am writing these words shortly after the experiment's conclusion and am filled with excitement.

Only after the experiment had ended was a further manifestation observed. The little chair was left standing in a liquid pool of melted body fat, which solidified into a solid yellow mass that glued the model chair to the base of the experimental stage. This, too, is consistent with the descriptions, which regularly reported liquid fat soaking the floor beneath the charred remains of the body. As police officer John Heymer wrote of a case in South Wales from 1980: "The charred portion of the rug and carpet were saturated in melted human fat." The report on Mary Reeser's death stated that melted human fat had similarly "saturated" the rug under her body. This was precisely mirrored in my first experiment.

What about the wick effect? We needed to observe it as melted fat soaked into fabric. I took two further portions; one was marinated in acetone, the other in ethanol. Each was enclosed in a cotton gauze sleeve that was tied at the top. The first we used was the acetone-soaked sample. As the flame contacted the vapor surrounding the sample, it immediately burst into fire. It burned fiercely. Jets of fire burst out laterally, and within minutes the specimen had been reduced to a small light parcel of black ash. Once again, the ethanol-soaked specimen would not light. In the end, I dripped some ethanol onto the gauze to guarantee that it would catch fire, but the result was the same. Although the flame burned for a moment or two, it soon went out. Even though this sample had been soaked in ethanol, so that the tissue contained a far higher proportion that could ever be experienced in life, it refused to combust. There was some slight searing down one edge where the liquid ethanol had burned, but the tissue itself would not catch fire. The point was proved: Tissues rich in alcohol will not burn, whereas those containing acetone become highly inflammable. Alcohol is not normally present in the body, whereas acetone is produced by our metabolism. When we're unwell, tired, dieting rigorously or exhausted, acetone levels can increase, and these experiments suggest that acetone is stored in the tissues.

This control specimen, exposed to acetone, immediately caught fire (another specimen infused with alcohol would not burn). The acetone flames were blue and the fierce combustion was accompanied by lateral jets of fire (extending to the left in this image). Both effects have been reported by witnesses on spontaneous human combustion. A small plug of black ash is all that remained.

A dummy made from porcine abdomen was cut to 1/12 scale and infused in a jar containing acetone. It was then clothed in appropriate garments and seated in a pinewood chair. It readily caught fire. The combustion phase lasted for half an hour, but much of the torso and upper extremities were consumed within five minutes.

FLAME-TEST DUMMY

What we needed next was a substitute body with clothing seated in a chair. For this experiment, I constructed a one-twelfth scale model human from tissue cut to shape. The samples were left to become infused with acetone for five days, and they were then assembled, clothed in garments made to scale and seated on a diminutive wooden chair. The scale-model person was installed on two large ceramic tiles 18-inches square, one upright to support the backdrop, another for the floor. The seated model was placed on a square of carpet in front of a room setting as a backdrop.

Once all was ready, a gas lighter was brought close. There was a burst of flame as the vapor caught fire. The whole body was enclosed in a fireball. The spec-

Within minutes, the scale dummy is enveloped in flames and shows charring. Breathing at this point would be impossible for a victim in this position; the lung membranes and much of the body would be seared. The vasovagal reflex, resulting from the severity of this profound physiological assault, would probably cause unconsciousness. If so, the true cause of death would correctly be described as presumptive vagal shock, not SHC.

This burned experimental model is a remarkably similar reconstruction of what witnesses have observed in real-life cases of SHC. Although the torso is completely burned, the legs remain unscathed. Oily smoke rises from the heated remains, and the wooden floor beneath the body is charred, but there is no other damage to nearby objects.

tacle was uncannily like the descriptions in scientific literature. At last, we had a clear demonstration of human combustion. After a minute, the chair burned through and the flaming model fell to the floor. The conflagration was fed by the pool of liquid fat that was forming on the carpet. Within five minutes, the model was mostly consumed and converted to blackened ash.

Sixteen minutes later there was the sound of a loud explosion. The ceramic tile beneath the carpet square shattered in the heat. There was only enough acetone in the sample to burn for a minute or two, but the intense heat from the burning pool of fat on the carpet continued to build up until the solid tile could not withstand it, and it snapped into pieces with a shattering sound like gunfire. The specimen continued to burn for an additional 40 minutes and was completely consumed by fire. Although the initial models were 1/12 scale, the duration of the combustion phase is not scalable — if the duration of an event lasts x minutes, a full-scale demonstration will not last 12 times as long. The timing obtained will be similar in a full-scale situation.

How did the fierce conflagration come about? It may be that acetone forms intermediate inflammable compounds in combination with lipid molecules. It would be helpful to quantify these experiments to determine what are the proportions of acetone found in the tissues of patients with ketosis. None of the previous demonstrations, on which our current knowledge is predicated, has raised questions like these. The BBC experiments were meaningless. Witnesses say the first trials were a complete failure, and even when some combustion of fat was eventually initiated, it was of a scale and intensity that clearly doesn't fit the facts. Among the factors they ignored was the presence of hemoglobin-borne oxygen in the tissues, and the fact that a combusting body starts at 37 °C, and not room temperature. I do not find my experiments to be conclusively detailed, but they are certainly far better than those on which all existing scientific knowledge has been based.

For the very first time we have a plausible model for spontaneous human combustion, which offers a natural metabolic explanation for this well-documented phenomenon. The model experiments match the descriptions of cases involving people. What are the practical implications? First — and this is important — do not accuse youngsters of solvent abuse, just because they have acetone on their breath. They are more likely to be unwell, or on a high-fat diet. Second, if you are suffering ketosis, it might be wise to avoid wearing synthetic fibers with the likelihood of static sparks. Is there a reasonable chance of dying from SHC? That can't be right — the reported episodes have been extremely rare so it is far too unusual to cause anyone serious concern.

On the other hand, if you're susceptible to ketosis, now might be the perfect time to give up smoking.