

On spontaneous combustion / by Alexander Ogston.

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BY

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FAMILIAR as we are with the minutest details of the structures forming the human body, we have still much to learn regarding their physical and chemical properties. In some important points, our knowledge of these properties amounts to almost nothing, so that many questions have to be left unanswered, and, indeed, will not be capable of being answered, until we shall have learnt more of them.

To take one or two of such still unanswered questions, in which observation has abundant space to assist the judgment, and in which experiment could not fail to solve the problem, we have still before us the unanswered inquiry as to whether the entrance and exit wounds of projectiles from small arms really show the marked differences so long described by every writer on surgery. On this subject observations have been numerous, but have also been contradictory; but, on the other hand, a few experiments, where the observer was in a position to modify the circumstances and eliminate sources of error, could not fail to determine whether the physical properties of the tissues, or the different forms and velocities of the projectiles, were the causes of the differences of opinions prevailing on this point.

Another point about which we are still in the dark is whether, apart from muscular action, dead bones are more difficult to fracture than those in a living subject? It has been stoutly maintained by some (Caspar) that a pistol bullet, capable of penetrating the skull of a living person, will, if projected with the same force and velocity, and under the same circumstances, barely indent the cranium of a dead body. In this, too, we obviously stand in need of increased knowledge of the physical properties of our tissues.

Nor are we on a better footing as regards the chemical properties of our frame. We are still ignorant of the extent to which fire is

capable of acting on the body, and of the possible differences of its action in different states of the system. To our want of knowledge in this respect, we owe it that the subject of spontaneous combustion and of increased combustibility of the human body, has excited so much discussion, and given rise to so many differences of opinion.

In many of the older writers, whose remarks were penned in the infancy of several of the sciences to which we now owe the great clearness and definiteness of our views of diseases and morbid states in general, there occur passages and details of cases leading to the question as to whether or not it is possible for the human body spontaneously to inflame, or, being once inflamed, spontaneously to continue to burn until the tissues are reduced to ashes.

As facts and observations accumulated, the subject began, in the latter half of the eighteenth century, to be worked into some shape by many continental writers, and their investigations were still further rendered prominent by the subject being repeatedly, and in cases of extraordinary interest, brought before the public and the profession in the law courts. Among these writers may be mentioned Lair, Vigne, Marc, Kopp, Lecat, and some twenty or thirty others, to whose researches we owe it, that numerous and minutely detailed reports of occurrences bearing on this question have been collected and rendered accessible. During this period, a general interest, not confined to the medical profession, was brought to bear on the subject, and the various periodicals, scientific and otherwise, teemed with cases, papers, and discussions, on so interesting a subject. This interest and these investigations were continued into the earlier years of the nineteenth century, at which time we find medical jurists and medical men of the greatest eminence engaged in working out the problem, and contributing to a better understanding of it. At this time, the belief in the possibility of such an occurrence was universal, with the exception of an unexpressed scepticism in the minds of the profession in England, with whom the notion of such a possibility has been at no time general or popular. And in the nineteenth century, the same belief in the facts advanced, and concurrence in the conclusions drawn, were the result of the scrutiny which the subject underwent in the hands of such men as Foderè, Orfila, Gordon Smith, Paris, Briand, Breschet, Devergie, Henke, Apjohn, and a host of others. Dupuytren, who also gave his attention to it, was, however, inclined to believe that there existed merely an increased combustibility of the tissues in certain cases, and not, as had been assumed, a capacity for occasional spontaneous ignition.

The new school of legal medicine, originated in Germany by Caspar, refused any belief to either of these views, and his opinions were confirmed by Liebig, who in 1850 published a pamphlet on the subject, setting forth, as had previously been mentioned by

Fontanelle, that portions of flesh soaked in alcohol will burn only so long as the alcohol burns in them, and asserting that the combustion of such a structure as the human body, containing 75 per cent. of water, is an absolute impossibility without the aid of a large amount of neighbouring combustible material. The works of the last-mentioned writers have given to the subject all the features it presents at present, and have stamped upon the minds of those who have, in recent years, adverted to the question, the tendency to incredulity observable in the treatises on legal medicine of Stillé, Guy, and Taylor. One fact, however, is rather remarkable, that none of those who totally disbelieve in the idea of spontaneous combustion, profess to have seen a single case analogous to those observed by its supporters.

There cannot be the least doubt that *the weight of authority is in favour of spontaneous ignition*, or, at least, of increased combustibility, two modes of viewing the subject, which have been generally combined under the title of spontaneous combustion, or *empresmus*. Of all the fifty-four writers on the subject whom I have been able to discover, the opinions of thirty-five of these are contained in the sources to which I have had access. Of these thirty-five writers, five are entirely sceptical, viz. Drs. Caldwell, Caspar, and Taylor, and the chemists Bischoff and Liebig; three believe in increased combustibility, viz. Dupuytren, Stillé, and Guy; while the remaining twenty-seven, including the illustrious names previously mentioned, believe in the spontaneous ignitability of the human body.

Many theories have been framed to account for such a supposed occurrence. The most prevalent has been that held by the earlier writers, and supported by Orfila, Foderé, Gordon Smith, Paris, Briand, &c. &c., that, under certain circumstances, the body is capable of generating under the skin, and in the connective tissue and cavities of the body, hydrogen or other gases similar to those formed in the intestines, and that the electrical condition of the body can sometimes ignite these gases. What these gases are has not been clearly stated; Gordon Smith being of the opinion that carburetted hydrogen was the chief compound, and others, such as Averardi and Apjohn, believing it to be phosphuretted hydrogen.

Another theory, advocated by Lair, Ritter, Kühn, and Mitchell, and based on the fact that most of the victims of this occurrence have been drunkards is, that alcohol was present in their blood to such an extent as to be combustible. Now Liebig and Bischoff say that alcohol cannot be present in the blood and tissues without coagulating their albumen. But this is not true; I myself have seen cases of death from alcoholic poisoning, or in people under the influence of alcohol, where the smell was strong in the blood, and sometimes so marked in the ventricles of the brain, that it was possible to ascertain the nature of the beverage used. Chemistry

too, has frequently detected alcohol in the blood, and in a case observed by my father, there existed so much alcohol in the body that the serum in the ventricles of the brain caught fire and burned on the approach of a lighted match. Marc and Scherf declare that the eructations and breath of drunkards are occasionally capable of taking fire, though this point seems rather doubtful. But even admitting the presence of large quantities of alcohol in the body does not make this theory tenable, as the experiments of Fontanelle, Liebig, and Bischoff on flesh soaked in alcohol sufficiently demonstrate.

An examination of all the literature of the subject accessible to me shows that there are recorded, in all, between fifty and sixty cases (fifty-seven is the exact number) bearing on the occurrence of *empresmus*, or spontaneous combustion in the human body. Some of these are of old date, from the middle and latter end of the seventeenth century, some are based on very questionable authority; but many are of recent date, and are undeniably correct and conscientious accounts of events which really happened. It seems profitable, in studying the subject, to divide the cases on which the theory of spontaneous combustion has been based into two classes. In the first class may be placed those manifestly false, or where the statements bear absurdity on their face, as well as those the truth of which may justly be suspected until fresh and better evidence shall have been collected to prove or disprove them. In the second class may be placed those whose accuracy cannot be denied; and it will be seen from this division that the deductions based on the authentic cases are very different from those which can be deduced where all the cases, true and doubtful, are admitted indiscriminately as evidence.

The first class, or spurious cases, forms only a small per-centage of the whole, but they are based on the most unreliable data, as a few quotations of them will show.

The first case I shall adduce is detailed in a Florentine journal of the date October, 1776, by Joseph Battaglia, a surgeon at Ponte Bosio, and is cited by most of the writers on spontaneous combustion. I quote Foderé's account, taken from the '*Journal de Médecine de Paris*,' September, 1786.

"Don Gio Maria Bertholi," says the surgeon Battaglia, "a priest residing at Monte Volere, in the district of Fivizzano, went, on the 25th September, 1776, to the market of Filetto, where he transacted some business. After having spent the whole day in travelling about the neighbouring country, he went in the evening to Fenille, and dismounted there at the house of one of his brothers-in-law. On arriving, he asked to be conducted to his room, and, when there, had a handkerchief put between his shoulders and shirt; he was then left alone, and betook himself to his breviary. After the lapse of a very few minutes, an extraordinary noise issued from Bertholi's

apartment, and this noise, in which the cries of the priest were audible, collected the inhabitants of the house, who, on their entrance, found Bertholi stretched on the floor, surrounded by a light flame which disappeared as they approached, and finally vanished. He was immediately carried to bed, and received every assistance that could be rendered him. On the following morning I was called, says Battaglia, and, having carefully examined the patient, I found that the skin of the right arm was almost entirely detached from the flesh and hanging, as was the skin of the forearm."

It is hard to say whether this means simple vesication or more. The account continues—

"On the space between the shoulders and the thighs the integuments were as severely injured as those of the right arm; there was, therefore, nothing for it but to proceed, conformably to the ordinary practice, to remove those shreds; and, perceiving a commencement of mortification in that part of the right hand which had been most injured, I hastened to scarify it, but, in spite of this precaution, I found it next day, as I had feared, in a state of total mortification. On my third visit all the other injured parts were equally sphacelated. The patient complained of burning thirst, and was agitated by horrible convulsions. He passed putrid bilious matters at stool, and was, besides, wearied by continual vomiting, along with much fever and delirium. Finally, on the fourth day, after two hours of comatose stupor, he expired, without showing, in all the course of this cruel illness, any sign or indication of symptomatic pain, or any other affection of that sort. At the last visit I paid him, and during which he was plunged in the lethargic sleep I have mentioned, I was astonished to observe that putrefaction had already made such progress that the patient's body exhaled an unbearable stench. I saw the worms which came from it crawl even out of the bed, and the nails detached themselves spontaneously from the left hand.

"Having carefully questioned the patient as to what had happened, he told me, assuring me of the truth of the facts, that he felt as it were a stroke of a club dealt him on his right arm, and that at the same time he saw a flash of fire seize on his shirt, which was instantly reduced to ashes without the wristbands being touched at all. The handkerchief which, on arriving, had been put on his shoulders between the shirt and the skin, was entirely uninjured and bore no traces of fire. The trousers were equally intact, but the cap was entirely consumed, without a single hair of the head being burnt. The night was calm, the atmosphere surrounding pure, no empyreumatic or bituminous smell was perceived in his room, neither smoke nor the smallest vestige of fire was observed; only the lamp, which had been full of oil, was dry, and the wick in a state of incineration."

In this case the man was not seen by the surgeon till the next morning, so the truth of the facts unobserved by him depends on the veracity of the patient himself, and of the witnesses who saw

merely the flame. It will not have escaped observation that there are many contradictory statements in the account. The priest himself stated that his shirt was instantly reduced to ashes, while his wristbands were untouched; and it is added that there was no smoke or smell, an assertion rather incredible when it is remembered that his shirt and cap, as well as the oil and wick of the lamp had just been consumed. That the man was injured by burning is beyond doubt, and it seems problematical as to whether lightning could explain the case; a more rational supposition is that he had spilt over himself a quantity of spirits, in which, perhaps, he had been in the habit of indulging; that he had caught fire at the lamp, and invented his story to conceal his evil practices. The state of his clothes observed by the witnesses is explicable if burning alcohol had been at work; and it will be observed that his person had been burnt where the garments had presumably been soaked with alcohol, and that his right, not his left, hand was affected. That some of the clothes were left unconsumed will astonish no one aware of the temperature at which alcohol boils, 173° Fahrenheit.

A second case, detailed by Blancard in his 'Collectio Medico-physica,' (Leipzig, 1690,) runs thus:—

"A brandy drinker died in Friesland of spontaneous combustion in July, 1681. He came home at night intoxicated, and lay down in bed insensible with his clothes on. In the night he cried out that he was burning, sprang out of bed, and threw himself on the floor resting against a wall. His wife quickly lighted a candle. He was in a dreadful state, his flesh as if torn from his body with hooks, his whole trunk covered with blisters, his head swelled and burnt black, his hair singed, his nose and ears black, shrunken, and as hard as horn. His clothes were very much burnt, and the tin buttons on them melted. Remarkable to state, at the places where his clothes were completely burnt the body was uninjured, and *vice versâ*. His thighs were burnt so deeply that the unfortunate man did not feel even the deepest incisions. One foot was burnt entirely to powder, and the penis was burnt as hard as horn and shrunk together. Death ensued five days later."—('Encyc. der. ges. Staatsarzneikunde,' p. 734).

This case might be ranked among the credible, instead of among the incredible narratives, were it not for the astounding and self-contradictory statements that he went to bed with his clothes on, that he was burnt on the head, *body everywhere*, thighs, and foot, and yet that he had escaped where covered with clothes; in other words, the parts not specially mentioned as being burnt are the arms and shins, and how a man could go to bed with his clothes on, and yet be clothed only in these parts, is difficult to conceive.

Scherf ('Kopps Jahrb. d. Staatsarzneikund Th.,' 4 and 6) mentions

a similar case where only the unclothed parts were burnt, but I have been unable to obtain details of it.

A fourth case is narrated in the 'Encyclopädie der gesammten Staatsarzneikunde,' page 733, thus :

"The example of a spontaneous combustion, though only partial, occurred in the village Leognan, eight miles from Bordeaux, on the 5th September, 1822, and was reported in the local French papers by a merchant of Bordeaux of the name of Leon. A smith, named Reynatau, belonging to Leognan, went on the above day on foot to Bordeaux. The day was very warm, the thermometer stood at 30° Reaumur, and the aspect of the sky seemed to presage a storm. In the afternoon he was returning, walking rather fast on an exposed road where the sun's burning rays beat on him. The smith's dress consisted of new cloth ; he carried no inflammable substance (*sic*), such as oil of vitriol or aquafortis, on his person ; he had eaten only a moderate dinner, being of temperate habits, never abusing spirituous drinks, forty years of age, of strong bodily frame and choleric temperament. When he had arrived at within a mile of his house, at four in the afternoon, it seemed to him, as he was turning his body, as if he received a blow on the right thigh ; and he observed on the index finger of the right hand, which hung down on that thigh, a bluish flame, which communicated itself to the middle finger. He immediately put his fingers on his trousers to extinguish the flame, but only communicated the flame to them. Reynatau then threw himself on the ground, buried as quickly as possible his fingers in the sand, and put sand into his trousers' pocket, which the flame had now reached. The fingers of the left hand then caught fire. In this state he went home, and dipped his fingers repeatedly in cold water, but without extinguishing the blue lambent flames, though this was finally accomplished by excluding the air. Fully two months elapsed before the inflammation and suppuration which came on in the fingers were cured. The burning was confined exactly to the point phalanges of the fingers."

This case, on the authority of the smith Reynatau, we are, I think, entitled to disbelieve.

A similar very remarkable case is said to have had its consequences observed in the Hamburg General Hospital, and is narrated in Hecker's 'Literarische Annalen der gesammten Heilkunde,' 2nd volume :

"A young girl, 17 years of age, of delicate frame but healthy aspect, who had menstruated scantily and with difficulty, but quite regularly since her thirteenth year, had suffered for a considerable time from giddiness and headaches, on account of which she had to renounce her occupation of servant, and lived by sewing. She had undergone the usual diseases of childhood easily and without bad consequences. On the 21st January, 1825, as she was busy sewing in the evening, she suddenly felt an unusual rapidly increasing heat

in the whole body; and in the index finger of the left hand, as she was removing wax from the window, a violent sensation of burning. At the same instant the finger was surrounded by a blue flame, an inch to an inch and a half long, which emitted a peculiar sulphurous odour. Neither water nor a wet towel wrapped round the finger extinguished the flame, and, as she repeatedly dipped the finger in water, the whole hand appeared to burn. The girl now hurried home, wrapping, in the mean time, her hand in her apron. The apron and her clothes took fire, but the flame was visible only in the dark. At home she applied milk continually all night long, after which the flame disappeared, but left a painful sensation of burning in the hand, with a frequently emitted sulphurous odour. After venesection and some medicines she improved, but retained still a painful sensation of burning in the left forearm, with occasional sulphurous odour. She was received into the Hamburg General Infirmary on the 25th February"—more than a month later.—"The palm of the hand was at this time studded with blisters; there was a larger one visible on the middle finger; and on the following days a new blister had developed itself on the point of the ring finger, after a renewed sensation of burning. The course of the blisters was rather slower than usual. There were present at the commencement, in addition, some gastric symptoms, and the patient *shrunk frequently together*" (this, I suppose, means rigors or syncope; but it is immaterial). "The thermometer indicated a higher temperature of the left than of the right hand; on the 27th February the left hand was at 25°, the right hand, on the contrary, only 17° (88° and 70°, Fahrenheit). The best electrometers were unaffected when the patient sat on an insulated chair. The disease lasted till towards the end of March, gradually diminishing, and was then finally cured" ('Encyc. d. g. S.,' p. 738).

Even Devergie, a believer in spontaneous combustion, was staggered by and disbelieved this case, which is attested by no medical man. It is certainly fair to doubt whether the young lady, the subject of such unpleasant experiences, had not attached an imaginary history to her blistered fingers.

A few other such cases are on record, but none deserving more attention or belief than those I have quoted; and certainly there seems to be no reason for seeking to found a theory of spontaneous combustion on such worthless data.

Before passing on to the next set of cases, it may be as well to remark that cases of the above class are those on which alone the doctrine of *spontaneous ignitability* rests; those to follow, whose veracity cannot be impeached, speak merely for *increased combustibility*.

The second class of cases, too truthful in their narratives to be disbelieved, and attested by so many competent observers, presents a character differing much from the fables cited above. In the first class, many of the patients recovered; in the second class, to which

I would now direct attention, the subjects all died; and not only so, but were all *found dead*—their bodies, their clothes, and the articles in their neighbourhood, being partially or entirely destroyed by fire, the only remarkable thing about them being that the bodies were burnt and charred out of all proportion to the destruction of the neighbouring objects, and to an extent which seems incapable of being accounted for by the heat of the burning clothes and objects in the vicinity. For illustration, the following specimens of cases of the second class may be cited:

“On the 22nd February, 1821, Dr. Tolson and the surgeon Lelarge, of Beauvais, were ordered by the local magistracy to go to the house of a certain man of the name of Vatin, whose corpse had been found greatly destroyed, and to ascertain the cause of his death. ‘We arrived there,’ says Dr. Tolson, ‘at nine o’clock in the morning, shortly after the occurrence, and received from the neighbours the following account:—Vatin, formerly a beer-brewer, and over sixty years of age, had lived for a considerable time in a very retired and inactive manner, had been in the habit of indulging in spirituous liquors, and had, on the left side of his head, a malignant sore, which often gave rise to hæmorrhages, and was, perhaps, one of the causes of his having already, some time previously, attempted suicide by burning charcoal, and having thereafter spoken to various persons of his intention to repeat the attempt. In other respects his constitution appeared good. He was a tall and very fat man. He spent the evening before his death with a neighbour, and went home at eleven o’clock. A woman who lived in his house certified that he put out his light about midnight, and went to bed. In the morning, towards eight o’clock, a thick smoke forced itself out of the openings of his chamber. The neighbours became suspicious, forced the locked door, and saw his corpse lying on the floor, burning with a flame which it took a good deal of water to extinguish. On our arrival the room was full of thick smoke, which, as well as the corpse, had a disagreeable empyreumatic odour. We found the body lying on the floor, several steps removed from the bed. A chair, the straw and part of the woodwork of which were burnt, lay upturned in the same direction as the body, near a vessel for coal, in which was a small quantity of half-burnt fuel. The water which had been poured out in the apartment contained a good deal of fat. The head of the corpse was still attached to the neck, the flesh of which, behind and laterally, was destroyed to the bone. The cervical vertebræ were unaltered. The face was puffed up and blackish-red, as in death by suffocation. On the left side the upper extremity and the wall of the chest were destroyed, and only calcined portions of the ribs and arm remained. The back parts of the ribs and the right shoulder and arm were present; but the hand, which from the bend of the forearm lay on the region of the stomach, was destroyed along with a part of the forearm. The spine was preserved as far as the lateral processes of the left side of the vertebræ. Of the contents of the

chest and belly we found only the lungs, heart, and liver, dried and shrunk, but still preserving their usual form; their substance was bloodless. No trace remained of the other entrails. The lumbar vertebræ were much injured, but were still attached to the pelvis, of which, however, only the right os innominatum preserved its texture. The left thigh was completely destroyed, the leg was separated at the knee-joint, and showed there only marks of an ordinary combustion. The right thigh was burnt, but the bones preserved their continuity, in spite of the destruction of the muscles. We found nothing else in the room that had caught fire, except the coals, which the deceased had purchased on the previous evening. This extensive destruction of a body in so short a time, and with substances so little combustible, hardly admits of any other explanation than that Vatin was first suffocated, and his body, which must have been unusually combustible, had come in falling into contact with the embers, and so was destroyed" (ibid., p. 735).

Second case (from B. Wilmer's cases and remarks in surgery, London):

"A woman was excessively addicted to brandy drinking. Her bed stood about three feet from the fireplace. One morning she was found burnt to ashes. Between the bed and the fireplace lay her remains—the feet, a thigh, and some bones. The furniture of the room was very little injured by fire. It was supposed that she had fallen out of bed at night, and that her chemise and unusually combustible body had been ignited by a candle which stood in the fireplace" (ibid., p. 736).

Dr. Proteau, in the 'Salzburger Med. Chirurg. Zeitung,' 1815, Bd. I, p. 284, details the following case:

"An extraordinarily fat woman, twenty-nine years of age, and much given to spirituous drinks, so as often to consume a bottle and a half of brandy a day, fell a victim to spontaneous combustion; and Dr. Proteau concludes, from the circumstance of the case, that the combustion took place from within outwards, that the clothes were not ignited till near the end, and that there was no external cause for the occurrence" (ibid., p. 736).

Dr. Proteau's conclusions are, however, rather rash, but do not invalidate the case.

"On the 12th of January, 1820, at 10 o'clock in the evening, the neighbours of a Madame P—, in Nevers, remarked a peculiar disagreeable odour, as of burnt animal substances and burnt wool; but as no smoke or steam was observed issuing from any of the adjoining houses, they retired quietly to rest, with the idea that the smell originated in the remains of some burnt rags from a Carmelite nun who had died that day in the vicinity. On the morning of the 13th, a neighbour who had a key of the house, because she was in the habit of coming in the mornings to help the servant maid, opened

the house door to do her usual duties. As she entered the room, she was surrounded by a thick smoke with such an unbearable smell that she thought she would be suffocated. She ran out immediately, crying pitifully for help, whereupon the neighbours gathered round the house, and, after they had got the thick smoke dissipated, searched the whole apartment. They saw neither Madame P— nor her servant, and at first no traces of even their corpses, they found only the bed burnt. The different parts of the bed, however, had preserved their form, but were changed into ashes, and fell in pieces at the first touch; bedstead, mattress, feather bed, sheets, coverlet, and curtains (which last two were of wool), and the top of the bed."

It may be remarked in passing that this account of the neighbours seems somewhat exaggerated.

"Before removing the ashes, the fireplace was searched, but no trace of burning wood or coals found in it; the fire had not been covered up, and had probably gone out from want of wood. One candlestick stood in the chimney, another on the floor in the middle of the room; there was no candle in either, though it was supposed that there had been one in the latter, and that it had been burnt along with the bed. On afterwards searching among the ashes, at the front of the place where the bed had stood, they found the lower part of a leg with a stocking on it and a shoe on the foot; it was recognised to be the right leg of the servant, and was the only part of her not reduced to ashes. The brain-pan of her mistress, half burnt, with neither hair nor skin, was found at the place where her head usually lay. Besides this, a small part of the neck remained; the neck was wrapped round with a red cloth, and portions of this cloth still adhered to the fragment of the skin. The servant's bed stood near that of her mistress, but was uninjured, as were the chairs, table, and remaining furniture, with the single exception of a wooden wall clock fixed to the wall near the bed, and which had preserved its shape, but fell into ashes on being touched. The room was not plastered, but yet the boards and beams close to the roof of the bed were not burnt, but black and giving out a burning heat. Everything in the room, especially near the bed, was very moist, probably from the condensation of the thick vapour which had filled the chamber. Nobody lived in the house but those two women, so the cause of the occurrence is unknown. During the night the weather had been calm, the air dry, and the frost so sharp that the thermometer stood ten degrees below freezing point (*i. e.* 14° Fahr.). The woman was ninety years old, the servant seventy; they were both weak, thin and wiry, and lived poorly, though the mistress had 6000 francs of income. The woman drank eau de Cologne to great excess, and the servant indulged in wine" (*ibid.*, p. 736).

The details of this case, it will be seen, are not confirmed by medical testimony, and are, no doubt, highly polished.

Dr. Hellis, of Rouen, gives, in the '*Journal Générale de Médecine*' for April, 1826, the following case:—

"On the 31st December, 1820, Dr. Hellis was required to examine into the cause of death of a woman who had been that morning found dead in her room. For that purpose he betook himself, along with the Commissary of Police, to No. 85, Rue des Arpens, where the woman had lived in an attic on the fourth floor, which entered from the court-yard. As soon as the door was opened Dr. Hellis was met by a strong empyreumatic odour, a thick smoke filled the room, and on the floor lay the corpse of a woman in the following condition:—She was lying on her belly, her face towards the floor, and only the legs, thighs, and a part of the buttocks and head recognisable. The breast, belly, and back, had vanished, their place being marked by only a few calcined vertebræ. The left hip lay on a block, which served to support a pulley. This block, as well as the hip, were still burning, although a good deal of water had been poured upon them before the arrival of Dr. Hellis. When Dr. Hellis had pushed away the hip from this block he observed the face, which was uninjured, and covered with a yellowish, fatty, and stinking deposit; the hairs which were removed from the head were entire, as was the cloth which had held them together and secured the head. The back part of the head and neck were converted into charcoal. The upper parts of the shoulder-blades and the space between them were covered with flesh, but the lower half of these parts was calcined and crumbled on the slightest touch. On the front could be seen the collar-bones, some remains of the first and second ribs, and a few pieces of charred matter where the lungs had been. The skin, muscles, and bones, which formed the rest of the trunk, were completely destroyed. There were no traces of the stomach, liver, or bowels, visible. The pelvis was partly destroyed, and contained only a calcined, shapeless mass. The loins, legs, and feet, were uninjured; the clothes were destroyed, only the coverings of the head, the stockings, and shoes remaining. The spectacles of the deceased lay on the above-mentioned block, and their case at a little distance off. None of the furniture of the room was injured. A screen before the fire-place, a cupboard, a bundle of twigs, and a chair at a little distance from the body, showed no trace of the action of fire. There was no fire in the fireplace. Near the hearth stood three vessels for coal, containing no burnt fuel. A candle on the table was found extinguished, but almost entire. Dr. Hellis learnt from the narratives of the neighbours that the deceased Thomasine Goret was fifty-seven years old, and had long been given to brandy-drinking. Her husband had separated from her on this account, but for twelve years had paid her four francs weekly, which she used forthwith to spend in a drinking-shop, and used not to leave the shop till she had lost her senses. On the 30th December she had got her usual donation, but went out to drink on credit, as she wished to reserve the money to do honour to the new year. She was heard to say that the cold had troubled her so much the previous night that

she was resolved not to go to bed that night, and, to protect herself still better from the inclement weather, she went home at ten o'clock excessively drunk. Nobody was astonished when, towards midnight, she was heard to move and throw herself about. Shortly after the neighbours heard a crackling, as if butter were being roasted. As the sound became louder, and continued some time, they conceived that fire had broken out in the house. Somebody rose, but immediately lay down again, as no particular light was visible. At seven in the morning a neighbour, wishing to borrow something from Goret, opened her door, but was met by a smoke so dense that she could distinguish nothing. She called for assistance, and water was immediately brought, and sprinkled through the room. As soon as objects became visible, to the astonishment of all none of the furniture of the room was found burning, but the unfortunate Goret was lying blazing on the floor. Dr. Hellis says he could not venture to decide whether this combustion arose spontaneously or from contact with a burning body. The woman was very fat, and of sedentary habits" (*ibid.*, p. 737).

To these few cases selected from many I would add a case which occurred in the present year in my own experience. On the 14th March, 1869, my father and I were requested to examine the remains of Mrs. Warrack or Ross, aged 66, who resided alone in a house near the Bridge of Dee, Aberdeen. She was said to have been stout, of intemperate habits, and her son stated that he had left her, at 10 a.m. on the 14th, in her usual health. She was found at 11 a.m. on the same day lying burnt on the lower steps of the stair of her house on her left side. The house was pervaded with a disagreeable smell, but liker that of burning straw than of burning animal matter. The room which she usually inhabited, the door of which was within two yards of the place where she lay, had the same smell; the chair in which she sat stood in the middle of the room, its back almost entirely consumed, and its arms wholly so. The seat of the chair showed mere traces of the action of fire. The bed, about two feet from her chair, had its straw mattress slightly burnt at its fore part. The woodwork of the bed and the curtains were uninjured. Her chair was about four feet from the fireplace, and about two feet from an uninjured mahogany table, on which stood an empty beer bottle smelling of whiskey. Nothing else in the room was touched by fire. The stairs were of wood, and underneath, and in the immediate vicinity of where she lay, they were charred to the depth of a quarter of an inch. The perpendicular bars of the hand rails similarly charred beside her for a foot up, the top rail and the wall, which was half a foot from the hand rail, blackened by smoke. The condition of the body, however, showed that the fire had caused the greatest alterations in it. The hair was burnt off, the soft parts of the face and front of the head burnt off, the bones exposed, blackened, and calcined. The back of the head,

the neck, and the trunk everywhere, converted into greasy charcoal to the depth of about an inch, the skin totally removed, and the bones of the trunk lying bare, blackened, and calcined. The front wall of the abdomen totally destroyed and wanting; the intestines burned into a hard and blackened mass; the liver converted into ashes to the depth of an inch, but retaining its shape, its left lobe projecting nine inches from the margins of the ribs. The upper limbs distorted; the elbows strongly flexed, and everywhere charred to a great depth, the bones, however, even of the fingers, preserving their position. The right thigh had its deeper muscles still uncharred, but of the appearance of roasted beef, and very dry; the skin and superficial muscles totally burnt away. The right leg only partially attached to the thigh, and entirely converted into a greasy, black charred mass, even the bones not escaping. At the lower part of this right leg the bones had the soft parts entirely burnt away from them, and were black and calcined. The right foot totally detached from the leg, and converted into a soft, black, greasy, and shapeless cinder, through which the finger could be pushed with ease. The left thigh and leg in a condition similar to that of the right extremity, but still attached to the foot, which was a charred and shrivelled mass similar to the right foot. Not a vestige of clothing remained anywhere.

This second class may profitably be concluded by the following case by Devergie, which is, however, one of perfectly different import from those which precede it. In it a dying man is supposed to have been burnt by the heat of a dunghill.

“ Charles Francois Francoy, aged 40, commissionaire, Rue de Faubourg Saint Antoine, was brought to the Morgue on Saturday, 20th August, 1831. He was a drunkard, and had, on the previous evening, for a bet, drunk a certain quantity of brandy. Becoming deeply intoxicated, he was thrown on a heap of dung, where he remained long without a sign of life. The face and eyes had the appearance of a man in drink; lips and eyes half open, limbs flaccid. No trace of violence on the exterior, and no sign of putrefaction. The legs and inner surfaces of the legs of a violet hue. Skin of the legs mottled violet and reddish-brown. The epidermis removed over the whole posterior surface of the lower limbs, and over the greater part of the buttocks and back. At all those parts the skin had acquired the inflamed and injected reddish-brown colour of a burn of the second degree. Course of saphenous veins marked on the insides of the legs. By atmospheric contact the denuded parts were dry and horny, like parchment. At a few parts of the legs and thighs, epidermis was still present, and could there be stripped off with the utmost ease, leaving the subjacent dermis and rete mucosum very red and injected. The garments, consisting of shirt, vest, and linen trousers, were unaltered, and the whole anterior surface of the body was intact. At the autopsy, three days after death, putrefaction

had invaded the face, neck, and shoulders, which were green, the veins there being filled with blood, and their tracks marked by green branching lines. Pectoral muscles and neck distended with gas; thighs also emphysematous, the gas existing chiefly in the muscles, deep connective tissue, and round the vessels. Lower part of the abdomen greenish."

The further details of the autopsy show excessive decomposition; and the gas, developed everywhere in the tissues, burnt when punctures were made ('Méd. Lég.,' vol. 2, p. 296).

This case I have cited for the sake of completeness, but believe it to be nothing more than early decomposition, hastened at the back parts of the body by the warm dung. If space permitted I might adduce analogous cases from simple decomposition.

On reviewing the two sets of cases, and the inferences fairly deducible from each, it becomes evident, as before mentioned, that while the *first class*, or untrue cases, *has given rise to the theory of spontaneous ignitability*, the *second class* of narratives countenances no such doctrine, and *speaks merely for increased combustibility on accidental ignition*. The possibility of, or mode of origin of, spontaneous ignition, need not be discussed here, since there is not, in any one of the trustworthy cases, the slightest call upon us to assume its existence, and it would be fruitless to discuss a phenomenon of the occurrence of which we have no evidence.

But that increased combustibility exists cannot be denied, though at first sight it is not so clear to what it owes its existence. The question has given rise, as has been already seen, to numerous hypotheses, all of which, with one exception, are manifestly untenable, and it is owing to the wildness and illogicality of these hypotheses and deductions surrounding the subject, that the whole question has come to be treated as a half-forgotten fable.

Most writers on spontaneous combustion have remarked that those who have fallen victims to it have been usually old women, and generally, though not invariably, fat people; and Dupuytren was led, in the '*Lancette Française*' for February 1830, No. 97, to say in regard to this subject, that he had, in frequently burning portions of bodies, found no difficulty in consuming them, especially the fat parts. "I do not know," he adds, "a single example of spontaneous combustion in a lean and dry individual: all were, without exception, extremely fat." After speaking of the way the victims among his countrymen become stupefied by drink and the carbonic fumes from their warming pans, he continues, "When the fire gains the clothes it burns the skin, which cracks and allows the fat to run out; part of this flows down on the floor, the rest serves to support the combustion, and with free access of air everything is burnt. This is how alcohol is the occasional cause of the combustion; it is in stupefying and rendering the patient insensible that it

acts, and not by the pretended amalgamation with our tissues." Devergie and others ridicule this explanation, which the clear intelligence of Dupuytren had suggested, and remark that while the flame of fat is white, the flame in cases of spontaneous combustion is blue (a property which belongs, we have seen, to the fabulous cases), while Beck, in a foot note to his 'Medical Jurisprudence,' disposes of his views with the words, "Without derogating from his acknowledged talents, I will only add that Dupuytren was a better surgeon and anatomist than a chemist."

Dupuytren is not absolutely accurate in all he says in the above quotations. He gives alcohol the position of a mere stupefying agent, whereas it deserves to be borne in mind that the prolonged indulgence in spirituous drinks is capable of producing an excessive deposition of fat in the body (Virchow, Huss). But in the doctrine that bodies owe their increased combustibility to excess of fat, Dupuytren has advanced the only explanation capable of setting the subject at rest, and on a true basis explaining rationally and philosophically the cases of so-called spontaneous combustion. That a body burning in a sheet of oil flame is capable in a high degree of incineration in a brief period of time, is proved by the accident at Abergele in August, 1868, where, some railway cars being surrounded by ignited petroleum, thirty-one persons perished, and their bodies were found destroyed in various degrees, the destruction being on the whole similar in extent and degree to that observed in the recorded cases of the so-called spontaneous combustion. The flame by which these bodies were burnt was of only a few hours' duration.

When we consider the amount of fat some bodies contain, the subject grows even clearer, and a review of the cases demonstrates that the incineration was always most extensive in the skin and subcutaneous adipose tissue and other places where fat is abundant, and least marked in organs and regions with less fat. The fatty degeneration of various organs and structures, the intermuscular and subcutaneous adipose tissue, along with the masses deposited in other parts of the body, so great as sometimes to constitute a layer under the skin two to three inches thick, and in the omentum another layer one to two inches thick, all present a body of oleaginous matter sufficient amply to account for the combustion, and which, once ignited, would tend rather to burn *in situ* than to flow out, thus explaining the greater destruction of the corpse than of objects in the vicinity.

As might be expected from the varying amount of fat in different individuals, the result, in the recorded examples of spontaneous combustion, varies according to the amount of combustible matter—clothing and fat—present; but, by considering each case by itself,

and excluding the tendency to assume some marvellous agency to have been at work, if we do not explain everything to our entire satisfaction, we arrive, at least, at a juster estimate of the nature of the process than has, except by Dupuytren, hitherto been attempted.

It is hardly necessary, in conclusion, to advert to the possible differences in the origin of the fire, and the influence these would have on the result. In some of the cases the clothing may have been of a more combustible character, and more abundant than in others, and may have been chiefly of vegetable character, such as cotton or linen; while in some instances there lies very close at hand the supposition that the victims may have, in their intoxicated state, emptied over themselves their alcoholic drinks, or may even have contrived to cover themselves with some oily and more fiercely burning substance.

NOTE.—In the discussion following the reading of this paper at the Aberdeen Medico-Chirurgical Society, in July, 1869, the following facts were mentioned by Dr. Robert Beveridge, lately Pathologist and now Physician to the Aberdeen Royal Infirmary, whose permission to reproduce them I here gratefully acknowledge.

In a number of experiments as to the combustibility of human tissues, Dr. Beveridge has had occasion to observe:

1st. That, while simple heat or exposure to a red flameless heat occasions but a slow charring and destruction of any tissue, the exposure, on the contrary, to the action of flame, gives rise to a much more rapid process of destruction.

2nd. That, in portions of flesh removed from the human body, if a surface containing no fat, such as the section of a muscle, be exposed to the heat, the charring which results is a slow and very gradual process, while if the cutaneous surface be placed next the flame, the cutis is speedily destroyed and charred, and cracking permits the liquefaction and flowing out of the subcutaneous fat, which, taking fire, envelopes the whole mass in a flame so strong as speedily to reduce it to the condition of a black greasy substance resembling cinder.

3rd. That soaking in alcohol makes no difference as to the result, neither accelerating nor retarding it. When a portion of tissue saturated with alcohol was exposed to heat, it showed at first the bluish flame of alcohol, which speedily passed away without affecting the tissue, the combustion of the latter then proceeding as if no alcohol had been present.

Dr. Beveridge had independently come to the same conclusions as Dupuytren as to the mode of action in the cases of so-called spontaneous combustion, and is of the opinion that in the reported narratives of this phenomenon, the body possessed in no case any

preternatural combustibility, beyond what the amount of fat existing in it gave rise to; so that, while admitting the result to differ in different cases, owing to the above-mentioned cause, there is no reason to believe that any other preternaturally combustible state exists; and that in the occurrence of such cases in habitual drunkards so often referred to, the presence of intoxication acted only in increasing materially the liability to accident, and in depriving the victim of any power of assisting himself or of giving an alarm.