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ON THE

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with the Author's Compl.*

PRESUMPTION OF SURVIVORSHIP.

BY

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ART. I.

ON THE PRESUMPTION OF SURVIVORSHIP.¹

By JAMES BELL PETTIGREW, M.D. Edin.

SYNOPSIS.

The phrase "presumption of survivorship" considered in its nature and bearings.—The laws framed for the regulation of questions of survivorship traced and commented upon.—The scarcity of said laws, particularly in Britain.—The demand which exists for a carefully drawn-up code, as proved by the uncertainty of the issue of cases of survivorship.—Outline of a new code of laws for settling the more obscure forms of survivorship.—Questions of survivorship resolvable into such as pertain to individuals lost by common accident, and where mother and child die during parturition.—The weight to be attached to the testimony of medical and other witnesses in questions of survivorship in the present state of science.—The fallaciousness in numerous instances of such testimony, and the demand which arises for direct proof or positive law.—The value of physical and other signs in determining questions of survivorship.—The chances of survivorship in death by parturition, by wounds, by suffocation, by starvation, by cold, by sun-stroke, by lightning, and by burning.—Recapitulation.

Introductory Remarks—the phrase "Presumption of Survivorship" considered.

IN treating of the many obscure medico-legal points involved in questions of survivorship, an arrangement differing widely from that adopted in the occasional chapters dedicated to this subject in works on forensic medicine, has been resorted to; partly with a view to classifying and arranging existing knowledge, and partly for the purpose of opening up new sources of information.

Although the question of survivorship is admitted on all hands to be one of extreme importance, there is unfortunately, from the unavoidable absence of competent witnesses during the last moments of those concerning whom it is raised, more or less difficulty always experienced in its solution. Indeed this want of positive or direct evidence in determining which of two or more related by birth or

¹ The subjoined paper obtained the Medical Jurisprudence Gold Medal in the University of Edinburgh in the summer of 1860.

otherwise, perished first, is fully embodied in the phrase "presumption of survivorship," as generally received; for the word presumption, which is derived from two Latin words—*prae* (before), and *sumo* (to take up)—means, in its literal acceptation, supposition as opposed to what admits of demonstration—in other words, it implies a judging before, or hastily, or when the premises are of such a nature as not fully to warrant the conclusion. The term "presumption," moreover, as used by the lawyer and medical jurist, admits of various shades of meaning, and may be construed to signify "possible," "barely possible," "probable," or "very probable;" and indeed, as far as this is concerned, much will depend on the plausibility and scientific acumen of the person by whom the term is employed.

This adaptability, if one may so express it, of the word presumption in the phrase "presumption of survivorship," seriously interferes with the dispensation of justice, it usually happening that not more deference is paid to the merits of the case, than to the ability and zeal of the counsel;¹ a circumstance, which while it opens up a wide field for the honourable exhibition of various kinds of learning, leaves, it is to be feared, a broad margin for the successful display of mere ingenuity. The laxity of the materials with which the medical jurist has to do in questions of survivorship, has, it is to be regretted, hitherto forbidden our having any very positive law on the subject—a want alike perplexing to the legal adviser, and the client whose claims it is his duty to advance. As, however, the determination of such cases may be a matter of great moment to surviving relatives, who may win or lose a position and fortune thereby, it merits the serious consideration of legislators. The difficulty to be experienced in framing a law or laws which shall so nicely meet the emergencies of every case as to be equally binding on all, will be readily admitted; but that British law would receive a most important accession in the adoption of certain Continental tenets which long use has sanctioned, if not approved, is equally certain.

If proof were wanting of this assertion, it is to be found in the feuds of surviving relatives and the uncertainty of the issue of cases of survivorship in the best hands.²

*The Laws framed for the Regulation of Questions of Survivorship
traced and commented upon.*

The ancient Romans, with their usual forethought, had a just conception of the necessity of positive law, in questions of survivorship; and in order that their sagacity may be contrasted with our own improvidence in this matter, and because their civil code formed the basis for all succeeding codes, it will be necessary briefly to advert to it before proceeding to enumerate the laws of more modern nations. "According to the civil law, for example,³ which generally regulates

¹ See the admirable and plausible reasoning of Fearne in his 'Arguments in the Case of the Representatives of General Stanwix,' in which he pleads with great ability on both sides of the same question. (Fearne's Posthumous Works. London, 1797.)

² Vide cases of General Stanwix, Colonel James, and others, as given in Philip's Reports, Fearne's Posthumous Works, &c.

³ Domat. C. L., pp. 652, 653.

the administration of personalty, it is held that when parent, whether father¹ or mother,² and child perish together, as in shipwreck, if the child be of the age of puberty he shall be presumed to have survived; but on the contrary, that he died first if he were under that age, regard being also had to the relation of the party who is to benefit by the decision. It may, however, happen in several ways³ that the mother may perish under the ruins of a building sooner than the child whom she suckles; it may happen that a son may be killed in battle before his father; and on the same occasion, and likewise in all others, it may so fall out that they both die at the same instant,⁴ or that even he who by reason of his age or some other infirmity might be presumed to die first does nevertheless die the last;—all which probabilities clearly demonstrate the necessity for ascertaining and fixing upon such law or laws as shall fairly meet the majority of cases: arbitrary to a certain extent they necessarily will be, but time and the experience which time begets would naturally tend to strengthen and consolidate a system founded on liberal and comprehensive principles.

The spirit of the Roman law, says Beck,⁵ guided the decisions of the Continental tribunals for many ages; and Zacchias,⁶ in his elaborate discussions on this question, cites cases from several jurisconsults which were settled according to the dicta of the civil code. The ancient French law took for the most part after the Roman; i.e., it supposed the husband as surviving the wife, the son the father, if he had arrived at the age of maturity, and the reverse if he was still a minor: it was consequently open to the same objections as the civil. It, however, made a curious provision in cases where testator and legatee perished together, adjudicating the property in such instances to the heirs of the testator himself; inasmuch as, according to it, a man must have heirs, though not necessarily legatees.⁷

With a view to remedying the felt defects of previous enactments, the present French law as set forth in the "Code Napoléon" was framed. It runs as follows, and although by no means perfect, is greatly to be preferred to anything yet existing:—

"I. If several persons, naturally heirs of each other, perish by the same event, without the possibility of knowing which died first, the presumption of survivorship shall be determined by the circumstances of the case, and in default thereof by strength of age and of sex.

"II. If those who perish together were under fifteen years, the oldest shall be presumed the survivor.

"III. If they were above sixty years, the youngest shall be presumed the survivor.

¹ Cum bello pater filio perisset, materque filii quasi postea mortui bona vindicaret, agnati vero patris, quasi filius ante perisset, Divus Hadrianus credidit patrem prius mortuum. Dig., Lib. 34, T. 5, 5, 9, S. 1, de Rebus dubiis.

² Cum pubere filio mater naufragio periit; cum explorari non possit, uter prior extinctus sit, humanus est credere filius diutius vixisse; l. c. lex 22.

³ Domat. p. 651.

⁴ See improbability of this occurrence as argued by Fearne in his Posthumous Works, p. 42.

⁵ Beck's Elements of Med. Jur., London, 1825, p. 211.

⁶ Zacchias, vol. i. pp. 440, 441.

⁷ Foderè, vol. ii. p. 221.

“IV. If some were under fifteen and others above sixty, the former shall be presumed the survivors.

“V. If those who had perished together had completed the age of fifteen, and were under sixty, the male shall be presumed the survivor where ages are equal, or where the difference does not exceed one year.

“VI. If they were of the same sex, that presumption shall be admitted which opens up the succession in the order of nature; of course the younger shall be considered to have survived the elder.”¹

In Section I. of the foregoing Code it will be observed that such cases as can be determined by collateral or circumstantial evidence, are left to turn upon their own merits; while those which cannot be so determined are to be settled according to strength of age and of sex, the conditions of which are explained in Sections II., III., IV., V., and VI. Thus, in Sections II. and III., by a process of exclusion, provision is made for all those who perish under the age of fifteen and above sixty—a wise arrangement, when age becomes the concomitant of much tenderness, and includes alike the infant at the breast and the old man in his dotage. The fourth section—viz., that which adjudges the survivorship to those under fifteen, when they and persons above sixty perish together—is not so happy; for, as was justly pointed out by Foderè,² it makes no distinction between the endurance of infants of one, two, and three years, and men of sixty-one, sixty-two, and sixty-three, whose age and experience would certainly entitle them to live the longest. Section V., which regulates the chances of survivorship in the male and female between the ages of fifteen and sixty, appears to me likewise faulty; for it does not state which is to be adjudged survivor when the difference greatly exceeds one year—the probability being that a robust female of twenty or twenty-four would survive a delicate male of fifty-nine.

On the whole, the Code Napoléon is a very admirable one; and the frequency with which it has been quoted by other nations in their decisions in questions of survivorship, proves at once its importance and the high esteem in which it has all along been held. Paris³ suggests that in disposing of questions of survivorship, where no direct evidence is forthcoming, the order of nature should be followed; and “that it should be presumed the child survived the parent, the nephew the uncle, descendants ascendants, legatees testators, and generally that the younger had outlived the elder.” But that something more definite is requisite will be evident from the following circumstance. If the order of nature were followed in all cases, then the sister or daughter of two years, might be regarded as surviving the brother of twenty, or the father of forty years, which is a manifest absurdity.

Scarcity of Positive Law in Cases of Survivorship, particularly in Britain.

Although, as far as I am aware, there is no separate code of laws in

¹ Code Napoléon, Titre 1^{er} des Successions, chap. i. § 6, p. 270, &c.

² Foderè, vol. ii. pp. 223 to 226.

³ Med. Jur., by J. A. Paris, M.D., &c. London, 1823, p. 392.

Britain for settling the actual question of survivorship, many provisions have been made which immediately come into operation when that is determined. Thus, in 'Blackstone's Commentaries,' it is stated: "If a man be seized in fee of lands and tenements, *though but for a moment*, his wife is entitled to dower;² therefore, if both father and son perish by a common accident, and the son survive—*however short the period*—his wife shall have dower, for the lands descended *the instant the father died.*" A curious illustration, cited by Paris,³ occurred in the case of *Broughton v. Randall.*⁴ On this occasion father and son, being joint-tenants, were hung in the same cart. The son struggled the longest,⁵ in consequence of which he became seized of an estate in fee by survivorship, and his widow had a verdict granted for her dower accordingly. The same provision extends also to partners and others where the interest of the deceased lapses to the survivor. In such cases, the heirs of the survivor become entitled at his death. So also of testator and legatee. When the latter dies first, it is a lapsed legacy, and falls into the residue; when, however, the legatee survives, his executors claim.⁶ According to the law of England, a man marrying a woman possessed of freehold property, if it be not specially settled by marriage articles, has no claim upon it after the death of his wife, unless he has a child by her capable of inheriting the estate,⁷ born during the life of the mother, and which has survived for a longer or shorter period. If, however, a child be so born, the husband retains the property during his life as tenant by courtesy.⁸

An example of the application of this law is to be found in the case of *Fish v. Palmer*, tried in the Court of Exchequer at Westminster Hall in 1806, in which, although the child was nominally still-born, the jury, in virtue of some tremulous motion of the lips—a very precarious sign of life certainly⁹—returned a verdict in favour of the

² Bl. Com. 132.

³ Vide Park on Dower.

⁴ Med. Jur., by J. A. Paris, M.D., &c., and J. S. Fonblanque, Esq., Barrister-at-law. London, 1823, p. 390.

⁵ Cro. Eliz., 502.

⁶ In *Noy*, 64, it is stated the father moved his feet after the death of the son.

⁷ Vide *Mason v. Mason* (Merivale's Chancery Reports, vol. i. p. 308), and *Taylor v. Deplock* (Philip's Chancery Reports, vol. ii. p. 281).

⁸ i.e., a male, if entailed.

⁹ Tenant by the curtesie of England is where a man taketh a wife seized in fee simple or fee taile general, or seized as heir in taile especial, and hath issue by the same wife, male or female, born alive (oyes ou vife), albeit the issue after dieth or liveth, yet if the wife dies the husband shall hold the land during his life by the law of England, and he is called tenant by the curtesie of England, because this is used in no other realme but in England only (this law prevails also in Scotland and Ireland, Co. Litt. 30); and some have said that he shall not be tenant by the curtesie unless the childe which he hath by his wife be heard crie (Coke says if it be born alive it is sufficient, though it be not heard to cry, for peradventure it may be born dumb), for by the crie it proved that the child was born alive. Har. Coke Litt., p. 29, chap. 4, sect. 25). Blackstone (vol. ii. p. 127) says that, although the crying of the infant is the *strongest* evidence of its being born alive, it is not the *only* evidence; and Fitzherbert was of the same opinion. Vide case in *Dyer's Reports*, p. 25; and *Paine's* in 8th *Coke's Reports*, p. 207.

⁹ Dr. Denman, Foderè, and others very properly object to twitching as a sign of vitality, it being in numerous instances a mere result of muscular contractility. As a case in point, see that of *Mattia Bracci*, in *Zacchias*, Capuron, &c. It may, how-

plaintiff.¹ The vagueness of this law, and the consequent temptation to *evade it altogether*, was ludicrously shown by a person of the name of Bowes,² who caused the bells of the town to be rung at the birth of a still-born child as if for a son and heir. Fortunately for the ends of justice, he was not able to substantiate the imposture. In Scotland the law bearing upon survivorship is more exact, for Lord Stair in his 'Institutes' lays it down that "the children of the marriage must attain that maturity as *to be heard to cry or weep*;" and adds that "the law hath well fixed the maturity of the children by the *crying or weeping*, and hath not left it to the conjecture of witnesses whether the child was ripe or not." A case of this kind, entitled *Dobie v. Richardson*, was tried in the Court of Session in 1765. In this instance the child breathed, raised one eyelid, and showed other symptoms of life for half an hour. As, however, the child *was not heard to cry*, and the mother died within a year and a day after the marriage, it was decided the husband was not entitled.³ It may be as well to mention here that the Roman law regarding the maturity of the child was equally strict, and that according to it, it was necessary for the child, in order to inherit, to be perfectly alive, "*si vivus perfectè natus est.*"⁴ Zacchias says, "*Non nasci, et natum mori, paria sunt.*" Dagobert ordained that in France the infant *should live an hour, and be able to see the four walls and ceiling of the chamber*. This edict was revoked by Louis IX., who held it sufficient *if the child cried*.⁵ The present French law⁶ directs that in order to succeed the *infant must be born alive*.⁷ And in order to receive by testament, it is sufficient to have been conceived at the time of the death of the testator; but neither donation nor testament can have effect unless the child *be born alive*. A more intricate, and not less important question, and one which has considerably perplexed foreign jurists,⁸ is, whether a child which has been delivered by the Cæsarean section may inherit. According to the law of England a child so born does not entitle its father to be tenant by courtesy.⁹

ever, happen that a child pronounced still-born may not really be so (see Manual of Jurisprudence, by Michael Ryan, M.D., &c. London, 1837, p. 156).

¹ For fuller account of this case, see p. 184 of this paper.

² Vide Jesse Foot's Life of Mr. Bowes.

³ See a note on the 25th of Dyer's Reports, by the editor, John Vaillant, A.M., &c.

⁴ Codex de posthumis.

⁵ Capuron, p. 198.

⁶ Civil Code, Articles 725 and 906.

⁷ By being born alive, according to the best authorities, is meant complete and perfect respiration. Vide Capuron, p. 199.

⁸ Illud autem valde controversam est inter jurisconsultos, an is qui editus est ex ecto matris ventre reputetur partus naturalis et legitimus et successionis capax. (Caranza, de Partu Naturali et Legitimo, p. 427.)

⁹ "The issue must be born during the life of the mother; for if the mother dies in labour, and the Cæsarean operation is performed, the husband in this case shall not be tenant by the curtesy; because at the instant of the mother's death he was clearly not entitled as having no issue born, but the land descended to the child while he was yet in his mother's womb; and the estate being once so vested, shall not afterwards be taken from him" (Blackstone, vol. ii. p. 127). Further, "if a woman seized of lands in fee taketh husband, and by him is bigge with childe, and in her travell dieth, and the childe is ripped out of her body alive, yet shall he not be tenant by the curtesie, because the childe was not borne during the marriage, nor in the life of the wife; but in the meantime her land descended, and in pleading he must allege

According, however, to the Court of Sancta Rosa at Rome,¹ and in a recent case in France (1780), children so delivered were recognised as viable,² and consequently entitled to the benefits accruing from survivorship. The only remaining question to which it is necessary to allude in this place is that which pertains to monstrosity, for monsters also may survive their parents. The English law on this subject is thus stated:³ "A monster which hath not the shape of mankind, but in any part evidently bears the resemblance of the brute creation, hath no inheritable blood, and cannot be heir to any land, albeit it be brought forth in marriage; but although it hath deformity in any part of its body, yet if it hath human shape it may be an heir."⁴ Here again, although the meaning of the law is very obvious, the want of precision in the wording, renders it liable to misinterpretation; for the question immediately arises, what is a monster? This of course is a primary difficulty, and would require to be settled before the laws regulating the descent of property could come into play.

The Demand which exists in Britain for Positive Law in Cases of Survivorship as proved by the uncertainty of their Issue.

Having briefly enumerated the laws bearing upon questions of survivorship in various countries, and having shown the paucity and vagueness of British law, it will be necessary to consider, by way of illustration, a few of the more celebrated cases of survivorship, a perusal of such cases alone conveying an adequate conception of the question as it now stands, and a knowledge of them being essential to the framing of new laws for their regulation. On taking a comprehensive view of the cases of survivorship scattered throughout the judicial reports of this and other countries, they are found to resolve themselves into two principal forms, viz., *such as pertain to individuals lost by common accident*, as shipwreck, conflagration, the falling of tenements, &c., *and those which relate to mother and child when they die during parturition.*

As an example of the first, the case of General Stanwix may be cited. In 1772 this gentleman, in company with his wife and daughter, set sail from Ireland for England. The vessel in which they sailed was wrecked, and all on board perished. On behalf of a nephew who would

that he had issue during the marriage (Co. Litt., 29). In illustration, see Paine's case, 8th Coke's Reports.

¹ Foderè, vol. ii. p. 163.

² See opinion of Pelletan on a case of this kind, vol. i. pp. 322 to 341.

³ If the wife be delivered of a monster which hath not the shape of mankind, this is no issue in the law; but although the issue hath some deformity in any part of his body, yet if he hath human shape this sufficeth. "Hi qui contra formam humani generis converso more procreantur (ut si mulier monstrosam vel prodigiosam fuerit enixa) inter liberos non computentur. Partus tamen cui natura aliquantulum ampliaverit vel diminuerit non tamen superabundanter, ut si sex digitos vel nisi quatuor habuerit, bene debet inter liberos commemorari. Si inutilia natura reddidit membra, ut si curvus fuerit aut gibbosus vel membra tortuosa habuerit, non tamen est partus monstrosus. Hermaphrodita tam masculo quam fœminæ comparatur secundum prevalescentiam sexus incalescentis" (Co. Litt., p. 29).

⁴ Blackstone, vol. ii. p. 246.

have become entitled if the survivorship of the General could have been proved, it was argued that the General, as a man of courage and accustomed to danger, in all probability outlived his wife and daughter—a circumstance rendered the more likely from the probability of his being on deck when the vessel foundered, while his wife and daughter, with characteristic timidity, would be in the cabin, and consequently liable to perish first. On behalf of the representative of the daughter (a maternal uncle) it was argued that as she was young, and consequently unwilling to part with life, while the General was old, and therefore ill prepared to battle with the storm, the chances of survivorship were greatly in favour of the daughter. The representative of the wife lodged a separate claim; and the Court finding the arguments equally solid and ingenious on all sides, advised a compromise, which was agreed to.¹ This case, which seems to have set at nought every principle of judicial decision, affords a remarkable example of the equilibrium which may obtain between dissimilar probabilities. The rougher sex, age (and consequent debility) of the General, contrasted with the gentler sex, youth (and consequent hardihood) of the daughter, and the one negated the other. It therefore seems to be a case requiring the interference of positive law, and illustrates very forcibly the objection stated to Section V. of the Code Napoléon. This section, it will be remembered, makes provision for individuals of different sexes who perish between the ages of fifteen and sixty, when the ages are equal, or where the difference does not exceed one year; but leaves the question wholly undetermined when the period greatly exceeds a year. A case resembling the foregoing in many respects is that of Job Taylor, quarter-master sergeant in the Royal Artillery. Taylor, it appears, had been in Portugal on foreign service, and was returning to England with his wife Lucy Taylor, whom he had appointed by his will as his sole executrix and sole residuary legatee. The vessel in which they sailed struck on a reef in Falmouth harbour, and upwards of two hundred, among whom was Taylor and his spouse, perished. Taylor died possessed of property to the amount of 4000*l.* A bill in Chancery was filed by the next of kin of the wife against those of the husband, but no personal representative of the latter appearing, the case for a time was at a stand. Shortly after the contending parties mutually applied for a limited administration, which being refused by the Court on the plea that it could not be given where a general one might be obtained if applied for, it became a question ultimately whether the general administration should be granted to the relatives of the husband as dying intestate, *his wife not having survived* so as to become entitled under his will, or the representatives of his wife as his residuary legatee, *she having survived* so as to become entitled under that character. From evidence adduced it appeared that a short time prior to the vessel going to pieces, Lucy Taylor was in the cabin while the husband was on deck, that being resolved if possible to save his wife, Taylor had offered large sums to such as

¹ Vide Fearn's Posthumous Works, p. 37, where elaborate and skilful arguments are advanced on either side.

would descend to the cabin and rescue her from the impending danger, but that, finding no response, he resolutely descended himself, and so perished. The bodies of the husband and wife were found close together. But as it further appeared in evidence that Lucy was of a robust constitution, and accustomed to endure much fatigue in the management of the officers mess, while her husband was sickly and latterly much affected with asthma, the question of survivorship became one rather difficult of determination. On the part of the husband's relatives it was contended that the case should be decided according to the Roman law, which supposes *the father and mother as surviving their offspring*, if they are still minors, *the husband the wife*, and so on; and that such a decision would be in accordance with established precedent and the known fact that the wife was in the cabin when the accident happened, and probably perished before the husband reached her. On the part of the representatives of the wife it was urged that the wife, being the stronger of the two, the order of nature was in this particular instance reversed; and both having perished by a common calamity, that she consequently was entitled to the doubt. Sir John Nicholl, who sat on the case, drew a distinction between residuary legatees and heirs-at-law, and showed that the representatives of the wife not being residuary legatees themselves, were consequently one step further from the property; the rule in such cases being that the presumption of law was in favour of the heir-at-law with regard to freehold, *and equally so of the next of kin with regard to personal property*, the Statute of Distributions disposing of an intestate's property among his next relatives solely on the presumption that such was his intention, unless the contrary should be expressed. The representatives of the daughter, on whom the burden of the proof rested, being unable to convince the Court of the survivorship of the wife, the administration was accordingly granted to the husband's next of kin.¹ This case forms a curious illustration of the old French law already quoted (p. 175), which declares that while a man must have heirs, he need not necessarily have legatees; and that on such occasions, where the testator and legatee perish together without the possibility of knowing which survived, the effects of the former should always pass to his next of kin. This case is illustrative in another respect as showing the necessity for defining by positive law the conditions of age, sex, and strength, and the great weight which may be attached to collateral evidence when any purpose is to be served by it. The representatives of the wife commended her robust constitution and admitted hardihood, and deprecated the chances of the sickly and asthmatic husband; while the representatives of the husband, on the other hand, laid particular emphasis on the fact of his being on deck when the accident happened, and on his being a man of arms, inured to danger, and not likely to forget himself in such a crisis. Independently, however, of special pleading, considerable importance must be attached to the position of individuals in a common calamity; and if Taylor had remained on deck instead of going below to the rescue of

¹ Taylor and others v. Deplock.

his wife, the chances of survivorship would have been greatly in his favour. In cases of shipwreck, e.g., when the vessel goes aground on a sandy coast, and the wife, daughter, or mother is found in the cabin, and consequently submerged, while the husband, son, or father is found lashed to the mast above water, the probability is that the latter died gradually from fatigue and exposure, while the former met an instantaneous death. A case in point occurred within my own knowledge. Two boys were drowned by falling into an old shaft in their attempts to gather brambles at its edge. The elder of the two was known to be an expert swimmer, and when the bodies were discovered that of the elder was found placed above that of the younger. In addition, the arms and legs of the elder boy were found discoloured and lacerated, which discolorations and lacerations were no doubt produced in his attempts to prolong existence. Another instance, in which there would have been little difficulty in determining the survivor, occurred in the west of Scotland within the last few years. A band of boys, seven in number, were amusing themselves on their return from school by sliding on a pond adjoining the road. The ice gave way, and all perished. The sad event told its own tale, for on the disappearance of the boys a search was instituted, and a slight fall of snow being on the ground, enabled the searchers to trace the footsteps of the boys from the school to the margin of the pond. Arrived there, a recently-formed slide was discovered which extended from the margin for some distance into the pond, and at the end of it was a large irregular opening in the ice. The satchels and other incumbrances of the boys were found strewn around, and pointed significantly to the yawning chasm in question. Further search only tended to confirm the worst fears of the searchers, for the bodies of the spirited but unfortunate boys were found piled the one above the other in the calm but treacherous waters. A case of a similar nature occurred at Dunbar within the last three years. An English family had gone to the coast for the purpose of sea-bathing. One of the daughters while enjoying that luxury went beyond her depth, and her sister seeing her sinking and hearing her shrieks, rushed to her assistance. They were both immediately in the same sad dilemma. The father and brother, who were walking on the beach and saw the accident, instantly rushed to the spot. The brother instinctively hastened to the rescue of his sisters, but being unable to keep himself afloat, it was evident that all three were fast perishing. The tragedy craved yet another victim, for the father, unable in his despair to profit by the sad warnings he was receiving, also plunged to the fatal rescue. Here, then, there was a sequence in the order of death; and if a question of survivorship had arisen, little difficulty would have been experienced in determining it. Of a like nature in the order of events was the melancholy accident which occurred in the Theatre Royal of Glasgow in 1849. In this calamity sixty-two perished, and in this wise. An alarm of fire was raised, and, as usual in such cases, all rushed to the door. The door was unfortunately closed, and as the long narrow passage leading thereto was literally choked with panic-stricken individuals eager to avoid an imaginary

danger, suffocation and pressure soon began their deadly work. The alarm was discovered to be false, and as the manager saw no reason for abruptly terminating the performance, the acting was resumed. At length, however, the appalling fact of the fatal passage became known; and on the outside door being forced, it was found that those next to it—i.e., those who had suffered most from back and therefore accumulated pressure, and who consequently experienced the suffocating effects most intensely—were for the most part dead; while the deaths became fewer and fewer in proportion as the passage was cleared and as the interior of the theatre was reached; thus proving that the presumption of survivorship was in favour of those farthest away from the door.

Somewhat similar in results are cases of accidental death from choke-damp, of which I have known many in the mining districts of Lanarkshire, Scotland. Those who perish first are invariably those farthest removed from the air-passages—and who consequently are nearest the point of concentration. But I need not multiply examples; suffice it to say that there is a certain class of cases in which the position of the body would go far to establish the claim of survivorship, and in which (for the circumstances are reversible) if the said position was in favour of the mother, the daughter, or the wife, instead of the father, the son, and the husband, the order of nature might fairly be considered as reversed, and the benefits resulting from survivorship awarded to the former.

A notable example of this state of things occurred in France in the seventeenth century. A mother (Dobie) and her two children, the one aged eight years and the other twenty-two months, were murdered secretly in the night. The husband claimed the property of his wife on the ground that *the children had survived the parent*. The parliament adjudged it to him on the plea that the murderers would naturally first destroy the person from whom most resistance was to be expected, which of course would be the mother.¹

A strictly analogous case, related by the celebrated advocate Ricard, occurred about the same time. "In 1658 a father and son fell in the famous battle of Dunes. On that same day, and at the very hour the battle commenced, the daughter and sister took the veil, whereby she became *dead in the law*" (here the order of nature was reversed in virtue of taking the vow). The question arose, which of the three survived? It was determined according to the principle of the Roman law, and the doubt was given in favour of the son, who had arrived at maturity, and for this reason. The daughter died in an instant, her vow being voluntary; while the father and son, in all probability, struggled for some time on account of their wounds, in which struggle the son, in virtue of his youth and strength, most likely prevailed.

For further information on these and analogous points, see several cases related by Zacchias in his '*Consilia*;' the case of Colonel James and his wife, as given by Paris;² the case of the merchant, his wife and

¹ *Causes Célèbres*, quoted by Foderè, vol. ii. p. 218.

² *Medical Jurisprudence*, by J. A. Paris, M.D. &c., and J. S. M. Fonblanque, Esq. London, 1823, vol. i. p. 389.

daughter, quoted by Beck from Foderè;¹ and the case of *Mason v. Mason*, in Merivale's Chancery Reports.²

Of the second class of cases—viz., such as involve the death of mother and child during delivery—are the following:

In the seventeenth century the imperial chamber of Wetzlar was consulted concerning a mother and child who had died during labour several years previously. No evidence was forthcoming, and they decided for physical reasons that the child had survived the mother; but as the *causæ physicae* are unfortunately not given, we are left in ignorance as to their real nature. They were, probably, however, as suggested by a commentator on the case³—1, that the mother was exhausted by the labour, and sank; and 2, that the child died after her for lack of nourishment. The justice of the foregoing decision has been questioned by several medical jurists,⁴ for, say they, the child may and is likely to have died first from various causes; such, for example, as protracted labour, labour complicated with convulsions, child unusually large or before its time, pressure on the umbilical cord, partial detachment of the placenta inducing fatal hæmorrhage, &c. &c., all of which are by no means uncommon; while the chances against the mother are comparatively few. Indeed, in the case in question only two have been suggested—viz., when the mother is being delivered of twins, and dies after the birth of the first, and before the birth of the second; and when she is labouring under an acute disease. Another very similar case is related by Beck,⁵ on the authority of the Hon. De Witt Clinton. The case was tried in the American courts, and involved the succession to a large landed estate. The mother and child both died during delivery. If the latter was found to have survived, the father was heir; if the former, the relatives. On the trial it was proved that the child was born alive, and the question of the priority of death was then decided against the parties claiming as heirs of the mother. In this case, of course, the *presumption* of survivorship was set aside *by the proof* of the child's being born alive.

A very good example of disputed survivorship of mother and child is that of *Fish v. Palmer* alluded to in p. 177. This case occurred in 1806, and was tried in the Court of Exchequer, Westminster Hall. Fish had a still-born child by his wife, and at her death resigned the estate to his wife's brother-in-law. Some circumstances afterwards occurred to induce him to bring this action, and to attempt to prove that the child was not born dead. Dr. Lyon (deceased at the time of trial) had declared an hour before the birth that the child was alive; and having directed a warm bath to be prepared, gave the child when born to be immersed in the warm water. It did not cry, or move, or show any symptoms of life; but while in the water (according

¹ Foderè, vol. ii. pp. 220, 316.

² Merivale's Chancery Reports, vol. i. p. 308.

³ Valentini's Pandects, vol. i. pp. 3, 11.

⁴ See remarks thereon by Capuron (*La Médecine relative à l'Art des Accouchements*, à Paris, 1821, p. 135); Belloc (*Médecine Légale*); and Suc (*Journal de la Société de Médecine de Paris*, tome viii.).

⁵ *Elements of Med. Jur.*, by T. R. Beck, M.D. London, 1825.

to the testimony of two women) there twice appeared a twitching and tremulous motion of the lips. Upon informing Dr. Lyon of this, he directed them to blow into its throat, but it never exhibited any other sign of life. Drs. Babington and Haughton agreed that the muscular motion of the lips could not have happened if the vital principle had been quite extinct, and that, therefore, the child was alive. Dr. Denman, on the contrary, gave it as his opinion that the child was not alive. He drew a distinction between uterine and extra-uterine life, and thought that the remains of the former might have produced the twitching of the lips. The jury found that the child was born alive, but according to Foderè, who quotes the case, the twitching was no evidence of vitality.¹

The Weight to be attached to the Testimony of Medical and other Witnesses in Questions of Survivorship, in the Present State of Science.

Such are a few of the more characteristic cases of the two principal forms of survivorship; and it only remains briefly to consider those physiological and pathological laws which, when taken in conjunction with the physical signs naturally resulting from their operation, are, in the absence of direct proof, the only ones left to the medical and scientific world for the elucidation of truth and the triumph of right over wrong. On these laws and their concomitant signs, however, as will be pointed out, no very great reliance can as yet be placed; for such are the discrepancies in the opinions of authors equally familiar with their principles, that it often becomes a question who is to be believed. Those discrepancies arise from the difficulty of rightly interpreting nature in her various phases, and will no doubt gradually disappear as science advances, but in the meantime, as far as mere opinion goes, it will be well to receive the statements of professional and other witnesses with a certain degree of caution. While, however, implicit reliance cannot be placed in scientific evidence in obscure points, little reasoning would be required to show, that as a whole, even in its most incoherent forms, it is greatly to be preferred to that furnished by mere ingenuity.

The Value of Physical and other Signs in determining Questions of Survivorship.

On making a hasty analysis of the physiological and pathological laws adverted to, they will be found to resolve themselves into—

1. *Such as regulate life in its various forms; and*
2. *Such as regulate death in its principal varieties.*

Under the first will naturally be considered the conditions of body depending upon age and sex; while under the second will be included the various kinds of death by which two or more may perish within a short period of each other, and the means to be taken in ascertaining

¹ Principles of For. Med., by J. G. Smith, M.D., London, 1821, p. 384.

who first succumbed to the destroying element. With regard to age, it may be and has been variously estimated. Aristotle, e.g., divided life into three portions—viz., the period of *growth*, the period during which the body remains *stationary*, and that of *decline*; while Varro divided it into five, and Solon into ten. Hippocrates and the greater number of the ancients adopted a septenary division, and this division has been almost universally adhered to in modern times. Thus *the period of growth is made to include*—Infancy (Infantia), Second Infancy or Boyhood (Pueritia), and Adolescence (Adolescentia); *the period during which the body undergoes little change*—Youth (Juventus) and Manhood (Ætas virilis); *and the period of decline*—Old Age and Decrepitude. Infancy, as commonly estimated, extends from the first to the seventh year; Second Infancy, or Boyhood, from the seventh to the fourteenth year; Adolescence, from the fourteenth to the seventeenth or eighteenth year; Youth, from the seventeenth or eighteenth year to the twenty-first, or, more properly, the twenty-fifth; Manhood, from the time the powers corporeal and mental are fully matured until old age and decrepitude supervene. As the epochs which comprise the sum total of existence insensibly glide into each other, it has appeared to me that in framing rules for the regulation of questions of survivorship, we shall gain precision by reducing them to the lowest possible number—i.e., by fixing on such periods only, as are characterized by obvious and well-marked mental and bodily changes. With this object in view, I have, on reflection, divided life into four great eras. The first, *embracing Infancy and Childhood*, and extending from the first to the fourteenth year, a period characterized by great bodily development; the second, *comprising Adolescence and Youth*, and extending from the fourteenth to the twenty-fifth year, at which latter period the body may be considered as having attained its full stature;¹ the third, *including Manhood*, and extending from the twenty-fifth to the fifty-fifth, or, it may be in some instances to the sixtieth year, which era may be said to be the term of man's greatest mental and bodily activity; and the fourth or last era, comprehending *Old age and Decrepitude*, when the body may be considered as gradually giving way. The latter period, I may remark, forms the converse of Infancy and Childhood, when the body rapidly develops.

Outline of a New Code of Laws for deciding Questions of Survivorship where Males and Females perish by themselves.

A. As far as infancy and childhood are concerned, the elder may fairly be presumed the survivor whatever the mode of death, and for the following reasons: the strength and power of endurance will be greater, while the instinct which prompts to the preservation of life will be more fully developed.

B. From the fourteenth to the twenty-fifth year the same rule will apply, as the activity of the elder will equal that of the younger, while

¹ Quetelet thinks this does not happen till the twenty-seventh year.

reason will combine with instinct in making attempts at self-preservation more effectual.

C. In manhood—that is, from the twenty-fifth to the fifty-fifth or sixtieth year—the presumption of survivorship ought to be reversed—in other words, it should be in favour of the younger, as possessing as much strength and greater activity in preserving life, while the love for it will not be less.

D. When the individuals perishing are above sixty, the same rule seems to be equally applicable, and for the like reasons.

E. When, however, those who perish are above sixty and under fourteen, the presumption of survivorship ought to be in favour of the aged up till the sixty-seventh year, after which it should be in favour of the young—i.e., the old male or female of sixty-one, sixty-three, sixty-five, and sixty-seven, will in all probability outlive the young male or female of one, three, five, and seven respectively; while the child of eight, ten, twelve, and fourteen, will most likely survive the adult of sixty-eight, seventy, seventy-two, and seventy-four. The first clause of this provision proceeds on the assumption that the endurance of the very aged and very young being about equal, the presumption of survivorship will be in favour of the former on account of experience; while the second clause takes for granted that the child of eight has more vital energy than the adult of sixty-eight, and therefore most likely to survive—a circumstance favoured, moreover, by the order of nature.

Outline of a New Code of Laws for Regulating Questions of Survivorship where Males and Females perish together.

A. When children under fourteen of different sexes, and of the same age, perish together, the female ought to be considered the survivor, as being up till this period the more apt; but when the difference exceeds two years, the elder should be considered the survivor, whatever the sex.

B. When adults above sixty, of different sexes, perish together, the male should be considered the survivor, as retaining his bodily powers longer, while his intellect decays more slowly.

C. When the persons are above fourteen and under sixty, and of different sexes, the male appears to be entitled to the survivorship when the difference does not exceed ten years, both on account of his superior strength and greater familiarity with the external world.

D. When the difference exceeds ten years, the female, under certain circumstances, may be considered the survivor. (See case of General Stanwix, &c., p. 179.)

The foregoing rules, although strictly arbitrary, are, it may be remarked, founded on periods or intervals of time which in the human body produce well-marked physiological differences as regards the power of endurance, strength of intellect, and other qualities. They do not, however, lay any pretension to completeness beyond what is attainable by arbitrary rules in general; and I may state in apology, that they

have been drawn up rather with a view to show what might be done in this direction, than from the most distant prospect or hope of my succeeding in such an undertaking.

The great difficulty of framing rules for the regulation of unexpected and sudden emergencies has been already adverted to, but this circumstance seems to make a virtue of necessity, and to invite us to settle by positive law what otherwise must apparently remain undetermined. Beck,¹ when speaking of this, says "that no one will doubt the propriety, and indeed the necessity, of positive law in questions of survivorship;" and Guy² expresses a similar belief in the words: "That an enactment extending to that large class of cases in which the circumstances of the death are but imperfectly known, and those in which it is, from the very nature of things, impossible to come to a correct decision, is certainly much to be desired." In order that the difficulty and the necessity of framing laws may appear in their full importance, it is only requisite to consider the multiplicity of deaths for which they are called upon to provide, and the dissimilarity of opinions regarding the duration of life in different individuals perishing by a common calamity. This branch of our subject will be most successfully treated under the following heads—viz., Death by Parturition, by Wounds, by Suffocation, by Starvation, by Cold, by Heat, by Lightning, and by Burning. And first:

Death by Parturition.—This form of death has been already so fully treated in the foregoing pages that the annexed extract from Mr. Guy's³ admirable work will suffice:

"In the case of mother and child both dying in childbed, *the presumption is that the mother survived*; for there is a *prima facie* probability of a still birth, and a still greater probability that a woman perishing in childbed will not be able to render to her child the assistance necessary for its preservation.

"It is probable, therefore, *that the death of the child would precede that of the mother.* A large child would be still more likely to perish first. If there is an opportunity of examining the body, the presumption may be still further strengthened by the external marks of a difficult labour, or the absence of the signs of respiration."

Death by Wounds.—Under this head would naturally be recorded lesions of all kinds; but as they are infinite in variety, the consideration of them must be left to those intrusted with the examination of the case, as the probability of survivorship can only be determined by their nature and extent.

Death by Suffocation.—The term "suffocation" is a very general one, and may include smothering, hanging, drowning, noxious inhalation, fatal intoxication, and a great proportion of poisoning. It is used when death supervenes from impeded respiration; as, in smothering occasioned by the fall of embankments and buildings, in drowning resulting from boat accidents and shipwrecks, in asphyxia caused by the fatal inhalation of noxious vapours, such as arise from burning

¹ Elements of Med. Jur., by T. R. Beck, M.D., &c. London, 1825, p. 218.

² Principles of For. Med., by W. A. Guy, M.B., &c. London, 1844, p. 311.

³ Principles of For. Med., by W. A. Guy, M.B., &c., p. 309.

charcoal, lime, fermenting liquors, putrescent sewers, and places where there is little or no interchange of fresh air, as old wells long closed, vaults, cellars, caverns, and the like.

Death by Smothering.—When several individuals perish by smothering, and the question of survivorship is raised, a variety of circumstances ought to be taken into account—as the respective ages of the deceased, their sex, mode of life, strength; but, above all, the position of the bodies when found, and the marks of external violence thereon. Death by smothering, which is caused by the forcible closing of the mouth and nose in whatever way, while not uncommon, is one in which it is exceedingly difficult to arrive at a correct diagnosis as regards survivorship; for when, as often happens, an embankment gives way or a house falls, death for the most part appears in such a formidable shape as all but completely to set aside those post-mortem and other appearances which in the majority of instances prove so eminently serviceable. A case in point occurred in Glasgow in 1849. A large sugar-warehouse, situated in Alston-street, was suddenly destroyed as follows. A rise was expected in the price of sugar, and the firm to whom the establishment belonged, thinking to profit thereby, bought up and incautiously stowed on the second floor of the building, innumerable large hogsheads of the said material. The floor thus immoderately strained, gave way, and in so doing pushed out the sides of the building, causing its utter demolition. The men who were employed on the premises at the time were of course involved, and it was found on removing the rubbish, with a view to saving such as still survived, that death, as a rule, prevailed in proportion as the *débris* was cleared away—in other words, those who had been at the top of the building, and who consequently were supplied with a certain amount of fresh air, escaped with more or less severe injuries; while those employed in the second and ground floors were, with few exceptions, found dead. The subject of one of the exceptions, according to his own account, had been struck down by a falling beam, which, resting at an angle above him, at once protected him from descending splinters and the deplorable effects of suffocation. A curious analogous case is quoted by Beck.¹ A number of individuals perished by the fall of a building, and among them a father aged sixty, and his son aged thirty. The bodies were found ten hours after the accident. That of the father was uninjured, but on the head of the son there was a severe wound. The heirs of each put forth their claims, and Zacchias was consulted on the case. After a long comparison between the strength and state of health of the parties, he came to the conclusion that the son survived the father. Being aware, however, that the wound in question was supposed to have accelerated the death of the son, he endeavours to avoid the difficulty by suggesting that it was not necessarily mortal, nor of a nature to destroy his strength immediately; while the suffocation was so much the more urgent cause of death, that the father, from his valetudinarian state and his advanced age, would be first

¹ *Elements of Med. Jur.*, by T. R. Beck, M.D., &c. London, 1825, pp. 211 212.

destroyed by it. The soundness of this opinion was controverted by Foderè,¹ and with considerable show of justice; for certainly a wound of the head, and of so severe a nature, may safely be considered the most sudden destroyer of life under the circumstances.

In the case of the sugar-refinery, of course the differences of age, sex, and strength would have been set aside by the nature of the calamity, and the proofs of the presumption of survivorship must have rested exclusively on the position and bodily condition of the sufferers when found.² The same reasoning will apply to the falling of embankments where stones or projecting boulders might afford a temporary safety. Death by smothering often occurs when persons of a weakly frame, or those addicted to intemperance, fall with their faces on the ground, or get into positions from whence they are unable to extricate themselves, and when children and others are overlaid. Here again position is the chief indicator. The notorious Burke and his associates, in addition to forcibly closing the mouth and nostrils of their unfortunate victims, pressed their whole weight violently upon their chests, and thus hastened death. In these cases, according to the testimony of Dr. Christison, it would have been exceedingly difficult to determine the mode of death by post-mortem appearances alone.

Death by Hanging.—See curious and illustrative case of hanging at p. 177 of the present paper.

Death by Drowning.—This form of death is perhaps of all kinds of accidental death at once the most common and complete. It arises under a variety of circumstances, and seems steadily to increase with civilization and the desire to extend our acquaintance of men and things. Dr. Desgranges has suggested that drowning may occur in two ways—viz., by nervous or syncopal asphyxia, and asphyxia by suffocation; to which Dr. Mare has added a third—viz., asphyxia from cerebral congestion. As these several modes involve differences as regards time, and are characterized by diagnostic signs peculiar to each, it is of importance to allude to them in this place, as being likely to prove of some value in the determination of questions of survivorship. In drowning by *nervous* or *syncopal asphyxia* the skin is characterized by great paleness, the result, as is thought, of spasm of the cutaneous vessels. Here, fear, the chill of the water, an attack of hysteria, or an accidental blow on the head in falling, suspends, as it were, the vital functions, and throws the nervous system into a state of inaction. Persons drowned under these circumstances generally survive much longer than those drowned by either of the other modes, as is proved by the following remarkable case:

A young woman was condemned to be drowned for the crime of infanticide. On being immersed she fainted, and although a quarter

¹ Vol. ii. pp. 320, 321.

² Guy says that in suffocation from the falling of houses or earth, or by mechanical means in general, the stronger may be presumed to survive the weaker—men women, adults children and old persons. (Principles of For. Med., by W. A. Guy, M.B. &c. London, 1844, p. 310.)

of an hour had elapsed from the time of her submersion she nevertheless recovered on being taken out.¹

In the second kind of drowning, viz., *asphyxia by suffocation*, the individual perishing is not at once rendered insensible by shock or otherwise, but makes vain endeavours to respire, the consequence of which is that a quantity of water enters the trachea and mixes with the air in the bronchi to form the frothy mucus so commonly perceived in drowned persons—the lungs in such cases being totally unable to perform their functions. Here of course the probability of survivorship is not so great as in drowning by nervous or syncopal asphyxia. In the third kind of drowning, viz., that by *asphyxia from cerebral congestion*, the persons most likely to suffer by it are those of an apoplectic habit, addicted to intemperance and the luxuries of the table. This species of drowning is characterized by lividity and swelling of the countenance.²

On these various modes of drowning, however, and their attendant signs, no very great reliance can be placed; for paleness of the skin may result from inanition, froth at the mouth from epilepsy, and swelling and lividity of the countenance from apoplexy, all of which might occur prior to immersion. The post-mortem appearances may perhaps be considered more satisfactory. On opening the heads of persons who have perished by syncopal asphyxia little or no engorgement of the blood-vessels, as a rule, is found; which is just the reverse of the appearance presented when death ensues from cerebral congestion.³

With regard to the frothy mucus found in the trachea and bronchi there is considerable difference of opinion; some authors, as Becker,⁴ Littre, Senac, and Petit, denying that its presence is ne-

¹ Quoted from Plater by Foderè (*Médecine Légale*, vol. iii. p. 85). A case is given in Sir B. Brodie's *Lectures on Pathology and Surgery*, in which recovery was obtained after a submersion of five minutes. According to the Rev. Mr. Corder and Dr. Lefevre the time occupied in the perilous exploits of the pearl and sponge divers varies from one to two minutes, but never exceeds the latter. (*Wharton and Stille's Med. Jur.*, pp. 634, 5).

² To these three forms of drowning others of a mixed nature might be added. Dr. Mare says that suffocation and apoplexy may act reciprocally either as the essential or aggravating cause of death. Devergie thinks drowning may be fatal in five ways, viz., by simple asphyxia, by syncope, by cerebral commotion, by apoplexy, by a mixture of these causes in which the functions of the brain, the lungs, and the heart are simultaneously suspended. Death by asphyxia, joined with syncope or cerebral congestion, he considered the most common, and comprehends five-eighths of all drowned—death by simple asphyxia being less frequent, and in the ratio of one to four; while death from syncope, from simple cerebral congestion, commotion of the brain, or apoplexy, which is still less rare, being as one to eight. In the first kind of death, viz., asphyxia joined with syncope or cerebral congestion, the post-mortem appearances are a little water and froth in the trachea and bronchi; while in the second, viz., that by simple asphyxia, froth and water are found in the trachea and bronchi (*Médecine Légale*). See also Dr. Wright's *Prize Essay* written in 1840. He recognises four kinds of asphyxia—the common, syncopal asphyxia, apoplectic asphyxia, and nervous asphyxia.

³ Goodwin states, in opposition, that the vessels in cerebral congestion are not turgid, but that the brain itself is of a darker hue externally, while the right side of the heart is full, and the left side half full of black blood. *Enquiry*, p. 415.

⁴ *J. C. Beckeri Paradoxum Medico-Legale de submersorum morte, sine pota aqua*, 1704, published in the *Novellae* of Valentini, p. 299. See also *Phil. Trans.*, vol. xxiv. p. 2512. Also *Memoirs of Literature*, vol. iv. p. 165.

cessary in any form of drowning whatever ; while others, as Haller, De Haen,¹ and Louis,² affirm that it is. Recent investigation inclines to the opinion of Becker and his followers, although Foderè³ thinks the presence of frothy mucus may be considered as a sign of asphyxia. That, however, frothy mucus even when present is not an infallible sign, is at once evident from the fact, that it may occur in death resulting from strangulation, from epilepsy, from violent catarrhal affections, and from breathing noxious vapours. The foregoing appearances are of course only valuable when the bodies are recovered soon after death and before putrefaction sets in. Another diagnostic sign of survivorship is when sand, mud, and other materials are discovered beneath the nails, and something or other is found clutched in the hands as denoting a struggle ; but here again appearances are deceptive, for the sand and mud may have got beneath the nails by the rubbing of the body on the bottom, and the hands may have grasped the substance they contain, while the individual was in the act of falling into the water. A difficulty which may arise in cases of drowning, and which is often debated in medico-legal circles, is whether the persons found in the water have not been made away with beforehand ; but as this is very improbable, where questions of survivorship are likely to be raised, it need not be discussed.⁴

On calmly reviewing the foregoing diagnostic marks, in connexion with the modifications to which they are subject, their inconclusiveness in matters of survivorship must be at once conceded. They can therefore only form part of the evidence in the settlement of such questions, a fact tending to strengthen a former line of argument, viz., the importance to be attached to collateral circumstances, as age,⁵ sex, strength, position of the bodies, &c.

Death by Noxious Inhalation.—Death occasioned by the breathing of impure vapours, although by no means so common as death by drowning, is nevertheless so frequent as to demand a large share of attention.

Perhaps the most common cause of death by this means, is the breath-

¹ De Haen's *Ratio Medendi continuata*, 130, &c.

² Louis, *sur les Noyés*.

³ Foderè, vol. iii. pp. 73-94.

⁴ In such cases the presence of external marks of violence will in general give a clue to the real state of things. In examining these, however, care should be taken that such marks are not the result of and occasioned after death, rather than the cause thereof.

⁵ Guy, in speaking of the probabilities of survivorship afforded by age and sex under the head of 'Drowning,' says that in shipwrecks men are more likely to be in a favourable situation for saving themselves, as they are more on deck than women ; they also in many instances are able to swim, or to save themselves by clinging to portions of the wreck, and they are less incumbered by clothing. When the comparison is made between men similarly exposed, and capable of the same exertion, it may be necessary to inquire whether one was more exposed to cold by having the body half immersed, whilst the other was more under water ; search should also be made for severe injuries which may have prevented the swimmer from using his strength. Death from apoplexy is stated by Devergie to be sooner fatal than by apncea, while in death by syncope there is the best chance of recovery. *Principles of Forensic Medicine*, by W. A. Guy, M.A., &c. Lond. 1844, p. 310.

ing of air deprived of its oxygen, the air being surcharged with carbonic acid gas, as happens when a large concourse of people are violently forced into a small and imperfectly ventilated compartment, and locked up for a considerable space. A most melancholy example of this occurred in 1756, at Calcutta, on the surrender of Fort William to the Viceroy of Bengal. On this occasion 145 men and 1 woman, were barbarously thrust into a small prison, measuring eighteen feet by fourteen, and ventilated merely by two barricaded apertures. Here they remained for the protracted period of ten hours, and when liberated 23 only of the 146 survived.¹

Another example, illustrating the same pernicious effects, though not to such a frightful extent, occurred a few years earlier in London, viz., in 1742. The scene of this atrocity was a place called the Hole—a part of St. Martin's Round House. The persons incarcerated were 20 in number, of whom several died during the night.²

In deaths produced by an imperfect supply of oxygen, the question of survivorship is somewhat difficult of determination. Those possessing large muscular development, although they have great strength and are consequently likely to exert it in obtaining the best places, or where most pure air is to be had, are on this very account liable to suffer as early as the others; for the demand for oxygen being in proportion to the muscular exertion, it follows that if they do exert themselves, they lose by violence what they would gain by being quiet,³ and are thus reduced to the condition of weaker individuals. Guy⁴ on this point says:—

“Females consume less oxygen than men; the same quantity of air therefore will last them for a longer time. Hence of adult males and females perishing together of apnœa, the females may be presumed to have survived. In poisoning by carbonic acid gas, which is nearly allied to death by apnœa, the chances of survivorship are with the female. This statement rests upon the authority of a large number of facts. In 19 out of 360 cases of asphyxia by carbonic acid, which took place in Paris during 1834 and 1835, in which a man and woman were asphyxiated together, 3 only were saved, and these 3 were females. In solitary cases of the same form of death, the result is also favourable to the female; for as many as 18 out of 73 females have been restored, whereas the number of restorations in males amounted only to 19 in 83. The proportion therefore of those recovered from poisoning by carbonic acid gas is, as nearly as possible, 15 females to 14 males.”

Devergie⁵ states it to be 5 females to 4 males, but in this he is in error.

¹ For an account of this horrible barbarity, see a pamphlet entitled, “A genuine narrative of the deplorable deaths of the English gentleman and others who were suffocated in the black-hole of Fort William, &c.,” by J. Z. Holwell, himself chief of the party.

² For further examples of poisoning by carbonic acid gas, see Professor Trail's *Outlines of Medical Jurisprudence*, p. 128.

³ Lavoisier states that a man under ordinary circumstances consumes 1300 or 1400 cubic inches of oxygen in an hour, but if he be engaged in raising weights the consumption is at the rate of 3200 in an hour.

⁴ *Prin. of For. Med.*, by W. A. Guy, M.B., Lond. 1844, pp. 309, 310.

⁵ Devergie, *Médecine Légale*, Art. *Survie*.

Beck and Sardaillon furnish illustrative examples :—

“A man and his wife were exposed in a small room to the gas from the live coals. The man was found dead, rigid, and contracted, *but the woman was still breathing and recovered.* A man, his wife and their child, aged 7 years, were asphyxiated in a porter’s lodge. The child died, the father was very ill, and with difficulty restored to life, while *the wife was well enough to call for help and to assist both husband and child.*”

In these cases it would be necessary to take into account the position which the parties occupied in the room, whether on the bed or on the floor, near or remote from the window, &c. In further treating of poisoning by carbonic acid gas, Guy is of opinion that “in all cases of suffocation depending on an insufficient quantity of air, or upon air rendered partially unfit for respiration, it may be presumed that those who require least air live the longest—women than men, children¹ than adults.”

Another variety of poisoning by carbonic acid gas occurs when the atmosphere is vitiated by charcoal or limestone fumes, as happens when individuals incautiously close the doors and windows of apartments containing stoves with burning charcoal,² or trust themselves in the vicinity of lime-kilns. It is moreover for the most part owing to the evolution of large quantities of carbonic acid gas, that the atmosphere of vaults, cellars, caverns, wells,³ and dungeons, is as a rule so pernicious.

The post-mortem appearances presented by those who suffer from the deadly effects of carbonic acid gas, are, head, face, and neck swollen; eyes projecting, tongue protruding, swollen, and inclined to one side of the mouth; jaws closed, face livid, lips of a dark blue colour; abdomen inflated, body warm, and limbs flexible for hours after death;⁴ head and lungs, particularly the right side of the heart, gorged with black fluid blood; epiglottis always elevated,⁵ muscles soft and readily torn.

¹ Paris (Med. Jur., p. 55) gives a contrary opinion, and the case quoted by Mr. Guy himself from M. Sardaillon is opposed to this doctrine. See additional case in Edin. An. Rg., vol. vi. part 2, p. 64.

² The fumes of burning charcoal consist principally of carbonic acid gas, and carbonic oxide. Carbonic acid gas is contained in the exhalations from lime-kilns and cellars where wine, beer, or other liquids are in a state of ferment. This gas is frequently produced in wells, marshes, and mines. In the latter, however, a different substance is also generated, called the fire-damp, or carburetted hydrogen gas, which is no less deadly. But the frequency of fatal accidents to persons descending wells is to be ascribed to carbonic acid (El. of Med. Jur., by Beck, p. 278).

³ Carburetted hydrogen of various qualities is given out by stagnant waters. It is one of the results of combination, and is abundantly produced in coal-mines where it is the formidable fire-damp. When the atmosphere is much contaminated with it, it opposes the breathing and produces headaches and giddiness. When mixed in the proportion of $\frac{1}{12}$ with the atmosphere of mines it will explode on the approach of a flame; yet in such an atmosphere persons will continue to work for some time with impunity. But even if there be no risk of explosion, the narcotic effects of the gas begin to be perceived in those long exposed to it. Outlines of Medical Jurisprudence, by Thomas Stuart Trail, M.D., &c., Edinburgh, 1857, p. 126.

⁴ Struse, p. 52. Billoc, p. 184-5. See also history of three cases by Dr. King in the Edin. Med. and Surg. Journ., vol. vii. p. 80.

⁵ Portal in Medical Commentaries, vol. iii. p. 254. Billoc, p. 184. Medico-Chirurg. Transactions, vol. i. p. 93. Orfila, vol. ii. p. 347. Larry, vol. ii. p. 128.

These post-mortem appearances, though frequent, are not invariable,¹ and even when present by no means proof positive that the person died from noxious inhalation, inasmuch as many of them are common to other kinds of death.²

In questions of survivorship, therefore, arising from death by noxious inhalation, there is a double difficulty; for it will be necessary to ascertain first whether the individuals have actually died through its agency, and secondly who died first. To determine the first point it will be requisite to examine the state of the atmosphere in which the bodies are found, although even this may prove fallacious owing to the noxious vapours having escaped from the entrance made by the victims themselves; and to determine the second, the position of the bodies when discovered should be carefully noted. Those nearest the entrance are almost certain to have survived the longest, whether male or female, unless in the case of children, who possibly might sink sooner than adults of either sex, even in that situation. A little latitude might also probably be allowed to thoracic capacity, and the healthy or unhealthy state of the lungs.

Death by various other forms of noxious inhalation, such as that produced by mercurial vapours,³ sulphuretted⁴ and carburetted hydrogen gas,⁵ chlorine,⁶ sulphurous acid gas, &c., might be enumerated, but as these are, comparatively speaking, very rare, and by no means likely to involve the question at issue, they may be passed over in silence.

Death by Poisoning.—Death occasioned by poisoning is analogous in many respects to death resulting from noxious inhalations. It occurs in such a variety of forms as would render a detailed account of any one of them inconsistent with the object of the present paper. As, however, the subject is too important to be altogether omitted, I purpose treating it very generally, referring for particulars to the many admirable treatises already existing in our own and other languages. As far as the question of survivorship is concerned, poisoning may very conveniently be divided into:—

Such as arises through Negligence and Accident, and
Such as is the result of Forethought and Design.

Of the former are cases of poisoning occasioned by the carelessness

¹ In some cases many of these signs are wanting, and in others some are reversed; thus the face is occasionally pale.

² The phenomena witnessed in death by drowning, by hanging, and various other violent deaths, simulate the foregoing appearances in many respects.

³ See effects of in his Majesty's ship *Triumph* as related by Paris in his vol. ii. p. 460. Also results produced at the Royal Manufactory of Looking-glasses in Berlin, p. 459.

⁴ According to Thenard and Dupuytren it is sufficient that the air contains 1-3000th of sulphuretted hydrogen in order to kill a bird in a very little time; that which contained 1-800th produced death in a dog of middle size; and a horse died in an atmosphere containing 1-250th part of it. (*Orfila*, vol. ii. p. 371.) See also cases recorded by Paris, vol. i. pp. 100-102.

⁵ Vide Sir Humphrey Davy's *Researches, Chemical and Philosophical*, chiefly concerning nitrous oxide, &c., London, 1800.

⁶ *Recherches de Physiologie et de Chimie*, p. 144 an. 1811. *Lond. Med. and Phy. Journal* for November, 1821.

of the persons suffering,¹ by the culinary mistakes of the household,² by indulging in delicacies out of season,³ by substituting poisonous fruits, fungi, &c., for wholesome ones which they resemble,⁴ and by the peculiarities of idiosyncrasy.⁵

Of the latter kind are wholesale poisonings (an endless variety), such as not unfrequently happen at the feasts of kinsmen, and others where contending claims and the order of succession in noble and wealthy families prove a strong temptation to younger members and immediate relatives.⁶

¹ Parties often take poisonous substances unawares; thus oxalic acid is sometimes mistaken for the sulphate of magnesia, arsenic for cream of tartar, &c.

² Vicat relates the case of a family who took some soup in which the root of white hellebore had been put instead of pepper. Beck (*Med. Jur.*, p. 521) gives the case of eleven French prisoners who gathered by mistake, near the town of Pembroke, a small quantity of hemlock dropwort (*Ananthe Crocata*) and ate it with bread and butter. Two of the number died after being violently convulsed. The foregoing case is quoted by Orfila, vol. ii. p. 242. Some soldiers partook of broth into which hemlock had been put. All of them were shortly after seized with pains in the head and throat, and felt as if drunk, from which they recovered. One, however, who had eaten more than the others, died. Schubert, the celebrated musician, together with his family (one child excepted), a friend, and a physician who dined along with him, were all poisoned by a dish of mushrooms. (*Paris*, vol. ii. p. 428.)

³ Beck says that symptoms the most violent and uncommon often occur in individuals who live in a luxurious manner and eat mushrooms, truffles, and shell fish out of season—i. e., in peculiar seasons of the year (*Elements of Med. Jur.*, by J. R. Beck, M.D., &c., Lond. 1825, p. 366). A case from poisonous effects of a crab supervening within fifteen minutes after eating it, is mentioned in the *New York Medical Report*, vol. xii. p. 189. And Dr. Burrows gives an account of two boys who died from eating small mussels picked from the sides of a fishing-smack in a dead and tainted condition (*Med. Rep.* vol. iii. p. 445).

⁴ M. Gaultier de Claubray, a medical officer, mentions a case of a detachment of French soldiers, several hundreds in number, halting a short distance from Perna, near Dresden, who being allured by the inviting appearance of the berries of *atropa belladonna* (deadly nightshade), ate freely of them. One hundred and eighty of the men were poisoned, of whom several died before medical assistance could be had in sufficient strength. Dr. Baxter states that in 1765, when some of the British troops, under Sir John St. Clair, were stationed in the vicinity of Elizabeth Town, near Jersey, three of the soldiers collected a quantity of *datura stramonium* (thorn apple), which they mistook for lamb's quarters (*chenopodium album*), and dressed and ate it. One of them became furious and ran about like a madman, while a second was seized with genuine tetanus and died. (*Burton's Med. and Phy. Jur.*, vol. i. p. 146.)

⁵ Dr. John Gordon Smith speaks of a person who was always purged if he took opium, and of another who suffered the most excruciating torments if he partook of anything into the composition of which an egg had entered (*Smith's For. Med.*, p. 65). Fordyer relates the case of a woman who was subject to cholics for 30 years in consequence of having once taken an infusion of the pulp of colocynth prepared with beer, and Schinkens relates a case in which the general law of astringents and cathartics was always reversed.

⁶ For particular examples, see poisoning of Drusus at the instigation of Sejanus (*Taciti Annal.*, lib. iv. c. 8), and also Livy's account (*Lib. viii. c. 18*) of the frequency of poisoning 200 years or so before the Christian era, wherein it is mentioned that upwards of 150 ladies of the first families in Rome were convicted and punished for preparing and distributing poisons. Also Tacitus' account of the poisoning of the Emperor Claudius and Britannicus the son of Agrippina by Locusta (*Tac. An. 13 s. 15-16*). In modern times see account of the diabolical Tophana, as given in Labut's travels through Italy and Beckman's history of inventions. This monster prior to execution in 1709 confessed to having destroyed upwards of 600 individuals. See also an account of her infamous pupils *Spara* the Sicilian, and *Margaret d' Aubray*, Marchioness de Brinvilliers,

As, however, in this last class of cases the assassins would naturally take especial pains to secure the death of their victims precisely as they wished, and scrupulously observe the time of their decease, it follows that they need not be taken into consideration, as the certainty of the event sets the presumption of survivorship completely aside. As moreover the utmost ingenuity was and is still expended in the composition of the love philtre, "poudre de succession," &c., as it has been significantly termed; it so happens that by excluding the entire mass of occult poisoning (and the foregoing considerations fairly entitle us), we at once get rid of many of the difficulties of a most extensive and perplexing investigation.

The only other form of secret poisoning which is likely to occur, and in which the question of survivorship might be raised, is when an individual through malice or revenge poisons a family or the branches thereof, and the surviving relatives, who took no part in the diabolical proceeding, institute rival claims to the property of the deceased.

As, however, in such instances the victims would, for the most part, be surrounded by domestics, and the order of death correctly ascertained, this too may be passed over with the mere mention. The only form of poisoning therefore which deserves to be considered here is the *accidental*.

A very excellent example of this kind of poisoning is given by Zacchias in his 'Consilium' (No. 85).

A man and his family had eaten copiously of poisonous mushrooms, and were taken ill. Before the domestics, who had been sent for assistance, returned, both husband and wife had expired. It appears that two years prior to their death a joint agreement had been made to the effect that the survivor should possess the sum of 2000 crowns. Concerning these 2000 crowns, as a matter of course, a dispute arose, and Zacchias was summoned to give evidence. He decided in favour of the husband, inasmuch as he was proved to have eaten little of the mushrooms, and although 60 years of age, continued hale and hearty; whereas the wife, on the contrary, had eaten largely, and although only 46 years of age, was asthmatic and subject to complaints of the stomach. A poison, therefore, which acts violently on the organs of respiration would naturally soonest destroy one diseased in those parts.

Other examples might be enumerated, but as they would only occupy space without throwing additional light on the subject, they are better omitted.

Poisonings of all kinds, whether accidental or intentional, will be most satisfactorily explained by a close attention to the history and circumstances of the case, in connexion with the post-mortem appear-

as related by Prof. Beckmann in his article on secret poisoning—the former of whom, as he informs us, was president of a society of young wives whose husbands were poisoned whenever they became offensive; while the latter, among her many enormities, poisoned her two brothers and father. Both those wretches were executed—the one (Spara) in 1659, the other (Margaret d'Aubray) in 1676.

ances. As, however, the same poisons act differently on different individuals, and on some not at all,¹ while many of the post-mortem appearances are identical with those occasioned by disease, it will be at once evident that no definite rules can be laid down for the settlement of questions of survivorship thereby occasioned. To suspect that poison has been administered is one thing, but to demonstrate its existence in the animal tissues is quite another; and to ascertain on whom it may have first exercised its fatal effects is more difficult than either. The immense variety of results produced by poisoning, together with the vast number of poisons themselves, must at all times form a stumbling-block in the diagnosis of such cases; nor is this to be wondered at when it is remembered the deleterious principle may belong to either of the three great kingdoms of Nature—the animal, the vegetable, or the mineral; that it may be irritant,² narcotic,³ narcotico-acrid,⁴ or septic⁵—that it may be active⁶ or slow,⁷ consecutive⁸ or accumulative,⁹ and that from the peculiarity of idiosyncrasy, its action may, in particular instances, be quite the reverse of what it is in others.¹⁰ The necessity of a law, therefore, in determining survivorship in cases of poisoning seems to be more imperatively demanded than in almost any other mode of death.

Death by Intoxication.—Death by intemperance, though by no means rare in individual cases, seldom supervenes in two or more persons about one and the same time. If, however, it should happen (for nothing is impossible), the medical jurist will have to pay particular attention to the previous history of the persons, their age, sex, and constitutional tendencies; their condition when last seen alive, and, above all, the position of the

¹ Pouqueville mentions the case of an old man at Constantinople who was in the habit of taking a drachm of corrosive sublimate daily. The inhabitants of the provinces of Lower Austria and Styria are also in the habit of chewing particles of arsenic mixed with their bread, for the purpose, it is said, of making them long-winded. A sexagenarian was in the habit of taking four grains daily, and yet possessed excellent health.

² Irritant poisons act by inflaming and sometimes corroding the surfaces to which they are applied; while some act indirectly on the heart and other vital organs.

³ Narcotic poisons act for the most part by inducing a species of intoxication, drowsiness, stupor, paralysis, or convulsion.

⁴ Narcotico-acrid poisons include mushroom poison, strychnia, camphor, belladonna, digitalis, &c., the fatal effects of which are well known.

⁵ Septic poisons include animal poisons, such as arise from the stings of insects, the bite of snakes, rabid animals, &c. (Traill's Jur., p. 98.)

⁶ An active poison is one which produces death within a few minutes from the time it is taken.

⁷ In slow poisoning a single dose is sufficient. The poison produces no sensible effect at first, but gradually undermines the health.

⁸ In consecutive poisoning a single dose kills. The poison at first produces violent symptoms, which are followed by apparent cure. Death however sooner or later supervenes from organic lesion.

⁹ In accumulative poisoning many doses are required—death being occasioned by the repetition of doses individually harmless.

¹⁰ Schinkens relates a case in which the general laws of astringents and cathartics were always reversed, and Morgagni speaks of an individual who died from eating bread made with the farina of the chestnut.

bodies when found, and the appearance presented by post-mortem examination, particularly the state of the brain. If the body of the one be found partially immersed, or otherwise exposed to cold, or in the vicinity of noxious vapours, or with the face burrowed in the earth, while that of the other is found lying on its side or back in a warm dry spot, and not exposed to a vitiated atmosphere, the chances of survivorship will be greatly in favour of the latter. If, moreover, serious external injuries be found on the one, received evidently in the stupor of drunkenness, while the other is free from such injuries, the chances will be in favour of him exposed to the destructive effects of alcohol only. If on opening the head, traces of cerebral congestion from apoplexy are discovered in the one, while the brain of the other is comparatively normal, the chances of survivorship will be in favour of the latter. But I need not anticipate. These and other casualties are for the consideration of the coroner and his assistants when the case occurs.

Death by Starvation.—The laws regulating death by inanition, although somewhat obscure in their operation, are nevertheless pretty well understood from their opposites, the laws of life, with which physiology is tolerably familiar. In order to estimate the probabilities of survivorship in death by inanition, a simple transposition seems to be all that is necessary.

During the first fourteen years of life, or in infancy and childhood, the body, as has been explained, rapidly developes, so that large quantities of nutritious food are constantly demanded. From the fourteenth to the eighteenth year (the period of adolescence), though development steadily proceeds, it is by no means so active as in infancy and childhood; the demands for food consequently are proportionally less frequent. From the eighteenth to the twenty-fifth year (the period of youth) the bodily powers are gradually matured, and still less food suffices. From the twenty-fifth year until the system begins to retrograde or decrease in vital powers, the amount of food required varies according to the amount of work done; but as a rule, less is required for a full-grown man than a growing youth. In old age, or when symptoms of decay begin to manifest themselves, the amount of food requisite for sustenance decreases in a direct ratio. Making allowance, therefore, for the extremes, i.e., the very aged and very young, death by starvation, as a rule, will supervene inversely as the amount of food required for the support and maintenance of the body in the performance of its healthy functions; thus, *cæteris paribus*, the child will perish before the youth, the youth before the man.¹ On the same principle the female, who requires a less quantity of food than the male, will outlive him. It is owing to this state of things that those Indian

¹ The immortal Dante seems to have been aware of this physiological fact, for he describes the ill-fated Count Ugolino as perishing on the eighth day, *after having witnessed his sons sink one by one*, amid the frightful convulsions of exhausted nature. This fact appears to have been also known to the ancient physicians. (Hippocrat. Aphor. xiii. sect. 2.)

Fakirs and others, in whom a low type of vitality has been induced by habit, famine, or disease, have been enabled to survive such incredible periods with so little sustenance. In cases of suspected starvation, the first thing that ought invariably to be done is to note with precision the position of the bodies when discovered. This is of vast importance, for if the one be found in the vicinity of water, and surrounded by a humid atmosphere, while the other is found far from the vivifying beverage and in a parched spot, the chances of survivorship will be infinitely in favour of the former. The accuracy of those remarks will appear from the following facts.

Redi¹ starved a number of capons, to which he gave neither solid nor liquid food. They all died on or before the ninth day. One, however, to which he had given water simply, survived till the twentieth day. Elizabeth Woodcock, who was buried in the snow near Cambridge for the space of eight days, undoubtedly owed her preservation, in the opinion of Paris,² to the snow which she occasionally sucked. A part of the crew of the ill-fated Arab ship *Futteh Islam*, lost in the Indian seas in 1836, were on a raft for the space of eight days and yet survived. In this instance they freely availed themselves of the surrounding medium in keeping their bodies moist, a practice well known to sailors when there is a scarcity of food and fresh water, and one to which they no doubt owed their safety.³ As a rule, individuals in dry situations, without water, perish about the fourth or fifth day,⁴ whereas those who are supplied with water may live till the fifty-eighth day. The resolute Viterbi perished on the twenty-first day,⁵ John Brown, the Scottish miner, on the twenty-third day.⁶ The subject of a case recorded by Professor McNaughton, on the fifty-fourth day,⁷ and Guillaume Granet, the prisoner of Toulouse, on the fifty-eighth day. Other cases are recorded. Valentin mentions a case of a woman who survived seventy-eight days on water and lemon juice. I forbear quoting cases of a still more startling nature as savouring too much of the fabulous. Some authors place considerable emphasis on the condition of the individuals prior to the period of inanition, and this is no doubt worthy of consideration, as the cor-

¹ Osservag : intorno agli anim. Viventi, &c., Nos. 3 et 4.

² Medical Jurisprudence, by J. A. Paris, M.D., &c., and J. S. M. Fonblanque, Barrister. London, 1823. Vol. ii. p. 68.

³ See also wreck of the *Medusa*, as given in the 'Quarterly Review' for October, 1817. Of the 150 who on this occasion betook themselves to a raft only 15 survived after 13 days of starvation.

⁴ Dr. Gadermann however relates a case of suicide wherein entire abstinence from liquid or solid food was maintained for 23 days. (Henke's Zeitschrift, 1848, 3 H.)

⁵ The unfortunate Luc Antoine Viterbi was condemned as an accomplice in the assassination of Frediani—a crime which he denied to the last. Being confined in the prison of Bastia he determined to destroy himself by starvation, a purpose which he effected on the twenty-first day, after having endured the most horrible suffering. He kept a diary of the sensations he experienced, for an account of which see Corsican Gazette and Lond. Med. and Phy. Jour., March 1822.

⁶ John Brown, aged 65, lived for 23 days in a coal-mine, during which period his entire sustenance consisted of chalybeate water sucked through a straw. Lond. Med. Gazette, xvii. 389.

⁷ Am. Jour. Med. Sci., vi. 543.

pulent will live for several days at the expense of their fat alone. This view is favoured by considering the persons suffering as being, after the first few days, on account of their impaired vitality, as much in the condition of hibernating animals, whose respiration is exceedingly slow, and whose blood undulates rather than circulates. I know of no human examples to illustrate this point, but take the liberty of adducing the case of a dog instead.

A spaniel bitch, fat and rather old, celebrated in former days for her hunting propensities, on one occasion thrust herself into a hole in the face of a rock, from which neither her own efforts nor those of her master were able to extricate her. She remained in her new abode for upwards of a fortnight, at the expiration of which period she returned, to the astonishment and delight of her old master, but so much altered that he scarcely knew her. She had lived on her adipose tissue until she was spare enough to effect her escape. A strictly analogous example occurred a few years ago at Dover Cliffs. A portion of a cliff which overhung a piggery had fallen and covered up an unusually well-fattened pig. The clearing away of the rubbish occupied nearly a fortnight, at the expiration of which time the poor animal was found alive, and tolerably well, although a miserable shadow of its former self.

The post-mortem appearances in cases of starvation are peculiar, and should always be attended to. They are the following. The body is much emaciated, and exhales a fœtid odour; the skin shrivelled, dry, and bereft of cutaneous veins; the eyes red and open; the mouth and fauces dark and parched; the stomach greatly shrunk and ulcerated on its internal surface; the intestines empty and contracted, so as to resemble a cord; the gall bladder gorged with bile, which stains the intestines; the heart, lungs, and large vessels collapsed and destitute of blood; all which signs are accompanied with a tendency to rapid putrefaction.

Of course the same precautions are necessary in diagnosing this form of death which are observed in all others, and it will be necessary before proceeding to the settlement of the question of survivorship to ascertain whether no disease is present which may have caused the appearances which we might otherwise rashly attribute to inanition.¹

Death by Cold.—This form of death, which in Britain is exceedingly rare unless in very severe seasons, as a concomitant of poverty and intoxication, is perhaps of all extraneous deaths the most gradual and natural. As it acts by destroying the vital energy from without inwards, it follows that those endowed with the greatest amount of animal heat (and therefore better calculated to ward off the insidious influence of the external cold by the irradiation of internal heat) will on all occasions prove the survivors. According to Sir Benjamin Brodie, animal heat is in some way or other dependent upon the integrity of the functions of the nervous system, so that if it could be proved of two or more perishing by cold, that the one at the time of the occurrence possessed

¹ The diseases which would produce a similar condition of the body are those inducing mechanical obstruction to the ingestion or chylification of the food.

a more perfect nervous organization than the others, the probability of survivorship would most assuredly incline to him. In proof of this position it need only be mentioned, and the fact is particularly *à propos* on the present occasion, that persons in the last stage of intoxication, in whom the nervous energy has been diminished by a previous state of morbid excitement, are especially liable to perish from cold,¹ while animals under the influence of narcotic poison are destroyed at a temperature which would scarcely affect others not so enervated. A striking analogy exists therefore between the effects of intoxication, poisoning, and cold itself; so that it appears if after a certain stage a little more of either were added, or of the one to the other, death would follow as a natural consequence. Captain Parry very well describes the similarity in the effects of intoxication and cold. In speaking of the return of some of his crew to the vessel after long exposure, he says, "When I sent for them into my cabin they looked wild, spoke thick and indistinctly, and it was impossible to draw from them a rational answer to any of our questions. After being on board for a short time the mental faculties appeared gradually to return with the returning circulation, and it was not till then that a looker-on could easily persuade himself that they had not been drinking too freely."²

The temperature at which fatal effects are produced seems therefore to vary according to the strength and circumstances of the individual. Another item which ought not to be overlooked is the rapidity of the cooling process,³ for in proportion as that is quick or slow, so is life endangered.⁴ Examples corroborative of these remarks will be found in the account of the excursion of Sir Joshua Banks and his party to the mountains of Terra del Fuego;⁵ in the expeditions of Captains Franklin, Ross, Parry, and other Arctic travellers, and in the melancholy fate of the Cambridge student so often quoted. Death by exposure to cold, which is the most insidious of all deaths, produces its fatal effects by inducing languor, loss of sensation, and an irresistible propensity to sleep, which sleep, in the majority of instances, proves the sleep of death. Mr. Portal was of opinion that cold produced death by inducing apoplexy, an idea which he grounded on the pre-

¹ For information on this point see Police Reports of our own large cities and Le Baume's account of the Campaign in Russia.

² Expedition to the North Pole, vol. i. p. 188.

³ The body is cooled in three ways—by cutaneous exhalation, by conduction from the direct contact of air, and by radiation. The *cutaneous exhalation* is increased by dry air and suppressed by moisture, and so far the heat of the body is affected by this cause. On the other hand the body is cooled by *conduction*, when the air is moist; so that the body is cooled alike by dry cold air and by cold moist air. Of the effect of cold humid winds in lowering the temperature of the body a good example is given by Dr. Currie in the Phil. Trans. of 1792. A rapid renewal of the air, as in a cold brisk wind, lowers the temperature of the body by evaporation and by conduction at the same time; and the effects of a slight breeze in increasing the feeling of cold is familiar to every one. (For. Med., by W. A. Guy, M.B., &c., London, 1844, p. 388.)

⁴ Dr. Chassat states that in an animal immersed in a cold bath death may take place at 79° Fahr. (26 cent.) although (17 cent.) before it dies; but, *cæteris paribus*, the animal dies sooner as the cooling is more rapid.

⁵ See Cook's First Voyage.

sence of sanguineous congestions in the vessels and cavities of the body, particularly those of the brain, in post-mortem appearances. There is, however, an insufficiency of data to warrant such a conclusion, for although the blood is found collected in the heart, spleen, liver, lungs, and brain, it follows that this may result from that fluid being gradually driven from the surface into the interior—a comparatively slow process, and widely differing from the characteristic suddenness of apoplexy. As moreover the post-mortem appearances in death by cold are by no means conclusive,¹ it appears to me that if we would arrive at a correct diagnosis we should betray more wisdom in taking a wide survey of the circumstances of the case, than by confining ourselves to those alone.

The difficulty of determining the question of survivorship is particularly evident in cases of death by cold; and as they for the most part occur in desolate places where few are passing; it will be safest in such instances to reason generally from collateral evidence, such as position, time, strength of body, &c.² In many cases moreover the amount of circumstantial evidence will be so great as to beget moral certainty. I adduce one case by way of illustration. Upwards of 30 years ago a father and son on returning home from a distance were overtaken by a violent snow-storm. Both succumbed to the inclemency of the weather, and on the bodies being discovered, that of the father was found a furlong or so nearer home than that of the son, while close by the latter was found the staff of the former stuck on end, clearly indicating that the father had survived the son, and that he had set up his stick as a mark to return, and it might be bring succour to his son.

Death by Heat.—The manner in which death is occasioned by excess of heat is as yet very obscure. The little that is known will be conveniently considered under the five following heads—viz., death by conflagration, or where the persons are exposed to the devouring element by the proximity of burning clothes, dwellings, and other heated media; death by scalding, where the victims are subjected to the no less deadly medium of heated water and steam; death by spontaneous combustion, or where the source of the fire is said to exist in the bodies of the individuals suffering; death by sun-stroke and other kinds of natural and artificial heat, such as the Simoom of the Desert, hot laundries, &c.; and lastly, death by lightning.

In death by conflagration the position of the body and the extent and nature of the lesions will do more to settle the question of survivorship than any difference in age, sex, or strength. The only difficulty that might arise in this form of death is whether the burning

¹ Unless the examiner knew the circumstances in which the body was found, which favoured the supposition of death from cold, he could not possibly assert from these signs that death had resulted from this cause. (Wharton and Stille's *Med. Jur.*, p. 601.)

² Guy says that young, aged, and infirm persons, worn out by disease or fatigue, and those addicted to the use of intoxicating liquors, perish most promptly in the depth of winter. (*Principles of Forensic Medicine*, by W. A. Guy, M.B. Cantab. London, 1844, p. 387.) See also Wharton and Stille's *Med. Jur.*, pp. 601, 602.

was produced before, and therefore the cause of death, or after death, and the result of accident or design.¹ This point, as far as the *ante* and the *post* are concerned, will be readily settled by the character of the eschar, for a careful description of which I am indebted to the discriminating pen of Professor Christison. When burns are inflicted during life, a narrow white line appears around the burnt spot. Outside this line is one of a deep red tint, which externally runs by essential degrees into a diffused redness, which diffused redness may be removed by slight pressure, and disappears after death—the deep red line being permanent. After scalds vesications usually make their appearance within a few minutes, although in children it may be hours. Vesication, however, is by no means a concomitant of the application of heated bodies. When burning is applied after death, the appearances will differ according as it took place sooner or later after the decease of the individual. In such instances there will be the absence of the deep red line, not removable by pressure, and if blisters are present they will be filled with air instead of fluid—the cutis being at the same time devoid of moisture. When the burning takes place an hour or so after death, the effect will be to ruffle the cuticle, and dry up the parts to which it is applied. The foregoing remarks, as a whole, apply equally to death by scalding. In death by spontaneous combustion the changes induced in the system by the free use of ardent spirits² are such that the body, in a manner but little understood,³ becomes ignited, and is with difficulty extinguished.⁴ As, however, the examples of spontaneous combustion are very rare, and the probability of two or more related perishing by it within a short period of each other, scarcely within the reach of possibility, it may be passed over by simply remarking that it is most common among females, and when it occurs the trunk is usually completely destroyed, the extremities being only destroyed in part. It is further found that the furniture of the room is spared, and that the walls of the chamber are covered with an unctuous humidity. For an epitome of the more illustrative and authentic cases of this form of death the reader may be referred to Beck,⁵ who quotes the authorities from whence his narratives have been drawn, as likewise to Smith, Briand, and Sedillot.

Death by sun-stroke, which has of late years been very common in America,⁶ and is constantly occurring in eastern climates, is charac-

¹ See case related by Foderè, vol. iii. p. 18, where several persons were murdered and the house afterwards set on fire.

² See an article 'On the Combustion of the Human Body, produced by the long and immoderate use of spirituous liquors,' by Pierre Aime Lair in the *Emporium of Arts and Sciences*, edited by J. R. Coke, M.D., vol. i. p. 161. Also Paper by Thomas D. Mitchell, M.D., in the *American Medical Recorder*, vol. v. p. 489.

³ Pierre Aime Lair and others think that the phenomenon is occasioned by an alcoholic impregnation of the body, and that actual contact with fire is then necessary to produce it; while Maffie, Le Cat, Kopp, and Mare attribute it to the agency of the electric fluid.

⁴ Water sometimes increases instead of diminishes the burning.

⁵ *Elements of Med. Jur.*, by J. R. Beck, pp. 312-316.

⁶ In the city of New York alone no less than 260 deaths from coup de soleil were recorded during the summer of 1853, while in the city of Philadelphia during the

terised by no well-marked post-mortem appearances.¹ It is generally thought to be occasioned by exhaustion from heat, accompanied most probably with some molecular change in the blood, and may be ascribed to the direct influence of the sun's rays or any kind of artificial heat.² Professor Trail is of opinion—"that the sun-stroke is a species of apoplexy induced by the direct influence of the sun on the head, and is in some cases similar in its effects to the Khamsin; whereas in others it appears to be produced by congestion of the lungs, resembling what has been called pulmonary apoplexy, of which most distressing dyspnœa is the chief symptom."³

No rules can be given for the settlement of the question of survivorship in such cases; but it is just possible that as the young and the old suffer most from cold, they will on this account withstand a greater amount of heat. A case bearing indirectly on this point is quoted by Foderè. An Englishman, and his daughter aged seven, in 1814 crossed the desert of Syria to the Persian Gulf; they rode on camels, and were placed in precisely similar circumstances. The father died, while the child arrived in safety at the journey's end.

Death by Lightning.—Death resulting from lightning is as a rule so instantaneous, that the idea of survivorship is out of the question. Of the numerous forces at work in the external world, there is perhaps none so subtle and disastrous in its effects as electricity. Trees, ships, houses, all the productions of nature and art, bend before its irresistible power; and when man himself is opposed to its dread influence his being is blighted with the rapidity of thought. So incomprehensibly short is the period generally occupied by this mode of death, that even in the presence of competent witnesses the question of survivorship could rarely, if ever, be settled. As, however, there are certain positions which are more exposed than others, it may be of use briefly to advert to them as being likely to contribute to our information on this difficult point. The places which are most exposed to the ravages of lightning are the very spots to which the uninitiated would naturally run for shelter, viz., beneath trees, by stone walls, by buildings, by prominences of all kinds, and, what may appear strange, in vast plains and by rivers. But the reason is evident. It is dangerous to be in the immediate vicinity of whatever attracts. Trees and prominences attract; and, as the body is itself a very good con-

months of June, July, and August of the same year, the deaths amounted to 57 (Wharton and Stille's *Med. Jur.*, p. 589).

¹ In some rare cases inflammation of the brain and its membranes is observed; but in the majority of instances, according to Dr. Pepper, the brain exhibits no indication of congestion, and nothing in fact of an unusual appearance. That observer, however, thought the heart pallid, flaccid, and softened, while the other muscles of the body were florid and firm. No difference can be observed between individuals dying of sun-stroke and other kinds of heat.

² Dr. Smith, of New York, states that 11 patients were admitted into his hospital from the laundry of one of the principal hotels in that city, and that several were brought from a sugar-refinery, where, after working several hours in a close and overheated apartment, they fell suddenly down in a state of insensibility.

³ *Outlines of Medical Jurisprudence*, by Thomas Stewart Trail, M.D., F.R.S.E., &c. Edinburgh, 1857, p. 86.

ductor, it follows that if the person be very far removed from eminences of all kinds (as in a plain) he may himself become the source of attraction—i.e., he may form the connecting link between the clouds on the one hand, and the earth on the other ; in other words, the electric fluid may pass through him to a negative cloud overhead, or vice versa.¹

Again, the places most exposed in dwellings are windows, fire-places, partitions, and proximity to mirrors and other polished surfaces. If, therefore, a severe thunderstorm has taken place,² and the post-mortem appearances are such as are most readily explained by lightning—the closeness of the bodies to the dangerous neighbourhood may assist in giving a proximate conception of the order of death. There are, moreover, collateral circumstances which might also come into play, such as metallic and other conductors about the person, and the appearance of the body itself; thus if the garments be found rent, and the body much lacerated or contused, while the metallic substances about it (if there be any) be fused and rendered strongly magnetic, the presumption of instantaneous death is pretty conclusive. If, on the other hand, the body be found a considerable distance from a dangerous locality,³ and the foregoing appearances are presented in a minor degree, then there is (*prima-facie*) a probability that death has not been quite so speedy.⁴ It must, however, never be forgotten that these are by no means certain rules to go by, for persons situated in the best possible circumstances to avoid lightning have been struck by it,⁵ while those who have been struck by the returning or ascending stroke, as it has been termed by Lord Stanhope, present no trace of the electric fluid whatever. Sir Benjamin Brodie thinks that lightning kills by acting directly on the brain and spinal cord, an opinion which seems to be borne out by individuals who have been struck and recovered,⁶ and the post-mortem appearances presented by

¹ It is now understood that death may be caused by an electric shock other than the lightning stroke. This takes place when a cloud in near proximity to the earth is negatively electrified while the earth is positive. The human body is here made the conductor by means of which the equilibrium is restored. This is called *the ascending or returning stroke*. (Guy's Principles of Forensic Medicine, p. 384.)

² It is not impossible that the stroke of lightning should have been neither preceded nor followed by rain or wind, as is usual in thunderstorms. On Monday the 2nd of July, 1843, about 3 o'clock p.m., five negroes were simultaneously prostrated by a single stroke of lightning on a plantation in Georgia. The sun was shining brilliantly at the time, and a greater portion of the western hemisphere presented the usual serenity of the summer sky. For further accounts see Medical Jurisprudence, by Wharton and Stille, p. 599.

³ It is thought that a distance of from twenty-five to thirty-five yards from trees, houses, &c., affords places of greatest security in a thunderstorm.

⁴ Sir Benjamin Brodie has discovered by his experiments on guinea pigs, that the rapidity of death by electricity varies in proportion to the strength of the shock ; and the proximity of the individual to good conductors which would transmit the electric fluid in all its intensity seems to me to favour the idea of more speedy death, and vice versa.

⁵ Mr. Taylor in his Elements (p. 288) relates a remarkable example where two persons were struck, although they were situated in a deep hollow surmounted by a lofty tree. These persons however were in a vehicle the metal of which may have afforded a better conductor than surrounding objects of a greater elevation.

⁶ In the frightful accident which occurred in July, 1819, at the village church of

the bodies of those who did not recover, viz., bluish markings in the region of the spine.

The other post-mortem appearances generally enumerated are contusion and laceration where the electric fluid has entered, with sometimes a small aperture denoting its exit—occasional marks of singeing of the clothes, and burning of the body, fluidity of the blood (John Hunter), the absence of cadaverous rigidity in the muscles, and the rapid tendency to putrefaction. These three last signs, however, have been very properly disputed. Sir C. Scudamore has found that the blood in the veins of animals killed by electricity is always coagulated. Sir Benjamin Brodie observed that animals killed by the electric spark become rigid after death, and Dr. Francis and Beccaria each mention a case where the individual perishing by a stroke of lightning became excessively rigid.

The question of putrefaction is also obscure, and requires at least further confirmation. Granting, however, that those signs obtained, they might all be referred to other kinds of death. In death by lightning, therefore, as in several other forms of death already adverted to, the post-mortem appearances are by no means conclusive, a circumstance which renders the question of survivorship exceedingly difficult.

Recapitulation.

The topics more particularly dwelt upon in the foregoing pages, of which a hasty résumé may serve to impress the leading features, are these :—

First. The term presumption has been referred to its origin, and the various meanings attached to it in the phrase “presumption of survivorship” pointed out.

Secondly. The laws framed for the regulation of questions of survivorship have been traced from the earliest times, their insufficiency in many instances having been clearly established.

Thirdly. The scarcity of positive law, especially in Britain, has been shown to be the source of much dissatisfaction to surviving relatives.

Fourthly. An attempt has been made to frame, on physiological grounds, such a code of laws as will fairly meet the majority of cases.

Fifthly. The difficulty attending such an attempt has also been explained, and abstracts given of the more celebrated cases in which the interference of positive law would have been beneficial.

Sixthly and lastly. The chances of survivorship in death by parturition, by wounds, by suffocation, by starvation, by cold, by sun-stroke, by lightning, and by burning have been considered at length; and the precautions to be taken in arriving at a correct diagnosis specified.

Châteauneuf-les-Moustiers, situated on one of the summits of the Lower Alps, eighty-two were more or less injured, and of these many suffered from paralysis of the lower extremities.

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