A treatise on medical jurisprudence : based on lectures delivered at University College, London / by George Vivian Poore.

Contributors

Poore, George Vivian, 1843-1904.
Royal College of Physicians of Edinburgh

Publication/Creation

London : Murray, 1901.

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A TREATISE ON MEDICAL JURISPRUDENCE

BY VIVIAN POORE

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A Treatise on Medical Jurisprudence

A TREATISE

ON

MEDICAL JURISPRUDENCE

BASED ON LECTURES DELIVERED AT UNIVERSITY COLLEGE, LONDON

BY

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WITH ILLUSTRATIONS

LONDON

JOHN MURRAY, ALBEMARLE STREET

1901

TO

SIR ROBERT H. COLLINS, K.C.B.

BARRISTER-AT-LAW

PREFACE

THIS treatise is based on Lectures delivered at University College, London. The Lectures were taken in shorthand for the *Clinical Journal* at the request of its editor, to whose enterprise this volume largely owes its existence. Considerable additions and emendations have been made and the matter has been divided into chapters, but the reader will understand that the selection of matter and the colloquial style is due to the fact that the chapters were, to a large extent, originally spoken and not written. The book is intended to place the ordinary practitioner of medicine and law in possession of those facts, a knowledge of which is essential.

By the free use of illustrative cases, drawn from the records of the Law Courts and the author's personal experience, an endeavour is made to give to dry details sufficient interest to cause them to dwell in the memory.

In the section devoted to Toxicology, the author has limited himself mainly to the discussion of such poisons as have been actually used for criminal purposes, and has abstained, as far as possible, from trenching upon the domains of the Physiologist, Pharmacologist, and Medical Officer of Health.

The subject of Insanity has been treated from the point of view of the general practitioner, so as to enable

him to recognise the different varieties of insane patients, and to fulfil adequately his legal duties in regard to them. This section has been made as objective as possible by the free use of illustrations, obtained from instantaneous photographs.

In the Appendix much information is given in the form of tables, which can be easily found and consulted. These include Tables of Ossification and Development and Tables of Poisons, with indications of the treatment, antidotal and otherwise, which is proper to each.

The author is much indebted to many friends for very timely assistance: he would especially tender his thanks to Mr Eliot Creasy for many kindnesses. To Professor George Murray of Newcastle, to Dr Mott, F.R.S., to Dr R. Langdon-Down, to Dr Kenwood, Dr Batty Shaw, and Dr Garson, his thanks are due for much advice and assistance, while to Mr George Pernet, for his invaluable help in passing the volume through the press, and in the preparation of the Appendix and the Index, his indebtedness is very great.

24A PORTLAND PLACE, W.,
April 1901.

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MEDICAL JURISPRUDENCE

CHAPTER I

INTRODUCTORY

Historical—Knowledge Required—Evidence—Illustrative Cases and Examples — Use of Medical Terms — Written Notes — Professional Secrecy—Attitude of the Medical Witness—Authorities — Expert Evidence — Solicitors' Actions — Fees — Subpœnas—Rules *re* the Facts of a Case—Dying Declarations—Wills of the Dying (or Making of Wills in the Article of Death).

Introductory.—Medical jurisprudence must be defined as the application of medical knowledge to legal purposes. It is sometimes spoken of as forensic medicine—that is to say, the medicine of the forum or public place. It is a branch of state medicine; the other branches being hygiene and public health.

Cases involving knowledge of medical jurisprudence are of everyday occurrence, such as sudden death, assault, homicide, murder, poisoning, damages for injuries, questions of identity, legitimacy, and insanity, and questions in relation to life assurance and benefit societies.

It is needless to point out to you the importance of the study of medical jurisprudence. There is no escape from it, not by any possibility. A man is free to choose his own line of practice; he may be a general practitioner, a surgeon, an obstetrician, a physician, oculist, dentist, or anything; but medical jurisprudence is very often a thing which we run into willy nilly. A man is knocked down

in the street—you happen to be the nearest person having professional knowledge, or you are called out to a serious accident which happens in the neighbourhood of your house. You cannot refuse to go; common humanity compels you to go, whatever your practice may be. But you have to follow that case into the law courts. It is important to remember that, whereas the practice of medicine is usually confidential, in courts of law no concealment is possible, and your conduct with regard to the case in question, whether it be wise or whether it be foolish, is canvassed by the public at large. A reputation may be either made or marred according as your conduct in the witness-box shows that you have behaved sensibly or foolishly in relation to some *cause célèbre*.

Now, in giving a course of lectures on medical jurisprudence, it is not my intention to talk text-book at you. There could be no object in a lecturer giving dry figures and tabular statements, and so forth, which are much better printed than uttered; and it is not my intention to do anything of that kind. But I hope to be able to interest you, and to show you that in the lecture-room it is possible by a little freedom of treatment, to give you, not only the bricks with which you will build the edifice of your knowledge of medical jurisprudence, but a little mortar also in the form of interesting details which will aid your memories.

Medical jurisprudence is a comparatively modern science. There always must have been cases in which medical jurisprudence was necessary, but it was long before the necessary knowledge was systemised.

Historical.—The first writer of importance on medical jurisprudence appears to have been Zacchias (1584-1659), who was physician to Pope Innocent X. He wrote a large book called *Quæstiones Medico-legales*, in which he discussed many of the questions which we shall discuss. Zacchias was one of the household of the Pope; he was a priest as well as a physician, and in his great book there is

a strange and interesting intermingling of questions of medicine with questions of theology.

The first writer in this country was Dr Farr, who wrote in 1788. One of the first French writers was Fodéré, who wrote in 1796. The founder of modern toxicology was Orfila, a Spaniard domiciled in France. Orfila's book on poisons is certainly the foundation of the modern science of toxicology. The first edition of Orfila's book was published in 1814. I have a copy of the second edition, which was published in this country in 1819. A notable English treatise on medical jurisprudence was that by Paris and Fonblanque. Dr Paris was president of the College of Physicians, and Mr Fonblanque was an eminent barrister; they combined, and produced a most excellent book.

Then we come to the great work on toxicology by Sir Robert Christison, based largely on the previous work of Orfila. Next in order is Alfred Swain Taylor, whose *Medical Jurisprudence* is a classic, and always will remain so; it is a magnificent book, and in it you will find excellent summaries of many of the great trials. *Taylor's Medical Jurisprudence*, as edited by Dr Stevenson, of Guy's Hospital, still retains its high character.

Knowledge Required. — The knowledge required by a medical jurist is very wide. There are in this country no specialists in medical jurisprudence, for the very good reason that there is not a living to be made out of it. In this country we do things in a haphazard way, but the results are nevertheless fairly good. The investigation of cases of poisoning, cases of assault, and so forth, is undertaken in the first instance always by the practitioner who happens to be in attendance on the case, and as a rule that works fairly well. Our modes of procedure in cases involving medical jurisprudence differ from the continental modes. On that account foreign books on medical jurisprudence are not so useful to an Englishman as the English books. Of course, on questions of path-

ology and pure chemistry you may get a great deal of very valuable information from foreign sources, but the whole management of a case involving medical jurisprudence is different abroad to what it is in this country. I have said that the knowledge required of you is very wide, and that is one of the advantages of medical jurisprudence; it compels you to attend to a good many questions. But the study of it is of great value in itself. In medicine and in surgery, but more especially in medicine, we are always confronted with a plurality of causes. A man comes before us with, say, pneumonia, and we ask what is the cause of it? He has, perhaps, been in a house where there are several cases of pneumonia, he may have been chilled, he may have diseased kidneys, he may have been starved, he may be a drunkard, he may have been injured, and out of the many causes you are often puzzled to say which have been the exciting, predisposing, and determining causes. While in medicine we have the plurality of causes and the singularity of effect, in medical jurisprudence we have the other conditions of things—the singularity of cause and the plurality of effects. And it is a very interesting thing to see how many effects may follow a single cause. When we discuss toxicology you will see the truth of this.

Evidence.—One of the chief duties you will have to perform as medical jurists—and you are all bound to be medical jurists—is to give evidence. You may have to give evidence in the sanded parlour of a public-house at a coroner's inquest; and you must remember that evidence, given possibly under squalid and hurried circumstances, may lead you to a magistrate's court or to the assize court. You must remember, therefore, that whenever you open your mouth as a medical jurist, you have got very carefully to consider your utterances. Never give evidence without thoroughly considering it and without recognising the importance of it.

Evidence is of many kinds. First of all, it may be *oral*

or it may be *documentary*. In this country almost all evidence is oral—given by word of mouth. Again, evidence is either *direct* or *circumstantial*. What is the exact meaning of that? Let us suppose there is a murder committed in Gower Street by A. If I say "I saw A stab B in Gower Street at ten o'clock," that is direct evidence. If I say "I saw A going down University Street towards Gower Street with a dagger in his hand at two minutes to ten," that is a circumstance which may lead to A's conviction. It has been debated whether circumstantial evidence or direct evidence is the more valuable, and it is very difficult to say. I say that I saw A going down Gower Street, but, with the best intention of speaking the truth, I may be mistaken—I may have mistaken the identity of A. If a series of persons give a series of circumstances all implicating A, then circumstantial evidence is quite as valuable as direct evidence. Circumstances, if you get a complete chain of them, are very valuable indeed, but the chain ought to be complete. It has been said that circumstances cannot lie. True, circumstances cannot lie, but of course there must always be a doubt as to whether the witnesses are credible or not.

Next, the evidence you get may be either *common* or *skilled*. I may put it in this way: If I say I saw A stab B in Gower Street, I may be subpœnaed by the police as a common witness; then I go to testify to facts, and it is my duty as a citizen to do so. But if the police come to me and say, "A man has been found dead in Gower Street, with certain wounds upon him, and we want you to say whether these wounds are the cause of death," then I go as a skilled witness to give opinions based on facts, and not to testify to facts which I have seen myself.

The evidence which you give in court must be relevant. Your evidence must have reference to the facts which are under discussion in the court. The judge is the only decider as to relevancy, and you very often find that barristers try to shake the credibility of the witness

by putting awkward questions as to character and so forth, the relevancy of which is very doubtful. You are not bound to answer any question which may incriminate yourself. In the old days of duelling any doctor who went out as surgeon to a duel became an accessory to the fact if the duel resulted in death. Technically he became accessory to a murder. Therefore in such a case if the doctor was asked whether he went, knowing that a duel was to be fought, he was not bound to answer that question, because the answer to it might incriminate himself.

It is important to remember that *hearsay is not evidence.* Evidence must be first hand, and you must be very careful to distinguish between hearsay and evidence. C may go into the witness-box and say that he saw a man killed in Gower Street, but B cannot say that C told him he saw a man murdered in Gower Street. A very important decision under this head occurred some years ago at the Norwich assizes.

Regina v. *Bedingfield*, Norwich Assizes, November 13th, 1879, before Cockburn, C. J., Henry Bedingfield was tried for the murder of Eliza Rudd at Ipswich on July 8th, 1879. Bedingfield and Rudd were on most intimate terms, and had been known to quarrel at times. They were heard to quarrel on the morning of July 8th. About eight o'clock Rudd was heard to scream, and was seen to run from the house with her throat cut. She was taken back into the house, where she died in ten minutes, and she pointed to the next room, where Bedingfield was found with his throat also cut, lying upon his belly with his left arm under his head, with his right arm extended, and near the right hand an open razor. The right hand and razor were both bloody. The wound in Rudd's throat was three or four inches long, sloping upwards from left to right, and deeper towards the right. It divided the œsophagus and big vessels. The wound in Bedingfield's throat was transverse, above the thyroid cartilage, and both sides alike.

The defence set up by the prisoner was that Rudd had first cut his throat and then cut her own. He was convicted and sentenced to death.

Rudd, when she rushed from the house screaming and with her throat cut, made a statement to one of the witnesses. The statement probably inculpated the prisoner, but it was not admitted as evidence because it was made after the deed and not in the presence of the prisoner. It was hearsay, and not part of the *res gestæ.* It was not admitted as a dying declaration because there was no evidence that the woman knew she was dying.

That is perhaps the strictest decision ever made with regard to hearsay and a dying declaration. This was the decision of Sir Alexander Cockburn, one of the ablest judges who ever sat on the bench. It has been disputed by Mr Pitt Taylor and others. This decision also impresses upon us the fact that dying declarations are not evidence unless the person making the declaration knows that death is imminent. The decision as to whether a dying declaration is to be accepted as evidence or not rests solely with the judge, but in order that a dying declaration may be accepted you must be able to state that you are perfectly sure that the person who made it knew that death was imminent.

I will refer to the recent trial before Mr Justice Hawkins, at Huntingdon, for strychnine poisoning, in which a statement of the deceased made to her daughter, one of the witnesses, was refused as evidence. I will relate to you carefully what occurred:—Counsel for the prosecution said, at the end of the trial, there only remained the question on a point of evidence raised earlier in the case. He had tendered certain evidence of Annie Holmes, the daughter of the deceased, on the authority of *Regina* v. *Palmer* and *Regina* v. *Lawson.* He tendered all the statements made by the deceased to her daughter or none. The learned judge said that what was said by the deceased as to her symptoms was

admissible, but not as to how she became possessed of the poison. Her narrative could not be received as a dying declaration. These cases stood on an entirely different footing from dying declarations. A person might say, "I am in great pain from having taken some medicine this morning," but might not, unless as a dying declaration, which was not the case here, go on to say where such medicine came from, or who gave it to her. It could not be said to be part of the *res gestæ*. Dr Anderson, recalled, said the deceased said when he was with her, "I believe I am poisoned." He asked her what she had taken, and she replied, "I have taken a powder." By the learned judge: "He formed the opinion that death was imminent because no one in her condition could be expected to recover. . . . Except the terrified look that her face showed, and the general struggle that was taking place during the spasms, there was no sign that she expected death. The spasms were agonising ones. Her mental condition was clear between the spasms."

Annie Holmes, the daughter, recalled, said that as she was getting out of her bed her mother said, "Oh, I feel so bad." When witness got round to the other side of her bed, her mother said, "Rub my legs and arms." Witness asked her what was the matter, and she replied, "I have taken poison." "What was it?" "A powder." The learned judge said that in the event of the defence taking a particular line, he might allow the rest of the deceased's statements to be given as rebutting evidence. That is a subtlety. The particular line of defence alluded to was, presumably, a defence of suicide as opposed to murder. However, as the case stands, it presents matter of very great interest, and it is important to you as doctors, because a doctor being a person who is often at a death-bed, he is very likely to have matters of this kind brought to his attention.

When you are called upon to give evidence about a

case, consider it from every point; and you will do well to consult any books you may have, and to talk over the matter with a discreet friend. Before you give your evidence you must try and look at the case from all points of view. Remember that you are going to give evidence which may incriminate A or B, and you must consider what A or B might urge in his defence. In that way you will weigh the question from both standpoints. Having once made up your mind, give your evidence, and do not trouble about the consequences.

Do not form a judgment on insufficient data; that is the first thing. In times past, very much oftener than now, one used to hear of coroner's juries returning a verdict of "death by the visitation of God." Well, every death is by the visitation of God, and if coroner's juries are only to tell us that, they are of no use. The coroner's jury has nothing to do with ultimate causes; it is only concerned with proximate causes, concerning which you cannot form a conclusion without data. If the data are not forthcoming, do not give evidence. On the other hand, do not be foolishly obstinate. A man is knocked down in the street, and he is obviously injured, and the injuries which you can see are quite sufficient to account for his death; do not insist upon a needless post-mortem examination—that would be foolish. You may urge that it will be advisable, but it is notorious that in many cases of sudden death the cause of the death is practically certain without a post-mortem. If a man drops suddenly dead, and you know that he has aortic disease, do not insist on a post-mortem examination. You may say "He had a disease which, in my judgment, was quite likely to cause sudden death." If death has nevertheless really been caused by a dose of poison, that is not your fault, but you would be quite right in giving the above opinion. Post-mortems are, of course, always interesting and instructive, but that is

another matter. In your public capacity do not needlessly insist upon them.

In a court your examination, as a rule, is in three parts. First there is the *examination in chief*. If you are called by the prosecution, the counsel for the prosecution elicits your evidence. He probably knows from previous depositions exactly what you are going to say, and he elicits your evidence by questions in this way: —You are Dr Smith? Yes. You are a doctor of medicine? Yes. You are practising in such and such a place? Yes. You saw the deceased? Yes. He had his throat cut? Yes. And so on. That is the examination in chief. In giving evidence be simple, and be careful of the language you use. Unfortunately medicine is hedged about by very long words, and the use of jargon has become a mischievous habit with most of us. It is a very important thing indeed when you are in the witness-box not to use puzzling terms. When I was house-surgeon at the hospital I had to give evidence on one occasion in a case of injury, in which a man had been knocked down by an engine. I made use of two expressions: I described the various wounds the man had, and amongst others one going from the *commissure* of the eyelids backwards, and I said that after he was admitted he suffered from *traumatic* delirium. The newspapers next day reported that the man was a "connoisseur of the eyelids," and had "aromatic delirium."

Taylor reports a case where a medical witness informed the court "that on examining the prosecutor he found him suffering from a severe contusion of the integuments under the left orbit, with great extravasation of blood and ecchymosis in the surrounding cellular tissue, which was in a tumefied state. There was also considerable abrasion of the cuticle."

Judge.—You mean, I suppose, that the man had a black eye?

Witness.—Yes.

Judge.—Then why don't you say so at once?

I bring forward these cases because it is very annoying indeed to find that in the newspaper reports of trials and so forth you are credited with having talked rubbish; and you will be sure to be reported as having talked rubbish unless you are exceedingly careful to explain what you mean. Medical jargon is sometimes only a screen for ignorance. It is said that everybody will talk sensibly and well about a thing he really understands, and I think that is true. It is also said that children of moderate age make excellent witnesses, because they are perfectly simple. You cannot shake them; they are guileless, they have no thought of traps being laid for them in subsequent cross-examinations.

In the witness-box be dry; avoid adjectives and adverbs and metaphorical expressions. Say that the wound was so many inches long; that the man may have lost six ounces of blood. It is much better than saying "he had a frightful wound" and "enormous hæmorrhage," or words to that effect. Be dry, and let your statement be as accurate as possible, because if you use expressions which are not accurate, such as "enormous" and "frightful," you are sure to be cross-examined upon them; and a clever barrister, if he does not shake your evidence, may have the satisfaction of making you appear a little ridiculous before the jury, and that may serve his purpose very well.

The next point is with regard to notes. You go to a case and you make notes of the circumstances, and the question is, May you use those notes in court? I answer, Yes and No. You may use your notes to refresh your memory. For instance, you may be asked, "Now, was it Monday or Tuesday you were at such and such a place?" You may then take out your pocket-book and refer to it. The judge will let you do it, but you must be ready to swear that the notes made in your pocket-book were made at the time; that they are not "cooked" notes—notes which you have concocted after consideration. That is

very important and quite reasonable, and they must be used only to refresh your memory, not to read from as evidence.

Next, with regard to professional secrets. You have no right to speak of what passes in the sickroom to anybody except in the witness-box; then you are bound to, and the judge will tell you that you are bound to. But I give you this piece of advice: never utter professional secrets without appealing to the judge. You know perfectly well what the result will be—you will have to tell them. But I think it is a wise course to make it appear to the public that you divulge these professional secrets under judicial compulsion. I have taken that course more than once myself.

I remember one instance of a report made in an insurance case. It was a report which rather called in question the character of a man for temperance. It was possibly a libellous statement, which was made confidentially. I said, "This is a confidential document made to the directors, and to them only." The judge said, "You must state it," as I expected he would; but I made it appear that the evidence was given only under judicial compulsion. The priest in Roman Catholic countries is allowed to escape from this compulsion. What is said to him under seal of confession need not be divulged.

After your examination in chief you are cross-examined, and it is, of course, with a view to shaking your testimony. Whereas in the examination in chief only simple questions are allowed, in the cross-examination "leading" questions are permitted. What is the difference? "Where were you at ten o'clock on Tuesday?" "I was in Gower Street." That is a simple question. A cross-examining barrister can say, "Were you in Gower Street at ten o'clock on Tuesday?" That is a leading question, and suggests the answer. If a leading question is put in the examination in chief, the opposing barrister will say, "I object to that question."

The reason why hearsay is not evidence, and why dying declarations, which are forms of hearsay, are received with great unwillingness, is this: They cannot be subjected to cross-examination, and cross-examination is the very essence of our judicial system. Evidence is almost worthless unless it be subjected to cross-examination—

> "A lie which is half a truth is ever the blackest of lies,"

and that is why cross-examination is so necessary. A man may state facts quite truthfully, but the way in which he puts them may give a totally false impression. I once heard it stated of a man that "he lived down a blind alley out of Oxford Street." It was quite true, but on cross-examination it appeared that he lived in a palatial residence in Stratford Place, which happens to be a *cul-de-sac*. Here the use of cross-examination comes in. Now the cross-examination is made by a hostile person, and it is the business of the cross-examiner to shake your evidence and to turn it, if he can, in favour of his own side. A cross-examiner, as I have said, is allowed to put leading questions, and he has been known to bully. You must not mind that, and it is a very great mistake for a witness, especially a scientific witness, to lose his temper or to bandy words with the counsel. If you speak the absolute truth you need fear neither examination nor cross-examination. It is when a man tries to give a biassed view, when he tries to appear learned about a thing that he really knows little or nothing about, that the cross-examination comes to him as a trial. If you are perfectly truthful and simple, and, let me say, think of your own reputation, not only for knowledge but for honesty and truthfulness, you need not fear any cross-examination.

> "This, above all, to thine own self be true,
> And it must follow, as the night the day,
> Thou canst not then be false to any man."

And that is the mental condition a man should be in when he gets into the witness-box.

Now cross-examinations are made by persons of great ability, and you must remember that the eminent counsel is a man of peculiar mental organisation, who acquires knowledge without the slightest difficulty. He can acquire knowledge of every kind; be perfectly clear-headed and be able to cross-examine on it. If you doubt this, read the trial of Madeline Smith or William Palmer for murder. There you will see what Inglis in Edinburgh, or Cockburn in England, could acquire in the way of a knowledge of chemistry and the detection of poisons. Remember you have to face a man not only of great ability, but a man who has got books and experts behind him, telling him what questions should be asked, and why.

Authorities.—May one quote authorities? Everything that is in print acquires an importance which very often it ought not to have, and there is no doubt whatever that authorities are calculated to influence the jury. But my advice to you is never to quote them. And you must remember that authorities come in the same category as hearsay; the author cannot be cross-examined. You may quote from Taylor or Christison, but you cannot call them from the vasty deep and cross-examine them. And you must remember that a clever advocate has possibly a more accurate knowledge of authorities than you have yourself, because if he is going to cross-examine you upon a technical point he has probably got all the authorities at his fingers' ends. That is the quality which brings a man to the front at the Bar. To give you an instance: at the trial of Madeline Smith in Edinburgh the question arose whether white arsenic had any taste, that is to say, whether a person might take white arsenic unawares. One of the medical witnesses said that arsenic had no taste, that it was merely rough on the tongue, and he quoted a passage from Orfila's book to the effect that white arsenic was "*âpre*" (rough). The opposing counsel was down upon him instantly. "Yes, quite right; page

so-and-so, volume so-and-so. But on page so-and-so you will find he says it is '*âcre et corrosif*.'"

Again, you must remember that you may have an authority quoted *at you*. Counsel may ask you, "Do not you know that So-and-so, the great authority, gives this opinion?" When an authority is quoted at you, if you do not accurately remember the passage, *always ask to see the passage referred to*. Remember that a passage in a book can only be fairly interpreted by the context. Do not have an odd paragraph quoted at you without being sure as to what is being quoted. It is a very important thing to keep your head in the witness-box.

In giving evidence, and when under cross-examination, always be respectful to colleagues. It is a very necessary thing. You may give an opinion, and are told that another medical witness has given a contrary opinion. The other medical witness may be of no account whatever. You may have the very worst opinion of him, and such an opinion may be justifiable; but do not use any expression which savours of contempt. Do not say it is "rubbish," or "nonsense"; simply say you do not agree with him. I think that is very important.

Do not appear unwilling to communicate facts. If you know anything say so. Another important point is to keep matters of fact and matters of opinion perfectly distinct. That is not always done.

Now, after your cross-examination, if the cross-examining counsel has given a different aspect to anything you may have said than that which you gave to it in your examination in chief, there is a re-examination by the friendly counsel. He will re-examine you, so as to correct any false impressions which may have been left on the jury. So much about the ways of giving evidence.

Expert Evidence.—You may be called, as I have said, as a common witness, to testify to facts; or you may be called as a skilled witness, to give your opinion upon facts.

The advice on this head which I have to give you will almost appear unnecessary. Do not go as a *skilled witness* unless you are *really* and *practically* conversant with the facts concerning which you go to testify. As a professor of medical jurisprudence, I am very often appealed to by lawyers to give evidence, and I will give an instance of an occasion when I refused to do so.

A year or two ago a lawyer came to me to know if I would give evidence upon a case in which the legitimacy of a child was disputed. It seems that a lady had run away from her husband, and nine months after the day she ran away from her husband a child was born. The question arose as to whether that was the son of the gentleman she left at Basingstoke, or the son of the gentleman she met at Waterloo. And they came to me to give evidence. The point at issue was the relationship of pregnancy to menstruation. Well, I may say this: I have on my bookshelves dozens of books that deal with the subject, and when I come to deal with it in these lectures, I may give you information which I hope will be useful to you. I know what the *authorities* say upon the matter, but I would not go. Why? Because I felt I could not stand being cross-examined. Supposing the adverse counsel had said to me, You are practising as a physician, I believe? Yes. You are not an obstetric physician? No. Are you in the habit of seeing a large number of obstetric cases? No. When did you last attend a midwifery case? Thirty-two years ago. That would have been my truthful answer. Now, although I could give the lawyer good advice, and did give him what proved to be good advice, it would have been very silly for me to go as a witness. It does not follow that because you are a doctor you know every branch of doctoring, and it does not follow that because I am a professor of medical jurisprudence, I have a practical and extraordinary knowledge (which a skilled witness should have) of obstetrics. So I did not go, and that will show

you what I think your attitude should be in these matters. If you go to speak about a thing which you really are particularly conversant with, then you will be useful, and you will do credit to yourself.

Now it is the custom in this country to call skilled witnesses on either side; and expert evidence, as a consequence, has an evil reputation. But it answers tolerably well, because there is such a thing as cross-examination, and if the expert has an extravagant opinion, or an opinion based upon ignorance instead of knowledge, a clever counsel and those who are behind him may be relied upon to prick the wind-bag, and show how hollow it is. If you are subpœnaed merely to give opinions as an expert, are you bound to go? The answer is doubtful. I will only say you had better go. Some years ago there was an artistic quarrel in the law courts, and all the Royal Academicians were subpœnaed *en bloc* on one side. These gentlemen all came to obey the subpœna to give evidence, because they felt it would not be safe to disobey it. But when the lawyer comes to you for your opinion as an expert, he first of all finds out what your opinion is before he calls you; and unless your opinion is useful to him, he will not call you.

Solicitors' Actions.—The next point is this. You are sometimes asked to give evidence as almost a matter of charity. There is no rule without an exception. But I would say Don't. The medical profession does a great deal for charity, I hope it will always continue to do so, but be very careful how you take up litigation as an act of charity. And I would say this, beware of solicitors' actions. There are black sheep in every profession; there are medical black sheep, and there are legal black sheep, and the legal black sheep are sometimes very black ones. And you must be exceedingly careful not to get linked with a firm of dishonest solicitors who are taking up an action simply for what they can get out of it. The taking up of an action for what they can get out of

it, is, I believe, illegal; it constitutes the misdemeanour of "Champerty and maintenance," concerning which you will find a great deal in Warren's novel of *Ten Thousand a Year*. You are not allowed to support a man in bringing an action if you are to benefit by the result yourself. Some years ago I had a letter from a firm of lawyers of whom I knew nothing, and it was couched in somewhat these terms: "Dear Sir, '*Smith* v. *The London Omnibus Company*.' Our client, Mrs Smith, is bringing an action against the London Omnibus Company for damages sustained in one of their vehicles. As I understand Mrs Smith is a patient of yours, we should be very much obliged if you would let us have your opinion of the case." Do not ever, under such circumstances, give a written opinion to strangers. What did I do? I answered perfectly truthfully as follows: "Gentlemen, '*Smith* v. *The London Omnibus Company*.' I am sorry I have no recollection of your client, Mrs Smith." A few weeks went by, and I got another letter: "Sir, '*Smith* v. *The London Omnibus Company*.' As we understand that our client, Mrs Smith, attended at your out-patient department at University College Hospital yesterday, and as we are further given to understand that you made rather lengthy remarks about her condition to a circle of students, and that you finally ordered her a plaster to go upon the back of her neck, we think that these facts may probably have brought her to your recollection. If such be the case, will you kindly furnish us with your opinion?" To that I replied as follows: "Gentlemen, '*Smith* v. *The London Omnibus Company*.' If you will send a member of your firm, or a responsible clerk, to me during my professional hours, I shall be very happy to discuss this question with him, on the distinct understanding that every interview and every letter is treated as a matter of professional business." That was the last I heard of *Smith* v. *The London Omnibus Company*. Now I advise you always to take a similar line; never allow yourself to be

entrapped into what is known as a solicitor's action. I did not know anything about that action; but *my* course of action, I feel sure, was right. If you give a written opinion you never know where it will end, or where it will take you. Moreover, you have no right to be dragged out of your house and be put to expense without proper professional remuneration. There have been letters in the papers lately stating that a fee of two guineas asked by a doctor somewhere for giving certificates *à propos* of litigation was an extortion. It was nothing of the kind; it was very proper. It was a moderate and proper fee. There is no rule without an exception; but if a person is able to employ solicitors, he is able to pay other professional fees, and you must be well satisfied that you are going to do a real act of charity before you link yourself with a case without being properly paid for it.

My experience of solicitors' actions came to me very early indeed. I will tell you about it, because I think it should serve as a warning, and you will see why I lay down this rule. When I was house-surgeon in 1866 or 1867, there was amongst the students a man of not very good reputation. One does now and then come across such a man. One day he came into my room with a cut across the back of his hand, a clean cut done with a pane of glass, which laid bare the extensor tendons of the little finger and ring finger. I brought the wound together according to the methods in vogue at that time, put on a splint, and sent him away. The account he gave was that, coming downstairs at a railway station, he slipped on the brass edging of the stairs and put his hand through a window, and so cut it. I heard nothing of him for several months, when he appeared in my room with a subpœna ordering me to attend next day at the assizes at Croydon, where his action against the railway company was to be tried. With the subpœna he gave me two shillings, which was enough to pay my second-class railway fare to Croydon. That was all he was really bound to give me

with the subpœna. I had not seen this man for six months, but he still had his hand in a splint. I was rather annoyed at the circumstance. He said to me, "If it will save you any trouble I will call for you to-morrow morning"; and accordingly at 7.30 A.M. on the morrow I found myself in a four-wheeled cab with the plaintiff. We stopped first of all in the New Road, opposite a big door-plate, and were joined by a sporting gentleman with tight trousers and a bit of straw in his mouth. He was a solicitor licensed to administer oaths. Then we went a little further and picked up a medical witness, old and wicked, who had been on the treadmill for perjury, as I afterwards found out. Next we stopped at Serjeant's Inn and picked up the barrister, a gentleman of stalwart dimensions, with a black eye, burst boots, and rotten clothing. And so to London Bridge Station. There we were met by the second medical witness, who was proprietor of a homœopathic dispensary, and employed sandwich-men to invite clients. I found myself, therefore, in the same boat with a very pretty crew. You will please note how I got there. I got there from no fault of my own; I was bound to be there because I was subpœnaed, and I could not refuse to go. Moreover, they could not help calling me, because I knew more than anybody else did about the matter. You must remember also I was little more than a boy. The old medical witness took me by the arm in a fatherly, gentle kind of way, and like Hamlet and the ghost we glided to "a more remote part of the platform"; then taking his left forefinger he drew it completely across the back of his right hand, and giving me a look, said, "All the tendons on the back of the hand completely divided." I said, "I beg your pardon, not one of them." The man was a rogue; there was no question about it. Then he began to try to bully me. He said, "How do you account for the stiffness?" I said, "If you keep a man's hand in splints for six months you could not account for anything else." He

said, "The tendons must have been divided. I was surgical prizeman at ——'s Hospital forty years ago, and I know something about surgical pathology. They must have been divided." I said, "I have taken two surgical prizes at University College this year, and surgical pathology has made some advances since your time. I am absolutely certain none of the tendons were divided, and that will be my evidence." We went down to Croydon; they were at one side of the carriage and I was at the other, and I was thinking over what line to take. It was a very disagreeable position to be in. I was in the company of—I do not hesitate to say it—four criminals, who were engaged in a conspiracy. The fee to which I was legally entitled (£1, 1s.) had not been paid, I felt it probable that they had not got a guinea between them, but I said to the lawyer, "My fee has not been paid, and if I am put into the witness-box I shall inform the judge." If your fees have not been paid you must inform the judge of the fact *before you are sworn*. After you are sworn he will make you give evidence, because you have taken your oath to speak the truth and nothing but the truth. In a large number of these solicitors' actions the fees are not paid, and the judge, if informed, will order the fees to be paid. I took this line on the occasion I am relating, not so much for the sake of the guinea, but to make it clear that I was not dipping in the same dish with these rascals. I advise you to take the same course always. The judge luckily was a strong one—the late Lord Bramwell—and the black-eyed barrister had hardly opened the case when he shut it up, saying there was no cause of action. I tell you the tale because it shows you what a solicitor's action is, and how you may be involved in it, and your reputation be endangered. Be cautious in giving opinions and information to solicitors of whom you know nothing.

The scale of fees for giving medical evidence in the higher courts ranges from one guinea to three guineas. If

you have been attending a patient, and you know the facts, you are bound to go on these terms. But supposing people come to you and ask you to give your opinion upon a case in which you have not been professionally concerned, then you become an expert witness, and the fee is a matter of arrangement with the lawyer. It stands to reason that no man in extensive practice would run the risk of being taken away from that practice and being kept perhaps day after day hanging about a law court for a guinea or three guineas; it would not pay him. Therefore the solicitor has to come to an agreement. Now what should you ask? That will depend very much on the value of your time, and the value of your time depends on the position in the profession in which you happen to be. The value of the time of the late Sir William Gull, let us say, or of the late Sir Andrew Clark, and the value of the time of an obscure general practitioner, are very different. Therefore, when you are asked to go as an expert what should you do? My advice is this: You should ask the fee which you would ask of a rich patient whose good-will you wished to retain. Now, if a man gives very strong and very one-sided evidence, and in cross-examination it is found that he has had an *exorbitant fee*, then the value of his evidence is diminished immensely by that fact, because it may be made to appear that he is giving his evidence because he has been practically bribed to give it. So that the fee you charge must be one which you can defend conscientiously.

There is another point with regard to evidence of which I have had personal experience. I had once two subpœnas to attend two different courts, one at Clerkenwell and one at assizes in the country, on the same day. I could not cut myself into two, therefore what was I to do? I think you will be perfectly safe to go to the higher court. In this case the assizes in the country was a higher court than the sessions at Clerkenwell. In these days you would telegraph to the solicitor who had

subpœnaed you in the lower court to say that you had been subpœnaed in the higher, and were going. It so happened that I was at Clerkenwell when I got the second subpœna, and I asked the presiding judge. He said, "We will postpone the case in which you are concerned until you have given your evidence at the assizes in the country and have come back again." In such circumstances always appeal to the fountain-head for advice.

Beware of giving evidence as a skilled witness unless you know the *whole* facts. Only a few days ago I was asked to give evidence in a case. The lawyer came to me and put the matter before me in such a way that I was more than half inclined to give evidence. But I adopted the rule which I advise you always to adopt I said, "Before I give you my answer, I should like to read the whole of the depositions as taken before the magistrate." These were left with me; I read them all through, and having read both sides of the question, and not merely listened to the *ex parte* statement of the lawyer engaged on one side, I came to the conclusion that I could not give the evidence I thought I could, and I accordingly refused. A lawyer will sometimes come to you and put one side, and then in cross-examination something may be said which puts a different complexion on the case altogether.

Dying Declarations.—Now there are one or two things which you may be called upon to do. You may be called upon to take down a "dying declaration." A dying declaration is admissible only in criminal cases, and only in cases of homicide where the death of the person making the declaration is the subject of the charge. We will suppose a murdered man wishes to make a dying declaration. In order that this declaration may be admitted, the person must be aware that he is, without hope of recovery, going to die. The judges always insist upon that. If you are taking down a dying declaration, take it down in the *ipsissima verba* of the dying person. Do

not put your own construction upon it. There is not the slightest reason why you should not ask him what he means by any expression, but you must not, under any circumstances, put a leading question to him, such as "Did you see John Smith?" That would be wrong. Then you must get the dying person to sign it or make his mark on it, and you should attest it yourself with the date, and get a witness, if possible. But if it can be avoided do not take a dying declaration yourself; send for a magistrate. That is much more satisfactory. You may not only have to take a dying declaration, but you may have to make a will. Now here again I would say very strongly: If you are asked to make a will, do not if you can possibly help it. If a person is dying in an out-of-the-way place, and there is nobody else at hand, it is your duty to do it. And if you are called upon to make a will, remember again that you must make no suggestions; you must be sure that the will is a free will, and not made in response to suggestion. I will give you a case in point. A doctor attending an old gentleman made his will for him, or helped him to make it. The doctor suggested that the housekeeper, who had lived with his patient for many, many years, and had been kind and trustworthy, and so forth, was the proper person to be benefited, as he had no needy relatives of his own. As a result of that advice the old gentleman left the bulk of his property to the housekeeper. No sooner was the old man dead than the doctor married the housekeeper. The relatives disputed the will, and the court decided that the doctor's advice was a breach of trust, as he was giving advice which was meant to benefit himself. Accordingly the doctor got the housekeeper without the money. In respect of wills, also, though you may make no suggestions, you may ask for an explanation if the meaning of a statement is not clear. Do not attempt to make use of legal phraseology. An important thing, without which no will is valid, is the

attestation clause. This clause is to the following intent: "Signed by the testator, A. B., in the presence of us" —there must always be two witnesses to a will—"present at the same time"—the two witnesses must be there together—"who at his request"—the request of the testator—"in his sight and presence, and in the presence of each other, have attested and subscribed the same." When a will is attested there must be three persons present, namely, the testator and two witnesses, and they must be present together. Then all alterations, interlineations, corrections must be initialled by the testator and the witnesses. For instance, to take an extreme case, you cannot leave John a thousand pounds and then scratch *John* out and put *Emily* in unless the alteration is initialled by the testator and the witnesses. Wills should, of course, be made with the most indelible and indestructible materials. Wills are usually written upon parchment; but it is said that a will is valid no matter what it is written on. There is a record of a will written with a bit of chalk on a barn door. (See p. 477.)

CHAPTER II

THE LEGAL RELATIONS OF THE MEDICAL PROFESSION

History — Early Medical Legislation — Priests, Physicians, and Surgeons—Barber Surgeons—Apothecaries—Modern Legislation—The Medical Acts—The General Medical Council—The Medical Register—Privileges of Medical Men—Recovery of Debts—The Unqualified Medical Man—Death Certificates—Laws affecting Medical Men—The Anatomy Act—Directions by Will as to Disposal of the Dead Body—Relation of Doctor to Patient—"Assault"—Master and Servant—Restraining Hospital Patients—Infectious Diseases—Vaccination Laws—Malapraxis—Precautions in administering Anæsthetics to Female Patients—Communication of Syphilis.

I THINK it is advisable, before getting to the more technical parts of the course, to give a sketch of the legal relations of our profession.

History.—It seems tolerably clear that in the early stages of society the functions of the physician were always conjoined with those of the priest. Hippocrates, the father of medicine, was probably a priest in the temple of Æsculapius at Cos. In the Hebrew literature we find that the priestly class conjoined with their sacerdotal functions those of the physician and the medical officer of health. And so when you come down to later times in this country we find the same thing, the priest and the physician joined in one person. The earliest record that we have in this country of the physician is the doctor of physic mentioned by Chaucer. There is one line in Chaucer's account of the doctor

which is very often quoted, and it is sometimes quoted (wrongly) to prove that as a profession we are apt to be a little sceptical on matters theological. Chaucer says of his doctor: "His studie was but litel on the Bible." Now the meaning of that is this, that his medical duties had diverted him, as it were, from his strictly clerical duties. The early priests who devoted themselves to medicine made a great deal of money, and those who devoted themselves to surgery made more; so that Pope Innocent III., who lived at the end of the twelfth century, found it necessary to issue an edict that priests should not draw blood, because he found that they were going after filthy lucre. This edict of Pope Innocent III. caused an early separation between physicians and surgeons. Physicians still continued to be culled from the ranks of the priests, but the surgeons came from the ranks of more practical men. Now mark the difference. The physician, or rather the priest-physician, was naturally brought up to regard authority as absolute; and just as the priest was not allowed to question the truthfulness of his Scriptures—using the word Scriptures in its usual sense—so the priest-physician was not allowed to question the authority of the medical scriptures. The medical scriptures consisted of the works of Hippocrates and Galen and others, and there is in the early records of the College of Physicians an account of a Fellow who doubted the authority of Galen, and who was made to recant upon his knees. That is an interesting fact, and one which effectually prevented any progress. On the other hand, it must be remembered that the early physicians were largely men of high education, and from the earliest times were graduates of Oxford or Cambridge, and were men of culture in its widest and best sense. It has always been the practice of the College of Physicians to look largely to the culture and character of its members and Fellows, and I take it that we owe an immense debt to the College of Physicians, because it has raised the level

and kept up the level of medicine in this country. I have no hesitation in saying that the medical ethics which obtain in this country will compare favourably with those of any other country.

Early Medical Legislation.—As society developed the necessity for physicians and surgeons was more and more felt, and we find that early in the sixteenth century, in the reign of Henry VIII., a Medical Act was passed (1511). This Medical Act was passed because it was found that ignorant people and wise women were practising medicine, not always to the benefit of their patients. And so it was enacted that nobody should dare to practise medicine who had not been examined and approved by the bishop of the diocese. There again you get the link with the clerical profession; but it is right to state that the bishop of the diocese was allowed to call to his aid persons having knowledge of medical and surgical matters. In 1518 Henry VIII. granted a charter to the College of Physicians, and the founder of the College of Physicians was Linacre, a man of great classical learning. He had studied abroad, and was one of the leading men of the time, certainly one of the leading scholars of the time. But Linacre was a priest, and not only was he a priest, but he was a pluralist, and his clerical revenue was very large indeed. But let us be thankful for it, because he made good use of it. He established the College of Physicians, and founded valuable lectureships both at Oxford and Cambridge. Those who were associated with Linacre in the early days of the College of Physicians were also priests. Of course with the Reformation this state of things came gradually to an end. Still I may remind you of the fact (as evidence of the relationship of our profession to the Church) that the Archbishop of Canterbury still retains the power of granting an M.D. degree—M.D. Lambeth—and we need not grudge him that power, because he can only give the degree now to persons who are legally qualified. He

occasionally gives the degree to a medical missionary who has deserved well of both the clerical and the medical professions. As far as I know there has been no abuse of this power, and I should be sorry to see that little link with the past destroyed.

So much for the physicians; how about the surgeons? How did they come? Surgery must have been wanted in the world earlier than medicine. Epidemics of disease were largely looked upon as visitations of the higher powers, visitations against which it was useless to struggle. But wounds were regarded probably differently, and the man who could staunch a wound and preserve a limb must very soon have been appreciated. War must be regarded as the mother of surgery. And certain it is that some of the earliest and best known surgeons were men who accompanied the armies of their sovereigns abroad. In civil practice surgery took its rise from those who I suppose were accustomed to use sharp weapons, and occasionally to inflict sharp wounds; and it need not surprise us that the surgeons are an offshoot of the barbers. One of the oldest surgical institutions in this city is the Barbers' Company, formerly the Company of Barber-Surgeons, that dates back to the reign of Edward IV. Formerly, as you know, a barber was accustomed to bleed; and sometimes even now, in country places, you see the barber's pole (painted in alternate stripes of red and white, to represent the bloody limb and the white bandage), and the bleeding dish shaking in the wind. That old sign of the barbers must remind you that the surgeons are sprung from them.

The Charter of the College of Physicians dates from 1518, and twenty-two years later Henry VIII. gave a charter to the Barber-Surgeons; and in the Barber-Surgeons' Hall in Monkwell Street, which is not far from the General Post Office, there is a very famous picture by Holbein of Henry VIII. giving the charter to the Barber-Surgeons. Soon after this the Company of

Barber-Surgeons recognised a distinction between those who practised surgery and those who practised barbery. In 1745, the surgeons separated from the barbers, and established a hall of their own in the Old Bailey.

"Honour to whom honour is due." I have said something in praise of the early physicians; now I will say something in praise of the early surgeons. We owe the early surgeons a deep debt of gratitude. The early physicians, practising mainly by the light of their "scriptures," did not trouble themselves very much about the arcana of the human body; but the surgeon who had to operate soon found that a knowledge of anatomy was absolutely necessary. In the charter given by Henry VIII. in 1540, a clause was put in that the surgeons might have the bodies of a certain number of criminals for anatomical purposes. The surgeons in their hall in Monkwell Street, in the city of London, established an anatomical theatre, where they gave anatomical demonstrations. They engaged for that purpose a physician of the highest attainments, one, probably, who had been abroad to learn anatomy at the great school of Padua. Among the early anatomists in this country was Dr Caius, the founder of Caius College. Another physician who read anatomy to the surgeons was Dr Scarborough, a very eminent man in his day, and also a great mathematician and friend of Harvey. You will find in Pepys' *Diary* a graphic account of how Mr Pepys went to see a demonstration in anatomy at the Barbers' Hall. The early surgeons having set the example as regards anatomy, the physicians very soon followed, and Queen Elizabeth gave an addition to their charter that they might have the bodies of criminals. Then Caius also got permission to have anatomical demonstrations at Caius College, Cambridge.

So much for the surgeons. Let us now say a word about the apothecaries. The apothecaries originated in a different way; and it is not surprising to find that

the Apothecaries' Company is an offshoot of the Grocers' Company. The grocers were people largely concerned in importing what we should call colonial goods. With these they imported a good many things which were used in medicine as well as in cookery, and it is not surprising that as medicine advanced, the number of drugs multiplied prodigiously, and that a separate company was organised for their supply. The apothecaries were established in the early days of James I., in the hall close to Blackfriars Bridge, which no doubt many of you know.

In its early days the College of Physicians exercised very great powers. They had absolute control over the practice of medicine in London and a certain radius round it, and they often put irregular practitioners in the lock-up. The surgeons might not administer drugs, and there is a case on record of the President of the College of Physicians putting a surgeon in prison for administering a purgative. Those early physicians undertook a great many prosecutions of quacks, and it is interesting to note that these prosecutions often came to nought, because then, as now, the quacks had influential friends among the governing classes.

The early physicians set their faces also against unprofessional conduct, and if a man's conduct and morals were not what they ought to be, they drummed him out of their society, and held him up to public obloquy.

Next we find apothecaries, who were originally druggists pure and simple, prescribing. For a long time a battle raged between the physicians and the apothecaries, but ultimately the apothecary became a practitioner who supplied medicine, and a very useful person he was and is.

Modern Legislation.—The profession remained in a rather chaotic condition until the middle of the present century. It was in 1858 that the first Medical Act was passed. That Medical Act was amended or supplanted

by the Medical Act of 1886, and we are now governed by the Medical Act of 1886. By that Act it is ordained that no person can be registered as a legally qualified medical practitioner, unless he has passed a qualifying examination in all three branches of the profession—medicine, surgery, and midwifery. The qualifying examinations may be conducted by any university or corporation capable of giving a diploma, or any combination of two or more universities or corporations, provided the conjoining bodies are in the same part of the United Kingdom. You know that the Colleges of Physicians and Surgeons in London have combined and formed a conjoint board for conducting qualifying examinations.

General Medical Council.—The efficiency of the examinations is supervised by the General Council of Medical Education and Registration of the United Kingdom; that body appoints inspectors to attend the examinations, and if in the opinion of the General Medical Council the examinations are not stringent enough, the General Medical Council has the power to report the fact to the Privy Council, and the Privy Council has the power to ordain that the diploma given by such defaulting body shall be suspended until it amends its ways.

If a corporation has not the power of examining in the three branches of the profession, it is unable to give a qualifying diploma. The Apothecaries' Company had the right to examine in medicine and midwifery, but not in surgery, so that it could not grant qualifying diplomas, its attempts to effect a combination with other corporations having failed. The Privy Council, in accordance with the Act of 1886, intervened, and gave them permission to appoint examiners in surgery; thus the Apothecaries' Company can now give a qualifying diploma. The Medical Register is controlled by the General Medical Council, and the General Medical Council is composed as follows: There are three Crown nominees for England,

gentlemen nominated by the Government. It is a very important thing that a certain number should be nominated by the Government, because then they are not delegates in any shape or form, and they can take a perfectly independent view of every question. Then there are delegates from the Royal College of Physicians, the Royal College of Surgeons, the Society of Apothecaries, the Universities of Oxford, Cambridge, London, Durham, and Manchester (Victoria University). In addition there are three members elected by the registered practitioners of the country. The total representation for England is thus fourteen. For Scotland there is a Crown nominee, one elected by the practitioners, and one each from the Royal College of Physicians of Edinburgh, Royal College of Surgeons of Edinburgh, the Faculty of Physicians and Surgeons of Glasgow, and the University of Glasgow, the University of St Andrews, the University of Aberdeen, and the University of Edinburgh. For Ireland there is one Crown nominee, one elected by the practitioners, and one delegate from the Royal College of Physicians of Ireland, the Royal College of Surgeons in Ireland, the Apothecaries' Hall of Ireland, the University of Dublin, and the Royal University of Ireland. The total strength of the General Medical Council is therefore thirty. When it meets, the Council elects one of its members as President.

The main duty of the Council is to guard the entrances to the profession, and upon it also devolves the duty of expunging from the Register persons who have been guilty of certain offences. To these duties is added that of compiling the Pharmacopœia. The corporations have bye-laws of their own, and many of them expunge from their lists those who are guilty of unprofessional conduct. If a man has been convicted of any gross crime his name may be expunged by the corporation which gave him his diploma, and then the General Medical Council has the right to consider whether his

name shall be expunged from the Register or not. The Council is now very much alive to the importance of suppressing unqualified practitioners in every shape and form, and has lately issued an edict that unqualified assistants shall no longer be employed by qualified men. Now the General Medical Council is a useful body, but we must not expect too much from any governing body, and while we have an eye to proper qualifications and honest practice, we must also keep the other eye fixed upon our liberties both as medical practitioners and citizens.

Exemptions.—Medical men have certain privileges, and are exempt from certain duties. They are not bound to serve on juries, and they need not take, unless they choose, certain corporate and parochial offices. Our profession is a very exacting one, and a man who is liable to be called suddenly to those who are seriously ill would have to set aside his public duties. By an old Act of Parliament medical practitioners were exempt from serving the office of constable, watch, scavenger, and overseer, and from bearing arms and serving on juries; and the same thing has come down to our own time.

Unless a man be legally qualified—that is, unless he holds a qualifying diploma and be upon the Register—he labours under certain disabilities. The first disability he labours under is that he cannot recover debts for professional services. No member or Fellow of the College of Physicians is allowed to recover debts in a court of law. It is one of the greatest privileges ever bestowed upon us. It keeps us out of courts of law, and insures that the physician gets his fees at the time he is consulted, which is an enormous advantage. Therefore the unqualified man is on a level with the highly qualified man in respect to the recovery of debts. I do not think it is a great disability to labour under, because the unqualified man takes care to get his money

before he gives his advice. Another point is that a man who is not legally qualified cannot hold certain offices under the Crown, and cannot, without danger to himself, give a certificate of death nor a certificate of lunacy.

Death Certificates.—With regard to death certificates, I remind you that you are bound to give them. I see that there was a case the other day in which a practitioner refused to give a death certificate because his bill had not been paid. He lost his case, because you cannot demand payment for giving a death certificate. If you have knowledge of the cause of death you are bound to give a certificate; the law will order you to do so. With regard to giving a death certificate, let me say that it is a very important duty. It is an important duty as regards the public, and it is an important duty as regards yourself. And let me implore you never to give a death certificate hurriedly and without filling up the counterfoil. The forms of death certificate are supplied to you gratis by the registrars. You should always fill up a death certificate quite truly. Always give it serious thought, because certificates of death are the groundwork of medical statistics, the value of which cannot, I think, be over-estimated. (See pp. 483, *et seq.*)

I may, perhaps, call your attention to the fact that in *Churchill's Medical Directory*, you will always find a very good summary of the laws affecting medical men. I only bring to your notice such laws as affect you as general practitioners. If you take service under the Public Health Laws or Lunacy Laws you will have to become acquainted with very voluminous Acts of Parliament. I shall not trouble you with those here. I shall only deal with those Acts which concern us all.

Anatomy Act.—The practice of anatomy is controlled by an Act of Parliament. I alluded yesterday to the fact that the early surgeons and physicians had the right to acquire the bodies of executed criminals for anatomical

purposes. Partly from this cause, *i.e.*, that dissection was made, as it were, to add to the disgrace of capital punishment, and partly from a too literal interpretation of the doctrine of the Resurrection, dissection of the human body was for a long time looked at askance by the public. The difficulties of obtaining bodies for dissection were at one time very great, and these difficulties led to the practice of "body-snatching." Body-snatchers rifled newly-formed graves, and took the deceased to the anatomists, who bought the body and asked no questions. The practice of body-snatching was supplemented, unfortunately, by murder, both in London and in Edinburgh. By the investigation of these crimes the public were at length aroused to the fact that an Anatomy Act was necessary. I will not give you all the clauses of the Anatomy Act, because you will not want them, not being professors of anatomy, but will merely state that facilities are given by it for the use of unclaimed bodies in public institutions. Sometimes people have left their bodies to be dissected. Now, I would like to say with regard to these, that when people make wills of that kind it makes no difference to them, but it matters a great deal to the friends; and to make a will that the disposal of your dead body is to be by some unusual method is not kind to your executors. But the executors are not bound to carry out such directions as to the disposal of the dead body. It has been laid down in law, again and again, that there is no property in a corpse, and if in carrying out the directions of a deceased person as to the disposal of his dead body you incur any expense, the executors are not bound to pay it. There is a very interesting case bearing on that point which I will read to you.

Williams v. *Williams.* Chancery Division, March 8th, 1882, before Mr Justice Kay. Miss Williams sought to recover £321 from the executors of one Crookenden, being the expenses of removing Crookenden's corpse to Italy for cremation. Crookenden made a codicil to his

will, dated April 12th, 1875, directing that three days after his death his body should be delivered to his friend, Eliza Williams, to be dealt with by her in such manner as he had directed in the private letter; and further directed that a certain Wedgwood jar should be given to the plaintiff to be used as he had directed in the private letter; and he further directed that any costs to which Miss Williams might be put should be paid out of his estate within three months. The letter was as follows, and was dated March 28th, 1875:—"Dear Eliza,—I have written, to be executed at some future time, a codicil containing my little request to you as you wished, the prints and the pots, and two little money legacies to servants. I have directed my body to be given up to you as soon as conveniently may be after my death. You know my wishes, but I here repeat them that you may have this letter to produce if need be. I should like to be burnt when I am dead on a, or rather under, a pile of wood. I think the most convenient way would be to lay the body on a layer of dry faggots, and to build upon and around them a considerable mass of firewood, what is called cord-wood in some places, then to set fire to the faggots. If the fuel is only tolerably dry, it will burn with great fury for hours, and consume whatever is combustible. The calcined bones and fragments of bones can easily be collected when the ashes are cold, and I should like them put in the Wedgwood vase I have named in the codicil; if this would not hold them, then in any other larger vase which my collection my contain, or which could be procured on purpose. Any would do, provided it were not metallic, or if metallic, not precious. You know my preference for earthenware. With reference to the ultimate disposal of this vessel and its contents, I leave that entirely to you. You might like the vase to be buried with you when the time comes, or you might prefer giving it a totally different destination. I should like to have

written you a letter on a more cheerful subject, but as I want this done when it comes to the time, I will say no more than that I am your truly obedient friend and faithful servant, Henry Crookenden. You had better put this by and keep it." There was an nice little errand to ask a spinster to execute! It appears that Miss Williams did not build the funeral pile herself, as she was directed to, but she got the body exhumed, and got permission for that exhumation under false pretences from the Home Secretary. She then exported the body to Italy, where there was a crematorium. The body was cremated, and she was put to £321 expense. She brought an action against the executors for recovery of the amount, and it was disallowed by the court. That is one of the most striking cases. The directions were very explicit, and there are many people who think that the directions in a person's will are in some sense sacred. I should say it is a cowardly thing to make a will of that kind.

In September 1889, a former patient of University College Hospital committed suicide, and in a letter addressed to the Coroner, which was found upon the deceased, occurred these words: "To save all trouble and expense, let Dr Poore of the University College Hospital have my remains. I think I should be very useful to him and his students." This was duly reported in the newspapers, and was read by my household, who, ignorant of the law, were in trepidation for a few days as to the possibilities of parcel-deliveries. I, of course, never received any formal intimation of my legacy.

Relation of Doctor to Patient.—Now just a word or two as to the relation of the doctor to the patient. A doctor and his patient are brought together under circumstances which involve great intimacy; and the doctor holds a position of trust and confidence in reference to his patient, and the law is very jealous that that confidence shall not be abused. A lady wished to

benefit her doctor, and she proposed to him that she should leave him a certain property. However, he persuaded her that it would be better to give it to him by a *deed of gift.* She did so, and after the lady's death the executors disputed the deed of gift and the court disallowed the deed. They held that there had been an abuse of confidence, and that no doctor had a right to advise a patient for his own interest and against the interest of the relatives and friends. The court further stated that if there had been a will she might have altered that will thereafter by a codicil or otherwise, but a deed of gift was irrevocable.

"*Assault.*"—Now a doctor is liable to actions for assault, and you must remember you cannot do anything to a patient without that patient's permission. If the patient be under age, then the permission of the parent is enough. A case which bears upon this point is that of *Latter* v. *Braddell and Wife and Another.* This case was tried in the Court of Appeal on February 24th, 1881, before Lords Justices Bramwell, Baggallay, and Brett. It appears that Latter was a servant girl in the employ of the Braddells, and that in October, 1879, Mrs Braddell, suspecting Latter to be pregnant, accused her of it, and, on her denying it, had her subjected to a medical examination by Mr S. The girl brought an action for assault, which was tried at the assizes before Mr Justice Denman, but as the jury were unable to agree upon a verdict, they were discharged. The case was next tried before Mr Justice Lindley, who withdrew the case as against the master and mistress from the jury, and as against the surgeon he instructed them that they must be satisfied "that the girl had been overpowered by force, or by threat or terror of actual force." The evidence, however, went to show that the girl never objected to take off her clothes, and that she lay down and was quietly examined. Mr Murphy urged, on behalf of the plaintiff, that the fact

of the girl neither struggling nor forcibly resisting was no more proof of consent than a schoolboy holding out his hand to be struck, but Lord Justice Bramwell upheld the instructions given to the jury by Mr Justice Lindley, and thought that there had been no evidence that the girl's wish had been overborne by violence or threat. The doctor, his lordship added, had appeared to have acted kindly throughout, but he dropped a word of warning to the effect that in such cases the wish of the master and mistress was no authority in the eye of the law for a doctor to examine a patient against her consent. It appeared to his lordship to have been rather a high-handed proceeding throughout.

Then with regard to restraining patients. The other day I found a patient who had just been admitted into my wards in a state of very considerable excitement; she wanted to go out of the hospital. She was not fit to go out. I told her so, and that she would die if she persisted, but I took care to tell her that she could go if she wished, but that it was contrary to my advice, and that such a course would be fraught with great danger to herself. The sister of the ward also spoke to and reasoned with her in the same way, and we succeeded in persuading her to stay, and she is under my care still. You cannot say "I forbid you to go," or to do anything which could assume the form of a threat.

Infectious Diseases.—There is now an Act of Parliament bearing upon the notification of infectious diseases, and that is an Act with which you all ought to be familiar. This Act, which was passed in 1889, makes it obligatory to notify to the Public Health authorities certain infectious diseases. The infectious disease must be notified by the head of the family, and further, "every medical practitioner attending on or *called* to visit a patient shall forthwith, on becoming aware that the patient is suffering from an infectious disease to which this Act applies, send to the Medical Officer of Health for the district a certificate

stating the name of the patient, the situation of the building, and the infectious disease from which, in the opinion of the medical practitioner, the patient is suffering." I call your attention to the words "the medical practitioner attending on or *called to visit* shall forthwith notify." It happens to some of us to be called in consultation to these cases, and we have to remember that we are bound to notify. I may say I am always careful to inquire whether the case has been notified. If I am answered in the affirmative, I usually do not take any further steps about it. But remember that the law says you are bound to notify. Sometimes this is of importance. For instance, supposing a doctor in attendance believes the case to be not notifiable, and the consultant comes to the conclusion that it is notifiable, and there is a difference of opinion, it would then become the consultant's duty to notify it, otherwise he would get into trouble.

In this Act the expression "infectious disease to which this definite Act applies," means any of the following diseases, namely, small-pox, cholera, diphtheria, membranous croup, erysipelas, the disease known as scarlatina or scarlet fever, and the fevers known by any of the following names, typhus, typhoid, enteric, relapsing, continued, or puerperal, and includes as respects any particular district any infectious disease to which this Act has been applied by the local authority of the district in manner provided by this Act.

The Vaccination Laws are now in accordance with the Act of 1898, by which every child is required to be vaccinated within six months of birth, and the parent may demand the attendance of the public vaccinator at the home of the child. The operation may be postponed by the public vaccinator for certain specified sanitary reasons. Parents and guardians of children, who, within four months of the birth of the child, make a declaration of "conscientious" objection before a magistrate are

granted certificates of exemption. Inoculation with small-pox is a misdemeanour which is punishable.

Malapraxis.—Finally, one may allude to malapraxis. What is malapraxis? Malapraxis is the wrong or bad treatment of a patient, and every doctor is liable to have an action brought against him for malapraxis, or even to be indicted as a criminal for having killed a patient by malapraxis. The law does not expect a doctor to show the highest possible skill; it expects him, however, to be able to prove to the jury that he showed a reasonable amount of skill and knowledge, and gave a reasonable amount of attention. As a sample of "gross negligence," Mr Justice Wills instanced a man going hunting and neglecting his patient. A very good instance of a civil action for malapraxis occurred some years ago in connection with one of our big schools. A father took his son to school, and put him in the house of one of the masters. There was a verbal agreement that under no consideration should the boy sleep elsewhere than in the house of this master. Scarlet fever broke out in the master's house, and the lad in question was one of the first to suffer. He was moved to the infirmary, where he died, and it was alleged that the infirmary, when he was moved to it, had not been properly warmed, and was not a fit place for the reception of a scarlet fever patient. The father brought an action against the head of the school and the doctor. The head of the school was accused of breach of contract, because, having promised not to move the boy out of his house, he did move him into the infirmary, and the doctor was accused of malapraxis, because he had moved a scarlet fever patient to a place which was unfit for his reception. In this case, of course, there was a great deal of evidence on either side. The derelictions of duty, however, were very slight. The head master could not keep a case of scarlet fever amongst a number of other boys, and the boy was obliged to go to the infirmary, and whether that infirmary was

cold or damp or not was not very clear. The verdict of the jury was for the defendants.

Another good instance of malapraxis which I should like to bring before you is an important one, and very well known. It is that of the *Public Prosecutor* v. *B. and K.*, who were medical practitioners. In the autumn of 1882, Mr K. was called to attend a child of Mr and Mrs W., suffering from laryngeal obstruction. After consultation with his partner, Dr B., tracheotomy was decided upon, and the operation was successfully performed without chloroform, and with the result of giving temporary relief. After the operation a diphtheritic patch appeared on the pharynx, and the case ultimately terminated fatally. Shortly after the operation the tube became obstructed, and the father was asked to remove the obstruction by suction with the mouth, which he did. He contracted diphtheria (in consequence?), and he brought a civil action against B. and K. to compensate for his suffering and loss of time. The jury could not agree, and were discharged without giving a verdict. Next a criminal indictment was laid, and this was taken up by the Public Prosecutor. The charge was that of manslaughter through gross and criminal negligence (1) in not taking the temperature with the thermometer, (2) in not giving chloroform, and (3) neglecting to order proper diet and stimulants. These charges were preferred at Bow Street in November 1883, but the magistrate (after five days' hearing) dismissed the case, reflecting that it savoured more of persecution than prosecution.

Why the matter should have been taken up by the Public Prosecutor is difficult to understand. But the case did not end there. We next find *W.* v. *B. and K.* in the Queen's Bench on May 8th, 1884. W.'s child had diphtheria in September 1882. Tracheotomy was performed by defendants. The plaintiff was asked by defendants to remove some false membrane from the

tube by suction, which he did, and afterwards suffered from diphtheria. The plaintiff sought to recover damages for suffering and loss of time, and alleged that defendants ought to have warned him of the danger he incurred by sucking the tube (there you come to something which perhaps has reason in it), and further alleged that, at the time of the operation, the defendants were ignorant of the nature of the case, and that they had mistaken it for "ordinary" croup and not "membranous" croup, which is the same thing as diphtheria. Lord Coleridge in the course of the trial said that "a mere mistake would not be sufficient cause for action." A medical witness for plaintiff said that "he had once sucked a tube but would not do so again."

Lord Coleridge.—Unless it was in a case of any one very near and dear to you?

Witness.—Of course if it were my own child I should not hesitate to do it; that is a question not of science but of natural affection.

Lord Coleridge.—And I think so too.

The jury stopped the case and gave a verdict for defendants.

Now with regard to criminal malapraxis. One cannot lay down absolute rules and principles in these matters, and the best thing to do is to give you a few illustrative cases. The following case is a very important one.

Regina v. *P.* On March 3rd, 1875, at the Warwick Assizes, before Lord Coleridge, Mr P. of N. was sentenced to six months imprisonment for the manslaughter of Mrs Ann W. It appears that the deceased died during her confinement with her eleventh child. For her first nine confinements she had been attended by midwives. The prisoner attended her in the tenth and eleventh. On the tenth occasion forceps were used, and again on the eleventh. Evidence went to show that after the child was born he remained "doing something" which gave great pain to Mrs W. He was seen to remove

something, which he cut off with scissors and took away to the privy. He ordered brandy for his patient, and left saying she could not possibly live. The suspicions of the husband were aroused, and the substance in the privy proved to be fifteen feet of intestine, chiefly ileum, with portions of mesentery and parts of the cæcum and colon. At the post-mortem the vagina was found ruptured and the intestines were minus the parts found in the privy. The coroner's jury had found a verdict to the effect that the deceased died of ruptured uterus (which was not the case), and that Mr P. was free from blame. As this verdict did not satisfy the neighbours the case came before the magistrate, and so to the assizes. It was probable that the vagina was ruptured by the forceps, and that the intestines had been mistaken for the cord, and had been pulled upon. It is not probable that so much intestine could escape spontaneously without rupture of the mesentery. There was much conflicting evidence.

This was a gross case, and one cannot say that the sentence of six months imprisonment was unjust.

There is a case of malapraxis against a nurse which is interesting. There was a girl in one of our big hospitals with pulmonary tuberculosis. She was of a neurotic temperament, and the nurses took the idea into their heads, or some of them did, that she was what was called "hysterical." One morning this girl passed a motion under her into the bed, and the nurse in attendance apparently scolded her for it. It was necessary to give her a cleansing bath. She took her out of bed, and took her rather forcibly along the ward, and put her in a bath in the adjoining bath-room at an early hour in the morning, when the water, which was usually hot, was not hot. It appears that this patient sat three-quarters of an hour in water which certainly was not hot, but was more or less cold. As she came back to her bed she was noticed to limp, and the evidence went

to show that the nurse treated her rather unkindly, telling her to walk properly, and that she could do so if she liked, and so forth. Before many hours had elapsed she died. Post-mortem, a mass of crude tubercule was found on one side of the brain; the incontinence of the bowel was due to a cerebral lesion, and so also was the limping on one side. That nurse got three months imprisonment. That is a very important case. The doctors there were quite free from blame; the nurse acted upon her own impulse entirely. I will not say hysterical patients never dirty the bed, but you may almost take it as an axiom that if you find that an adult patient has passed a motion in the bed you will do very wrong to put that down to hysteria. In this case the passing of the motion in the bed was due to a coarse lesion in the brain, and if any physician had seen the case at the time, there is no doubt that it would have been recognised.

Next I will mention the case of *D.* v. *M.* that occurred in 1885. It came forward in the Court of Appeal, before Lords Justices Cotton, Lindley, and Fry. D. practised medicine at R., *but was not legally qualified.* M. became his assistant in November 1883, and entered into a covenant not to practise in R., or ten miles round, without the written consent of D. The agreement between D. and M. terminated in August 1884, and M. commenced practice in R., whereupon D. brought an action to restrain him. This was tried before Mr Justice Pearson, who granted an interim injunction to restrain M. from practising. In the covenant between plaintiff and defendant D. was described as a "medical practitioner." Lord Justice Cotton said that "the covenant had been broken, and the Court did not look with favour on the conduct of the defendant," but since the plaintiff had been practising as an apothecary contrary to the Act of 1815, 45 George III., cap. 194, he could not enforce the covenant by injunction. Lords Justices Lindley and Fry concurred.

We are sometimes guided by American decisions, and there has been a decision in an American court that a contract by a medical man to attend a patient injured in a railway collision, and to be paid according to the amount of compensation recovered, was void. It is allied to the solicitors' actions I was talking to you about the other day.

Finally, never give an anæsthetic to a female patient without a witness being present. That is very important. Actions for criminal assaults have been brought against medical men, surgeons, and dentists, again and again, by women who alleged that having been anæsthetised they were then violated, and that kind of accusation is not at all uncommon with an hysterical woman, and it is very difficult to rebut when only the man and woman are present. It is the man's word against the woman's word, and it is a very unsatisfactory state of affairs.

The Conveyance of Syphilis has been before the courts both in this and other countries, and I will quote an instructive Call as given by Taylor.

Communication of Syphilis. — Simpson and Wife v. *Davey*, tried in the Queen's Bench, before Lord Chief Justice Cockburn, in December 1874. Defendant, a surgeon in large practice at Old Ford, injured the index finger of his right hand on the 18th March 1872 with a gun cartridge. He attended a woman who was suffering from constitutional syphilis in labour on the 21st of March. (She died before the trial came on.) But on the 16th May, his finger still being sore, he attended the plaintiff's wife. He stated that he only used this hand to remove the placenta, and did not touch the woman. This was, however, disputed. On the 27th of May he consulted Mr Hutchinson for what seemed a bad whitlow on the same finger. There was a measly rash on the chest, which soon assumed specific characters. He suffered very severely from syphilis. Whilst away for change of air, symptoms of syphilis appeared in plaintiff's wife,

whom he had delivered. She allowed him, however, to attend her in a second confinement. The child then born had symptoms of hereditary syphilis. The case was complicated by an agreement which, though verbally repudiating liability, tacitly admitted it—and a verdict of £500 damages was agreed to by advice of the Lord Chief Justice, rather for breach of this agreement than on the direct issue. The medical witnesses (Messrs Coulson, Heath, and Hutchinson included) agreed that the *period of incubation* in infecting sores or chancres was much longer than usually supposed, from four to five weeks before the development of symptoms being common, according to the latter. All agreed that these cases are rare, and that chancres under the nail are difficult to diagnose.

This finishes the legal part of our subject.

CHAPTER III

DEATH

Causes of Stoppage of the Heart—Modes of Death: by Heart, Lungs, Brain—Post-mortem Appearances of Asphyxia and Syncope—Signs of Death—Cooling of the Body—Rigor Mortis—State of the Guillotined Criminal—Growth of the Beard after Death—Importance of the Early Signs of Death, with Case in Point—Lividities.

Death.—The medical jurist is more concerned with the dead than with the living, and therefore we have to consider the phenomenon of death. Life ceases not because we wear out, but because we break down. It may be that when public health reaches that pitch of perfection towards which some are striving, that we shall live indefinitely, and decay equally in every part, which will be a very doubtful gain. We live so long as the heart beats, and we have to consider shortly why the heart stops. I will therefore review very briefly the main proximate causes of stoppage of the heart.

First there are mechanical causes, *a failure of the cardiac mechanism.* This may be *valvular*, as in sudden death in aortic regurgitation; you may get *blocking* of *the efferent vessels*, as in thrombosis of the pulmonary artery, to take a common cause; you may get air in the big veins so that the heart cannot drive the blood on; or, to take an exceptional case, you may get hæmorrhage into the pericardium and the heart stopped in that way. Or, again, the cardiac muscle may fail; it

may fail from gradual degeneration, it may fail as a result of a poison, such as digitalis, which brings the heart to a standstill in systole, or aconite, which is said to bring the heart to a standstill in diastole. Then there are, of course, some organic poisons brewed by bacteria during infective diseases, such as diphtheria, which poison and stop the heart. In the same way you may, of course, get failure of innervation. The heart is said to stop sometimes from shock, and you sometimes hear—chiefly in the third volume of a sensational novel, I grant—of people dropping dead from mental shock. But you may take it that a person whose heart could be stopped in that way could not have lived much longer in any case.

We may get sudden death not from failure of the cardiac mechanism but from failure of blood, such as in sudden hæmorrhage or bursting of an aneurism.

Then you may get failure of the pneumatic machine, such as paralysis of the diaphragm, from damage to the spinal cord, or from poisoning by such a thing as curare, which paralyses the end-organs in the muscles, and so arrests their movement. Strychnia, on the other hand, causes tetanus of the diaphragm. Again, you may get a wound of both pleuræ, which makes the pneumatic machine useless. Or you may get disease of the lungs, those well-known pathological conditions, pulmonary apoplexy, double pleurisy, or double pneumonia. Then there are mechanical impediments to moving the chest. You may get exclusion of air from the lungs from a variety of causes — hanging, drowning, suffocation, substances impacted in the glottis, or membranous croup or diphtheria. There may be failure of oxygenation of the blood from damage to the hæmoglobin, such as in the inspiration of carbon monoxide. Carbon monoxide enters into combination with the hæmoglobin, the aëration of the blood cannot go on, and so death results. There are cases on record in which failure of

the pneumatic machine has been brought about by external compression, such as that produced by a plaster jacket. When a plaster jacket is put on, it is customary to put a towel underneath the jacket, which is ultimately withdrawn, so as to leave room for breathing while the jacket is on. There is a tale told of Horace Vernet, who had amongst the models in his studio a fine negro. He was beautifully formed, and they wanted to take a plaster cast of his chest; therefore they put on him a plaster jacket, and did not notice that he was getting dusky. They nearly killed him.

Again, we may have failure of the respiratory centre. This may be of cerebral origin. Or the respiratory centre is sometimes poisoned, and then it is said to be of hæmic origin. The centre is poisoned during the inhalation of chloroform, and it is poisoned in that condition which we speak of as uræmia. Of course the integrity of circulation and respiration depends really upon the health of the medulla oblongata, and it is said that you may slice the brain down to the level of the medulla oblongata, and you may slice the spinal cord away up to the level of the medulla oblongata, and that respiration and circulation will go on. The respiratory and circulatory centres are very near together, in the floor of the fourth ventricle, and sometimes one stops first, and sometimes the other. All these facts which I have been recalling to your recollection are very necessary for you to remember as medical jurists when you come to make post-mortem examinations.

Modes of Death.—Bichat said that death comes on in three ways: that it approaches sometimes by way of the heart, sometimes by way of the lungs, sometimes by way of the brain. Well, when the heart stops first we get the phenomena which are common in syncope. The heart suddenly stops, and post-mortem you find the body exactly in the condition in which it was at death—the cavities of the heart nearly empty, and the organs almost

everywhere pale. Now, when death occurs by the lungs, you get a different set of phenomena, the phenomena of asphyxia. In death from the lungs the first feeling is one of want of breath and a sense of impending suffocation. Then you notice an ashy pallor, followed sometimes by a cyanotic blue tint in the lips and face. This gets darker and darker, and the respirations become gasping. Then the person becomes insensible, and finally there are often convulsions. I should mention that in death from syncope there are often convulsions before death. It is important to remember that. Then, as I have said, Bichat described death as beginning at the brain. In death under those circumstances, one of the prominent symptoms is insensibility and very slow respiration. Well, death beginning at the brain is generally death from asphyxia; and in these cases of apoplexy you almost always find post-mortem evidence of asphyxia. It is convenient, for clinical purposes, to recognise these three forms of death—death beginning at the heart, at the lungs, at the brain; but for purposes of medical jurists, and for strictly scientific purposes, we must recognise that sometimes the circulation stops before the breathing, and that sometimes respiration stops before the circulation. When the action of the lungs ceases, blood no longer passes through them, and as a consequence you get engorgement of the right side of the heart, and an engorgement of the veins throughout the body. But when the circulation stops before the respiration, then you get signs of pallor. It is very important to recognise these modes of the onset of death, and you must remember that in cases of failure of respiration the treatment is one thing, and in failure of the circulation the treatment is another. In a case of syncope where the heart fails, the one thing which you have to do is to try to nourish the circulatory centre; and so you either put the patient on the floor, or depress the head between his knees, and hold him there until he begins to recover.

The idea is to cause a determination of blood towards the medulla oblongata. Then give stimulants. Under this treatment, if he is recoverable, he comes round. In dealing with asphyxia, on the other hand, you must remember two things; to get the respiration re-established by artificial respiration is all-important; and if the right side of the heart and the venous system is unduly engorged with blood, and over-distended, so that it cannot grapple with the work which it has to do, that one can often do much in relieving this condition by withdrawing a little blood. Never forget the importance of the respiration to the circulation; and that the lungs are (physiologically) inserted between the right and left heart. Respiratory movements can be artificially produced, and being thus produced, will often start a circulation which is on the point of stopping. You will often do good, and can never do harm, by having recourse to artificial respiration in cases of lightning stroke, bullet wounds of the brain, etc. The experiments of Horsley and T. Oliver have shown this conclusively.

Post-mortem Appearances of Asphyxia and Syncope.—Now it is a very important thing in making post-mortems to know how death approached. I have here two rabbits, and the difference between them is that one has been drowned and the other has been suddenly killed by being knocked on the head. First of all we look at them externally. You will notice that the drowned rabbit has the eyes rather more prominent than those of the other rabbit. Sometimes you may notice a difference in the position of the tongue—sometimes the drowned animal has the tongue thrust forward between the teeth. In these animals, however, there is but little difference in that respect. I now proceed to open them. I ask you to notice the difference in the tint of the intestines. In the drowned rabbit the intestine is of a dark dun colour, whereas in the other animal it is of a comparatively light grey; the difference

is most marked in the small intestine. Looking at the drowned rabbit you are justified in saying that death was the result of failure of respiration, judging by the colour of the viscera. If you say, as I have no doubt has been said hundreds of times, "Oh, these engorged intestines show inflammation of the intestine, possibly from poisoning or something of that kind," that is a conclusion which is quite unwarrantable and wrong. We next come to the heart. Here, again, in the rabbit which was suddenly killed, the right ventricle is of about the same size as the left, but in the drowned rabbit you will see the right ventricle is much more distended than the right ventricle of the other animal. The lungs in the killed rabbit are pale, while in the drowned one they are somewhat engorged. But you must remember that the condition of the lungs in death from asphyxia is variable, and the condition of the left ventricle in asphyxia is also variable. It is said that if you make a post-mortem immediately after drowning, you often find the left ventricle distended. But, as rigor mortis comes on, the left ventricle empties itself and the right ventricle is engorged. Here the right ventricle is obviously engorged. The point is this. You assume these are two people found dead, and you are asked by the coroner to make a post-mortem examination. You open the body and find a general pallor or general engorgement of the viscera, as the case may be. If you find general engorgement of the viscera, you search for whatever may have caused this engorgement, and that may have brought the lungs to a stand-still. You may find evidence of drowning, you may find a foreign body in the trachea, or you may find, as I did once, death from membranous croup which was unsuspected. Remember that the causes of this engorgement and consequent failure of respiration may be found in the kidneys. In "uræmia" you may get the respiratory centre poisoned and a gradual failure of respiration. In

opium poisoning you get the same thing, respirations getting slower and slower, and an engorgement of the veins throughout the body. Sometimes it is stated in works on medical jurisprudence that opium causes engorgement of the vessels of the brain, but it only causes that because it produces slowness of respiration and brings about death from gradually supervening asphyxia.

I would allude once more to the fact that in death occurring by the heart, the lungs, or the brain, convulsions may equally occur. Because a person is comatose or because he is convulsed, do not rush to the conclusion that therefore the cause of death is in the brain. That is a conclusion that is not at all warrantable. In no disease is coma more marked than in diabetes, but that is a disease of the blood or of the viscera, and not of the brain. Again, in uræmia you may open the brain and find it quite healthy. On the other hand, you may get a severe cerebral hæmorrhage leading to pronounced hemiplegia, and yet you often find that the patient suffering in that way is not comatose, is not delirious, is perfectly conscious, and not convulsed. Therefore do not necessarily attribute coma and convulsions to primary brain disease. Of course you would not have the coma or the convulsions if the brain were properly nourished, but do not attribute such things to *primary* brain disease.

Signs of Death.—Now what are the signs of death? I do not think they need detain us very long. When a man is dead the circulation ceases and the respiration ceases, and it is very seldom indeed that you have any difficulty in saying whether a person is dead or not. Occasionally it happens with very old people that death advances very very slowly indeed, the respirations get slower and shallower, and finally cease, and in watching a person in this way you cannot quite say when death took place. And in cases of this kind sometimes friends

are nervous and think that death has not taken place when really it has. If deaths of this kind take place in subjects not prone to putrefaction, and at a time of year such as the depth of winter, when putrefaction is held in abeyance, it is difficult to convince people that their relative is really dead. There are cases on record in which people have remained with scarcely perceptible movement for a long time and have recovered, and we have in the hibernation of animals a condition in which respiration gets excessively slow, and the condition really approaches that of death.

When you are called to a case to know whether a person is dead or not, can you determine it? Of course you listen to the heart, you watch the respirations, you feel the pulse. Then, if still in doubt, a good plan is said to be to tie a ligature round the root of the finger, and if the circulation is going on the strangled finger will get blue. There is a source of fallacy there. I remember once on visiting the hospital, one of the house-physicians came to me and asked me to go upstairs. He said there was a man just dead, and he had tied a ligature round his finger and it had got blue; nevertheless, certainly, the man was dead. I cross-examined this gentleman and found that he had not merely tied the ligature round the finger, but had done everything he could to draw blood into the extremity by a process akin to that employed in milking a cow, and by that means he had made a blue finger, but the circulation did not make it. If that test is to be of any use, you must merely encircle the finger with a ligature and nothing else. Sometimes people think that there has been vital movement of the body after death, and it seems very generally admitted that after sudden death from some diseases, especially cholera, there are movements of the limbs.

Another test is said to be to apply a blister, when if a person is alive the blister will rise, and if the

person is dead the blister will not rise. Another test is the loss of muscular irritability. Immediately after death the irritability of the muscles remains, and with a faradising machine you may get a little contraction; but after death has taken place some hours there is no longer any contraction of the muscles.

Cooling of the Body.—Now there are certain conditions of the dead body which enable you to form a judgment as to when death took place — how long a body has been dead. One circumstance is the cooling of the body. Some of the books have said that the body cools at the rate of 1° F. per hour. That is so easy to remember, that it is a pity it is not true. But you have only to think of it to see that it could not be true. The rate of the cooling of the body depends upon circumstances, and mainly on the difference that exists at the time of death between the temperature of the body and the temperature of the surrounding air. If a febrile body is left exposed to the extreme cold of a winter night and be naked, cooling will go on exceedingly rapidly; if the body be a fat one, and be beneath two or three blankets and an eider-down quilt in a hot room, cooling is naturally very slow, so that you cannot lay down any rule of any kind whatever.

You must therefore take the whole of the circumstances into account, and I would warn you when you go into courts of law not to attempt to be precise where precision is really impossible. If you try to lay down rules of that kind you will, with the best intentions, more often deceive the jury and yourselves than you will do good.

Now I would remind you that sometimes after death the temperature rises. Of course that is a very complicating circumstance. At the moment of death the temperature may be 106° or 107°, and after death it may reach 112° or 114°, as has happened.

The internal warmth of the body is very often perceptible to the hand twenty-four hours after death; indeed,

in making a post-mortem examination twenty-four hours after death, you may find the viscera perceptibly warm.

Rigor Mortis.—After death there is another phenomenon which we must attend to, namely, rigor mortis. In rigor mortis the muscle becomes shorter, harder, and inelastic; it becomes slightly acid in reaction, and opaque instead of translucent. Rigor mortis is due to the coagulation of muscle plasma. As a rule the muscles remain in a position in which they were at death. But that is not quite true. You will find, for instance, that there is what is known as the cadaveric position of the hand (slight flexion of the thumb and fingers), due to the contraction of the muscles after death before the extinction of muscular irritability, in which the muscles are subject to the action of the spinal cord only, and the stronger group get the mastery. You will find that this position is assumed against the force of gravity. The time of onset of the rigor mortis varies, but as a rule it is said to begin five to six hours post-mortem. But this, again, is so variable that there can be no rule at all. Beginning, as a rule, in the jaw, it spreads to the face, neck, trunk, and limbs. It would appear practically that the time of onset of rigor mortis bears a direct ratio to the irritability of the muscle at the time of death. If the muscle is in good condition with its normal irritability, rigor mortis sets in slowly; if the muscle is exhausted, rigor mortis sets in early. Now in persons who die while undergoing great muscular exertion, the muscles are sometimes fixed at the moment of death apparently. Whether this be precisely analogous to rigor mortis, or whether it be a spasm occurring at death which continues until that spasm is fixed in rigor mortis, is a debated point. As a practical fact, when the muscles are exhausted by excessive work at the moment of death, rigor mortis or cadaveric spasm comes on instantly. The hare which has been coursed to death stiffens very quickly because the muscles are exhausted, and rigor mortis sets in instantly and passes off quickly.

The coursed hare may therefore be eaten by the epicure earlier than a shot hare, because it is fit to cook earlier. So also on the field of battle after forced marches, or when a man is killed while fighting for dear life and putting forth a quite unusual amount of muscular energy, it is found that he remains fixed in the position in which he was when he was killed. That is apparently due to the exertion, and possibly also to the way in which he is killed. A man shot through the head is very often fixed in the position in which he fell, and I take it that the evidence is perfectly good that soldiers have been found grasping the rifle and in the position adopted for firing, perhaps in readiness to shoot over an earthwork. There is a case which comes from Germany of a man who got out of a train at a railway junction and went across the metals to the refreshment room ; he came out of the refreshment room with a sausage in one hand and a sandwich in the other, and on going back to his carriage his head came between the buffers of opposing carriages and he was killed instantly. When an examination was made the sausage and the sandwich were tightly grasped in the hands. That was due to some spasm of the muscles caused by the shock to the brain. So it happens sometimes in death from lightning that rigor mortis comes on suddenly. The sooner rigor mortis comes on the sooner it passes off; that is the rule. John Hunter came to the conclusion that in death from lightning rigor mortis did not set in. The reason for that belief was probably that it set in early and passed off early, and at the time of inspection it had ceased. And so when patients die of exhausting diseases, with presumably little muscular irritability left, the rigor mortis sets in early and passes off early. That is one of the difficulties with people who die gradually. In those cases rigor mortis either does not come on or it is badly developed and passes off quickly, and people think that the body is not dead because it has not got stiff.

Now there are certain relationships, perhaps more

apparent than real, between vital contraction of a muscle and rigor mortis. I will remind you that after excessive exercises — we all must have experienced it after a walk of unwonted length—when after a rest we rise to continue our journey, our walking is labour and sorrow, because the muscles are all stiff. That is a matter of common occurrence, but after walking a little way again the muscles become supple. Now after exercises a muscle is acid in reaction. A muscle in rigor mortis is acid in reaction. A muscle after excessive exercises is stiff, it does not move easily, it requires force—sometimes considerable force—to move it; the muscle in rigor mortis is stiff in the same way. Now whether these be the same or allied conditions or not, it seems perfectly certain that the muscle which has been excessively used immediately before death passes quickly into rigor mortis, the best example being the coursed hare, and the next example being the death spasm as seen in the dead soldier shot through the head; but it is doubtful whether the physiological condition of the coursed hare, which is a matter of fatigue, and the physiological condition of the dead soldier is the same thing. You know that when we are very intent upon anything we put forward an enormous amount of muscular power, very much more than is necessary. This probably occurs in battle. When a muscle is severed from the nerve centres, rigor mortis is late in coming on. That is what might be expected, because a muscle separated from the nerve centres cannot get fatigued, and cannot get spasm, and cannot be subjected to those conditions which practically we know precede the early onset of rigor mortis.

The next point is, why does rigor mortis go off? Some say it goes off because of the onset of putrefaction. That is open to question, but it is nevertheless true that after rigor mortis has gone off putrefaction usually sets in early. The coursed hare must be eaten the day it is killed, or within twenty-four hours; if it is not so eaten it goes putrid; that is a well-known fact. I take it that the

difference between tender and tough meat is whether you eat the meat before the rigor mortis has gone off, or whether you wait until the rigor has gone off and the muscles become soft again. Rigor mortis once destroyed does not return; therefore the cook takes a steak and beats it, and she makes the steak tender. Now cadaveric spasm may be of importance in law courts. There is a case recorded from Bordeaux which is of importance in this connection. A man was found by his bedside sitting in a chair, dead, with a bullet wound through his head. The dead body was leaning against the bed, and across the right knee was his right hand, and in the hand a pistol. Of course the case looked like one of suicide. But the son who slept in the same room was a *mauvais sujet*, and the question arose whether he had not murdered his father and put the pistol in his father's right hand in order to deceive. The first person who came into the room jogged against the corpse and the pistol dropped from the hand very readily, and the arguments *pro* and *con* turned upon that. The pistol was very loosely held. Could it have been put there by the son? Or was it a true case of death spasm holding the pistol? Now if you should be called to a dead body in which a similar condition of things exists, you must examine it very carefully for cadaveric spasm. The question is, can it be imitated? I should very much doubt whether cadaveric spasm can be imitated, and I should think there are cogent reasons against its possibility. You may put the dead hand over a weapon, and pull the fingers over the weapon and leave it. By doing that you have flexed the finger-joints, but you have done nothing to the flexor muscles of the fingers. The flexors of the hand not being in contraction would not be kept in contraction. I should say it was impossible to imitate a death spasm by a trick such as I have suggested. Always examine to see if the muscles are really stiffened.

State of the Guillotined Criminal.—With regard to the

condition of the body immediately after death, I may read you "Researches made at Amiens on the Remains of a Criminal," by MM. Regnard and Loye, from *Le Progrès Médical*, July 1887.

"Up to the moment the knife fell the face maintained its natural colour, which persisted when the head was examined two seconds afterwards. The features were immobile, and eyelids widely open, the pupils moderately dilated; the mouth was firmly closed; the head presented no trace of spontaneous movement, nor of fibrillary contraction. No result was produced by presenting the finger immediately before the eye, but on touching the eyeball, or the extremities of the eyelashes, the eyelids contracted as promptly as in the living subject during the first five seconds after death. Six seconds after death this reflex could no longer be evoked. The jaws were firmly clenched and could not be separated by the strongest efforts. In no other part of the body was there a trace of similar muscular contraction. One minute after decapitation the face commenced losing colour; the mouth remained firmly closed; light produced no movement of the iris; the trunk was flexed; the carotids still ejected blood; the knee reflex could not be produced. At the end of four minutes the face was entirely exsanguine, the upper eyelids were half dropped, the mouth was still firmly closed, but the point of the finger could now be introduced between the upper and lower teeth. Peripheral excitation, as pinching the tongue or sounding in the ears produced no effect. Irritation of the spinal cord, either cephalic or of the trunk, met with no response. The body was closely observed for twenty minutes, after which interval the autopsy was commenced. On opening the thorax the heart was found to be still beating, and on opening the pericardium regular rhythmical contractions of auricles and ventricles were observed until the twenty-fifth minute after decapitation. The auricles continued to

contract for nearly an hour. On opening the heart, the left ventricle was firmly contracted, the right ventricle being relaxed. The left lung was emphysematous at the margins — a common condition in death by the guillotine. The right lung was very adherent. The bladder was empty. The vessels of the pia mater were moderately filled with blood. There was a considerable quantity of air in the sub-arachnoid space. The vessels on the pia mater, especially on the convexity of the cerebellum, were filled with blood containing air bubbles. The blood was bright red. The head was separated from the trunk at the lower part of the fourth cervical vertebra. Post-mortem rigidity did not supervene until three hours after death; the temperature, taken in the rectum, being 90° F. The rigidity appeared first in the lower extremities. Six hours after death the upper extremities remained flaccid.

"*Conclusions.*—No sign of conscious life can be observed two seconds after decapitation. Death thus produced is painless."

With regard to the teeth being clenched, you will have noticed that a man expecting a blow clenches his teeth. When a butcher pole-axes a bullock, the axe makes a hole in the forehead, and the animal drops apparently dead instantly. Then the butcher usually puts an ordinary bamboo cane through the hole in the skull, and stirs up the medulla. You must keep very clear of the animal's legs while the stirring process is going on, because the spasm is tremendous. But in this man who had been decapitated, the irritation of the spinal cord produced no movement of the head or of the trunk. The account does not say whether the urine was voided at the time of the execution, that is to say, whether it was found in the clothing. The abstract I have read is taken from the *Medical Chronicle*, and was made by Dr Dixon Mann. Of course you must always take into consideration that the mode of death here was

very exceptional. Probably where the spinal cord and vessels are not divided you would get other conditions.

Growth of the Beard, Post-mortem.—There are other signs which demand our attention. One sign of death is said to be loss of translucency of the hand. If we hold the living hand up to a bright light we get a gleam of red through it, but in the dead hand that partial transparency is lost. Then there is loss of elasticity of the skin, and it has been debated as to how much the beard grows after death. I take it that just as the heart may beat for a few minutes after sudden death, and just as the muscular irritability persists for a few hours after sudden death, so the growth of the hair may, theoretically, proceed for a few minutes after death. But I think that is all. A man may be clean shaved at the moment of death, but the loss of elasticity of the skin and the pallor of the face combined often give the impression that perhaps he had not shaved that morning, and it looks as if the beard had grown a little. I should not mention this fact were it not that many years ago I was dining with five or six military gentlemen, all men of standing in the army, and one of them, whom I knew very well, was a colonel of engineers. These gentlemen had all been in the Crimean war, and the question arose as to the growth of hair after death. I told them what I have told you, and what I still believe to be true, and my friend the engineer colonel turned round on me and said, "You are perfectly wrong; there is no doubt whatever that in the Crimea the beards of the soldiers grew through the collars of their greatcoats." Now this man was a most estimable man; he was perfectly incapable of a joke, and would not have said such a thing in a joke, nor would he tell an untruth in joke. I said, "Of course, if you can assure me that you carefully examined these soldiers yourself, that you yourself carefully examined the beard and the coat, and found the hair was growing

through, I will accept your statement; you are a trained observer, and if you have examined the men so closely you cannot be wrong." It then transpired that a lieutenant told him, and a captain told the lieutenant, and somebody told the captain, who had been told by Tommy Atkins, and that is how it came about, and shows that "hearsay" is not evidence. I mention this because I think it is important to show how widespread, even among educated people, are these absurd notions. The idea of the hair growing for a few moments after death is rational enough; but that the hair should grow through a man's greatcoat is quite absurd; it is not alleged to have happened even to Rip Van Winkle.

Importance of the Early Signs of Death.—Now to sum up these early signs of death. One may remark that the early condition of the dead body is of immense importance in a medico-legal sense. The recently-dead body is first of all warm and pliant, and that exists for a variable period; it may last apparently from one to twenty-four hours. Secondly, the body may be found warm or cold and rigid, and that is a condition which may last from ten hours to three days. Then a body may be found cold and pliant, but not putrefied. And finally there is the access of putrefaction. When you go to a body the two things you look to are the temperature and the state of rigor mortis. Taking all the circumstances into consideration you must form the best judgment you can; and again I would say, do not attempt to be precise where precision is impossible; that is a mistake which is very often made. Averages of course are very useful things, but averages are made up of extremes, and you must always take the whole of the circumstances into consideration carefully before giving an opinion.

Now, there is a case in which the early condition of the dead body was of very great importance, and the case is reported at length by Taylor. It is the case of Gardner the sweep, and I will recite it to you :—

The prisoner Gardner lived with his wife and another

woman named Humbler. The wife was found dead in her bedroom, with wounds in her throat, at eight o'clock in the morning of September 15th, 1862. The nature and direction of the wounds, the position of the body, and of the weapon, as well as other circumstances, proved conclusively that this was an act of murder; and as there were no persons in the house at the time of the occurrence excepting the woman Humbler (the servant) and the prisoner Gardner, it followed that one or both must have been concerned in the act. Gardner accused the servant Humbler of having perpetrated the murder during his absence from home; but as there was no evidence against this woman, he alone was subsequently called upon to answer the charge. The facts as they bear upon the question which we are now considering are very simple. Mr S. saw the body of deceased, a healthy, well-developed woman, aged thirty-seven, at eight o'clock in the morning. Her body was found lying on a wooden floor, covered with a flannel petticoat and a chemise. The upper limbs were cold and rigid; the face, shoulders, and chest were cold; the neck was so rigidly fixed with the trunk that the entire body was lifted up with it when the head and neck were raised. The thighs and legs were quite cold, but there was no rigidity in these parts. The only warmth found about the body was in the lower part of the abdomen; and this obviously arose from the contents of the uterus, the deceased being in the seventh month of pregnancy. The opinion given by Mr S. regarding the time of death, before its exact bearing on the guilt of the prisoner could have been known, was that the deceased had been dead *about four hours*, certainly more than three, and that she could not have been dead so short a time as two or three hours when he first saw the body. This opinion was corroborated at the trial by another medical witness.

Without going into all those circumstances which tended to fix this crime beyond any reasonable doubt upon the man Gardner, it may be sufficient to state that

the defence turned principally upon the condition of the dead body when found. It was proved that from four to eight o'clock in the morning, that is for about four hours, the prisoner was absent from home following his usual occupation as a chimney sweep. It was contended by his counsel that within this short period the body might have become cold and rigid, as it was found, and, therefore, that the murder had been perpetrated by some one during his absence. On this theory the woman Humbler alone was guilty. The facts proved at the trial were, however, considered by the jury to be quite inconsistent with the innocence of the prisoner, and he was convicted of the crime. This is an excellent case as showing the importance of these early signs in fixing the time of death. The body was cold and it was stiff, and that would go to show that at eight o'clock in the morning she had been dead very likely ten hours. At any rate everybody was justified in saying that the time was more than four hours.

Lividities. — On a recently dead corpse, *livid spots* appear, called hypostases. They are due to the blood flowing into the most dependent veins. At death the left ventricle may be full, but after death it contracts and enters into rigor, and the arteries contract also and empty themselves of blood. You know, of course, that the early anatomists were of opinion that the arteries conveyed air, because they were always found empty. The blood accumulates in the veins and takes the line of least resistance, that is, it goes to the dependent parts which are not pressed upon. If you look at a recently dead body, such as we find in post-mortem work, lying on its back on a table, you will find where these hypostases are. You will find them in the flank, and if you turn the body up you will find there is a very dark coloration in the nape of the neck, in the loins, in the hams, and above the heels. Those parts which are subjected to pressure are not full of blood; and you must have observed again and again a great white patch over the shoulder blades and buttocks

upon which the body rests, and others on the calves of the legs, if the calves were big enough to press on the table, and on the heels. These lividities are not due to extravasation; they are not accompanied by any swellings of the parts, and if you cut into them you get no hæmorrhage and find no extravasation in the tissues. These lividities are of very great importance, because coroner's juries not infrequently take them for bruises when they "view the body," and consequently come to the conclusion that because there are blue marks on the body the person has been maltreated ante-mortem. When putrefaction sets in you may get these stainings in parts other than the most dependent parts, because the accumulation of gases in the abdomen may drive the blood in various directions, and you may find the hypostases on the face and elsewhere. I remember once, when giving evidence at a coroner's inquest, I had considerable difficulty in persuading the jury that these marks were not bruises. However, the coroner, who had seen the body, quite agreed with me.

CHAPTER IV

PUTREFACTION

Gases generated after Death—Action of Micro-organisms—Condition of the Body—Influence of Temperature and Moisture—Mummification—Variation in the Onset and Quickness of Putrefaction, with a Case in Point—Medico-legal Importance of the State of Putrefaction : a Case cited—Insects in Relation to the Dead Body —M. Mégnin's Observations : their Value—Adipocere—Superficial and Deep Burial—Results of the Exhumation of Animals—Fertilising Power of the Superficially Buried Body—Purification of the Soil by Cultivation—Theoretical Danger of Deep Burial —Experiments with Dead Rabbits—Quicklime a Preserver, not a Destroyer, of the Dead Body.

NOW, as rigor mortis passes off putrefaction sets in. Putrefaction, of course, is a sure sign of death; by some it is said to be the only sign of death, but that is going too far. The earliest stages of putrefaction are often marked by a greenish-blue coloration of the abdomen. Sometimes you find these greenish lines taking the course of the great venous trunks. They are due to a change in the blood pigment. Then soon, you get the generation of gas, and sometimes gas distends not only the abdomen, but the tissues generally. Sometimes you get a body exceedingly disfigured in that way. This generation of gas in the body may drive the contents of the stomach and intestines out of the mouth and anus. The pressure of gas in the abdomen has even emptied the uterus in women. The gases so formed are very varied. You get ammoniacal gases and sometimes carburetted hydrogen,

which is inflammable. It has never fallen to my lot yet to be able to demonstrate that the gases are inflammable. It is a question that interests me, and occasionally, when I have had to make a post-mortem examination on a very putrid body, particularly in the summer, I have more than once made punctures, and applied matches to see if I could ignite the gases. Still, I do not think there is any doubt that they sometimes are inflammable. It probably depends on the kind of microbe that is at work in bringing about the putrefaction of the body.

As you know, putrefaction is due to the action of micro-organisms, and the rapidity of their action depends upon circumstances. There is no doubt whatever that the causes of death influence very much the rapidity of the onset of putrefaction. Putrefaction is apt to be exceedingly quick after some of the infective fevers, including acute pneumonia. Then the access or otherwise of putrefaction depends upon the condition of the body. We know that for putrefaction to set in a certain amount of water is necessary, *i.e.*, a certain amount of fluidity and moistness of the tissues. The bloated drunkard rots quicker than the lean and slippered pantaloon; that is what you might reasonably expect. Thus, it is said that people who die suddenly with their bodies full of blood are apt to decompose rapidly; and that sometimes where death has been very slow and due to exhausting disease decomposition is deferred. Again, putrefaction is usually influenced by temperature. We know that in the frozen ground of Siberia they have dug up the mammoth with the flesh upon it which had not undergone putrefaction, and how long it had been buried no one but a geologist with an imagination would venture to say; and if a body could be kept from putrefying so long by extreme cold, then it is possible for the same result to occur in shorter intervals. The temperature and condition of the atmosphere most favourable for putrefaction is "muggy" weather at a temperature of about 70°. That, again, is a matter of

common knowledge. When a body putrefies, of course it gets distended with gases, becomes discoloured, the cuticle separates, and very soon the body becomes quite unrecognisable. On the other hand, if the death took place in a perfectly dry place, then putrefaction properly so-called does not set in, and the body dries up and mummifies. Some of you may have been to, and others have read of, the waterless parts of the world, where you find dead animals which die on the travellers' routes; they are simply shrivelled up and mummified. Indeed, it is highly probable that in Egypt the practice of making mummies was simply going in the direction that Nature was going in; a person dying in the waterless regions of Egypt could only be mummified, and the people took up the natural process and converted it into an art. The proper disposal of the dead in rainless districts except by mummification must be a very difficult matter.

Considering the conditions surrounding the body, the disease of which the person died, the temperature, the dryness of the air, and so forth, you will readily conceive that it is difficult to lay down any rules with regard to putrefaction. Sometimes it is very rapid, sometimes it is very much delayed. Here, again, you must use your common sense, and form a judgment by reasoning *pro* and *con.*

The rapidity of onset and the quickness of putrefaction is one of those things which vary immensely. I warned you at the close of yesterday's lecture that you must take all the circumstances into consideration, and you must not attempt to be precise where precision is not possible. Now, to show you how rapid decomposition may be, I will read you this case, which is taken from Taylor's book.

A man, aged thirty-nine, was admitted into Guy's Hospital in October 1849. He was fat, of pale complexion, and of intemperate habits. The muscles were flabby. He died suddenly after a few days, with-

out suffering from any symptoms indicative of danger. His death took place at 10.30 P.M., the body remained in the ward until 8 A.M. the following day, the air having a temperature of from 60° to 65°. The conditions as to cooling and rigidity were not observed during the night; but when removed at the hour mentioned, decomposition had already commenced. Dr Taylor saw the body seventeen hours after death. The skin of the face and neck had then a bloated and tense appearance from the collection of gas beneath. Blue, green, and livid red discolorations were seen more or less over the whole surface, with bladders or vesicles as in the advanced putrefaction of bodies after some days' exposure in hot weather. The gases which issued in jets from every part of the skin in which a puncture was made were highly offensive. When a flame was applied to the puncture, the gas burnt suddenly, with almost explosive violence. The gas did not discolour slips of paper moistened with acetate of lead or nitrate of silver; hence neither sulphuretted nor phosphuretted hydrogen was present. It burnt like the bright carburetted hydrogen, and I believe that it was this gas mixed with other gases and vapours derived from putrefaction. When the tense skin of the scrotum was punctured a jet of carburetted hydrogen escaped, which burnt steadily, with a pale yellowish flame, for above a minute. The state of the body precluded a post-mortem examination, which was considered unnecessary.

Now, with a fact like that before you, you must be very careful how you draw conclusions from putrefaction; you have to take all the circumstances into consideration.

The state of putrefaction of the body is of medico-legal importance, as the following case, also from Taylor, will show:—

Regina v. *Byrne* (Dublin, 1842). Prisoner was

accused of murdering her husband by strangulation, suffocation, or other violence. The Byrnes were a drunken couple, and on July 1st they retired to their bedroom, where much spirits was taken to them. The deceased was heard to speak by an attendant on July 3rd and July 5th, but not afterwards. On July 6th prisoner left the room for a short time and closed the door after her. On the 7th and 8th she was seen at the door of the room. On July 9th she ordered *two* cups of tea at 10 A.M., and at 7 P.M. she suddenly called one of her sons to come and turn his father on to his back. The husband was dead and in an advanced stage of decomposition. The body was swollen, discoloured, and covered in parts by maggots. The face and neck were black, the right eye protruded, and the tongue projected between the teeth.

When did Byrne die? Mrs Byrne asserted that she slept with him on the night between 8th and 9th July, and that he died on the night of the 8th, and it is possible that a body in a close room in July might reach an advanced stage of decomposition in twenty-four hours. On the other hand, the deceased was never seen alive after July 5th, and did the state of the body represent a four days' decomposition? There were witnesses who adopted both these theories, and both were sufficiently plausible. It is certain that Mrs Byrne must have known of her husband's death when she called for two cups of tea on the morning of the 9th. The deceased probably died from suffocation, possibly from falling over on his face among the bed-clothes while drunk, and, since there were no signs of strangulation (which might, however, have been obliterated by decomposition) and no motive for murder was alleged, Mrs Byrne was acquitted.

Undertakers by preference place a corpse in a cold room with the windows shut. There are certain poisons which tend to preserve the body, and it is important

to know this fact. Arsenic is one of these, carbolic acid is another. It stands to reason that if a person has been killed by an antiseptic poison the body will keep longer than a normal one would.

Insects in Relation to the Dead Body.—Many interesting facts have been acquired of late years with regard to decomposition of the body, and M. Mégnin, a member of the French Academy of Medicine, has written a very interesting book called *La Faune des Cadavres*, and has described the insects which are largely operative in making away with dead bodies. I will tell you what his conclusions are. The majority of the bodies which Mégnin studied had been left exposed to the air. M. Mégnin has shown that insects do not attack the carcase of an animal in any haphazard fashion, but that the kind of insect which is found upon the corpse depends entirely upon the stage of putrefaction on which it has entered. M. Mégnin says that a dead body which is exposed to the air is made away with by successive squadrons of insects. The first squadron that attacks the carcase are all Diptera, and belong to the genera *Musca*, *Curtonevra*, and *Calliphora*, *i.e.*, the common house-fly, blow-fly, and allied species. The attack by the house-fly and the blow-fly are made before putrefaction sets in. The next squadron, which is also composed of Diptera, are attracted by the smell of commencing decomposition. These include a fly of a metallic green lustre (*Lucilia Cæsar*), as well as flies of the genus *Sarcophaga*. M. Mégnin says that among these flies there are specialists which prefer the flesh of particular animals. When we study entomology and bacteriology in relation to dead bodies and excreta we find specialism carried to an extraordinary degree. The third squadron appears as soon as the fats of the body begin to undergo acid fermentation, and the Diptera then give place to certain Coleoptera or beetles (genus *Dermestes*), and Lepidoptera or moths (genus *Aglossa*). M. Mégnin mentions in this

connection the *Dermestes lardarius*, or bacon beetle. The next change in the body is a caseous one, and when this begins the Diptera reappear, and among them the *Pyophila casei*, which breeds jumpers in cheese, and *Anthomyia*. These are accompanied by a beetle (genus *Corynetes*) which is fond of rancid fluids. To the caseous fermentation succeeds ammoniacal liquefaction; and then comes the fifth squadron of Diptera (belonging to genera *Tyreophora*, *Lonchea*, *Ophyra*, and *Phora*) and Coleoptera (*Silphida* and *Necrophora*), to feed upon it. The sixth squadron consists entirely of Acari or mites, whose function is to dry up the carcase and reduce it to a mummy-like condition. Mégnin figures six species of mite and mentions others. Then the body becomes attractive to the seventh squadron, which consists of beetles and some forms of moth which are the scourges of the housewife, and a vexation to the furrier and the collector of dried specimens in museums. The eighth and last squadron consists of two species of beetle, which consume and make away with the pupa-cases, dung, and débris of the seven squadrons which have preceded them.

This is a very interesting study, and to Mégnin undoubtedly belongs the credit of being the first to embark upon it. It is not a very attractive branch of natural history, but still it is a most important one, because there is great need of accurate knowledge concerning the dissolution of the body. Mégnin, as an entomologist, says that by the eggs or larvæ, or other evidence that he may find in the dead body, of such and such insects, he is able to tell how long the body must have been dead. He assumes that these squadrons of insects come in proper order, and as an entomologist he knows how long they take to lay their eggs, to produce their young, and so forth. On the other hand, it is but right to say that other entomologists state that the remarks of this pioneer are not quite accurate. That, again, one can understand. You will notice that the insects come attracted

by the condition of the body, and I take it that the caseous change, the ammoniacal change, the acid fermentation change, and so forth, are caused by vegetable microbes, and it is only reasonable, I suppose, that the vegetable microbes which grow in the fat and watery body would be different from the vegetable microbes which grow in a dry and thin body. Thus it behoves us not to run these theories too hard. Still Mégnin's researches mark a distinct advance.

Adipocere.—When bodies are buried in moist positions there is formed a material which is known as adipocere, a fat-wax, a sort of soap formed by the union of fatty acids with the ammonia in the body. It has a peculiar smell, such a smell as you sometimes get in old anatomical preparations which have been macerating in water. It is inflammable, and if you heat it over a spirit lamp it melts and burns with a sooty flame.

I have given you some account of the state of a body that is left above ground. Sometimes bodies which are ripe for decomposition, and which have not been previously sterilised, are put in lead coffins, and sometimes untoward accidents have happened. Decomposition may go on and perhaps burst the coffin. On the other hand, if bodies are put into lead coffins early they are preserved for long periods, and the form and features may be recognisable after a considerable interval. Bodies in this country are almost always buried in coffins, and are buried at a considerable depth. You may remember that Hamlet, when accosting the gravedigger in the 5th Act, asks him how long the body will lie in the earth ere it rot; and the gravedigger's answer was to the effect that a body should last you some eight or nine years. It is, I believe, the evidence of sextons in the present day that if a body be buried at a considerable depth it takes eight or nine years to make away with it. I believe the rate of disappearance of a body depends very largely on the depth at which it is buried. If you bury a body without a coffin in the upper

layers of the earth, which is full of microbes and burrowed by insects in every possible direction, then the body is got rid of very quickly, say in twelve months or so. In this country it is illegal to bury a corpse at a less depth than four feet, but I will tell you of an experience I have had in the exhumation of animals. The first animal we dug up was a cow that had been buried eighteen months previously, and had been buried only superficially. It was buried in Hampshire, on the chalk ; a hollow had been dug in the chalk big enough to take the cow, and the earth was piled on top of that. On exhuming this cow we found nothing but the bones ; they were beautifully clean. Next we went for a favourite old horse, which had been buried very near the same spot, but about a year longer ; that was buried eighteen inches deeper than the cow. We found that the horse's flesh was coming off the bones ; there was no disagreeable smell. Then we went in search of the carcase of a pet pony. This pony had been interred very deeply indeed. It so happened that the gardener had used the spot for making a pile of dead leaves for leaf mould. When we got to the depth where the pony lay the pickaxe came upon something with a soft thud, and the odour sufficed to cause us to abandon the work. It was clear that decomposition had not proceeded nearly so far as in the case of the other two animals which had been buried nearer the surface. I think there can be no doubt whatever that if you want a body to disappear quickly you must bury it superficially. I have heard Sir William Flower say that many years ago a gentleman who lived on the coast of Norfolk wrote to him and said a whale had been cast ashore near his place, and that if it was wanted for the Natural History Museum it was at Professor Flower's disposal. They thereupon got it on shore and buried it near the margin of a wood or copse, and in two years' time Sir William Flower exhumed it and got a most beautiful specimen of the bones quite clean. Sir Seymour Haden has exhumed calves after a year's superficial burial,

and found nothing but bones. I have buried a large number of smaller animals. I found a cat at the end of sixty-nine days was not quite clean, but with a little shake and holding it under the water-tap there was a perfect preparation of the bones. Worms do not eat carcases if they can get anything else in the shape of leaves and vegetable refuse.

Of course, there are great difficulties in the way of superficial burial without coffins. Some people die dropsical, and you have to be sure that in burying a dead person of this kind it is done decently, and that there is no leakage of fluid. Therefore there must be some impermeable vessel to take the corpse to the grave, at all events. Another very important matter is this: if you bury bodies too superficially you may get animals trying to exhume them.

I think there can be no doubt that if you want to get the greatest amount of good and the least amount of harm from a dead body it should be buried superficially. There is no doubt that bodies so buried very soon sweeten, and they are exceedingly fertilising. If you bury an animal at the root of a shrub you will find the shrub grow, and will find the roots among the dead body, the dead body being perfectly sweet. The only way to purify the soil is to grow something. In many countries cemeteries are used over and over and over again. Two or three years after the bodies are buried the bones are taken up, and in many large cemeteries on the Continent you will find a charnel-house where the bones are collected. By growing something over these bodies you produce wood, and I think there can be no harm in using such wood as firewood, and secondary cremation of that sort is profitable all round. But if you bury bodies deeply, like the pet pony I spoke of, and especially if you bury in a brick vault, and water flows in on the top of this putrid mass, leaking under pressure to a spring, then I think you may theoretically get very considerable danger. We hear a great deal about the evils of cemeteries. All I can say is

that as far as I know there is no good evidence of serious evil. The Local Government Board publications are perfectly silent on the point, and last year I was present at an inquiry about a cemetery which was very interesting, because the witnesses who came up one after another gave no definite evidence as to the evils of cemeteries. I do not mean to say that the old city churchyards, for instance, in which there were nothing but heaps of rotten corpses, have not been the cause of ill-health, but I cannot find any evidence of epidemics arising in this way.

In 1897, I buried twenty-four rabbits in my garden and buried them at different depths, and surrounded them with different materials, such as humus, sand, clay, cinders, and quicklime. A year later they were all exhumed, and the results were such as to bear out what I have already said, that the dissolution was greatest in those animals which had been buried most superficially. Those surrounded by relatively sterile materials, such as cinders and sand, were not so far advanced in dissolution as those buried in humus. All of them were perfectly sweet and inoffensive, except three which were buried in quicklime. The quicklime surrounding these three rabbits had "set" into an impermeable sarcophagus within which the rabbits were putrefying, and generating offensive gases. These experiments showed that quicklime is a preserver and not a destroyer of the dead body. They were re-interred and exhumed at the end of a second year. The skin and fur were still recognisable. To bury anthrax carcases in quicklime is a mistake.

CHAPTER V

PERSONS FOUND DEAD

Importance of the Duty of looking at the Dead Body by the Medical Man called—Position of Body—Surroundings: Case in Point—Post-mortem Examinations: their Importance—Mode of Procedure—Signs of Identity—Value of Scars and Other Marks on the Body—Indications of Occupation—Notes of Post-mortems—Examination of the Urine—Signs of Injuries—Appearances of Wounds—Examination of the Three Cavities: Thorax, Abdomen, and Head—Preservation of the Viscera—Persons present at the Post-mortem Examination.

WHEN persons are *found dead* we have to determine how they came by their death. The police are informed, and the police generally call the nearest doctor, who is asked to come and look at the body. It may be that the body is under a hedge, or in a field, or in a room. The body may have died from natural causes, or from an accident, or suicide, or homicide. Especially in country places you have to remember that this duty of looking at the dead body is an important one, and that you are a common witness as well us a skilled witness. You will very likely be the only person of education who sees the body. It is very important, when you are called to a dead body, that you should know whether the body has been moved or touched before you saw it. You will generally be able to get evidence on that head. Perhaps some fussy person has moved the corpse from the position in which it originally was, and that is misleading. If you are sure it

has not been moved you will take careful notice of its exact position. For instance, if a dead body were found on this floor you would make a rough plan, giving the size of the room, and the position of the body, window, door, and so on. It is very important that, while you should listen to everything that is said, you should utter no hasty opinion. Keep your eyes and ears open, and your mouth shut. Look at the ground and see if there are footprints or signs of a scuffle, and examine the condition of the clothes, and so forth. I will read you a case from the book of Paris and Fonblanque which is full of instruction.

"A Cornish peasant, engaged in attending upon the lighthouse on the western coast, was found dead in a field near the public road leading from Penzance to the Land's End on Sunday, December 12th, 1813. He was lying in a dry ditch, with his stick at a little distance from him; one of his shoes was down at the heel, and both were smeared with mud; his pockets were empty. The body was taken to a public-house in the village, and the coroner having received notice of the occurrence, an inquisition was taken, and the verdict of wilful murder returned against some person or persons unknown. The body was afterwards buried, but a rumour having arisen that the anatomical inspection had not been sufficiently minute and satisfactory, it was, by an order of the magistrates, disinterred, and the author was desired to assist in the further investigation of the subject Upon examining the body, which had not yet advanced so far in putrefaction as to obliterate the traces of violence or to confuse the appearance they presented, patches, arising from extravasated blood, were seen in different parts of the throat, and distinct abrasions corresponding with the nails were visible; the face presented the physiognomy of a strangled man. On the chest, bruises evidently occasioned by the pressure of the assailant's knees, were also noticed.

Upon dissection the brain was found excessively turgid with blood. The rest of the organs appeared in a perfectly healthy and natural condition. It is worthy of remark that the field in which the deceased was found contained several shafts of abandoned mines. Upon visiting the spot the author observed tracks on the grass, as if it had been scraped, proceeding in a direction from the hedge next the public road to that in the opposite part of the field, and under which the body was found; near the former hedge also some fragments of a glass bottle were discovered. The deceased, it appeared, had been at Penzance for some medicine, and it was proved that he had left that town, on his return to the lighthouse, with a phial in his pocket. All these circumstances combined placed the murder beyond conjecture. He had evidently been strangled, probably at the spot where the glass fragments were found, which were undoubtedly the remains of the phial broken during the scuffle; besides, it would appear that he had been dragged along the field from this spot to the opposite hedge, for marks denoting such an act were visible on the grass, and this received further confirmation from the condition in which the shoes of the deceased were found. Who then did the murder? From the circumstances of its having been perpetrated in a field containing several old mines, without any attempt on the part of the villain to avail himself of the advantage which these caverns would have afforded for the concealment of the dead body, the author was convinced that the perpetrator of the deed would be found in some stranger to the country, for such a one alone could be unacquainted with the mines to which we allude. The suggestion of this idea very naturally gave the direction to the line of inquiry. Were any suspicious strangers in Penzance or its neighbourhood? Had the deceased been seen in the society of any person unacquainted with the country? He had been

seen, it was discovered, playing at cards in a public house with some of the privates of the artillery stationed in the Mount's Bay, amongst whom was a very powerful and athletic Irishman of the name of Burns, who had lately landed, and immediately enlisted into the corps. Burns was accordingly arrested on suspicion, when the purse of the deceased, containing thirty shillings, was found on his person. He was, moreover, unable to show where he was at the time the deceased left Penzance in the evening; and he was subsequently recognised by two witnesses who had seen him accompanying the deceased on the road towards the Land's End. It is only necessary to add that he was convicted and hanged; and it is not the least satisfactory part of this case to state that on the evening previous to his execution he confessed to the author that all the circumstances of the case occurred precisely as we have stated, that he strangled his victim with a pocket handkerchief, but that from the difficulty of completing the act he was compelled to place his knees upon his chest."

That shows you how very useful a clever man, such as Dr Paris undoubtedly was, may be in an investigation of a crime.

Post-mortem Examinations.—Next, as to making post-mortem examinations of persons found dead. You should always carefully examine the clothing for stains, soiling, stabbing, etc., and notice whether stabs in the clothing correspond with stabs in the body.

I need hardly say that nothing requires more skill or practice than the making of post-mortem examinations. The experienced pathologist is the only person capable of properly interpreting the signs which are found after death. When you are called upon to make a post-mortem you must remember it is a very important duty, and one that has to be done with a great deal of care. Therefore, be sure that, when you start to make a post-mortem, you

have plenty of time before you. You do not know what you are going to find; the cause of death may be something perfectly obvious, or, on the other hand, it may be something which is very difficult to find out, and you have to continue with that examination until you are satisfied. Those who have had experience of this kind of thing must often have been aware of the fact, that instead of half an hour or an hour they have been occupied five or six hours. In cases requiring judicial investigation, it is very important, seeing that the post-mortem examination must not be hurried, that it should be conducted in a proper place. In London there are now public mortuaries and coroners' post-mortem rooms, so that if an examination proves to be a long and difficult one it need not be finished at once, but the room can be locked up and things left, for the examiner to get a needed meal or rest. If you have to make a post-mortem examination in a remote place, you must take every single thing with you which is likely to be necessary. I had almost said you must take the water, and towels, and a bit of soap to wash yourself with. You can never rely upon getting anything. You must take not only what is mainly necessary, but trifles such as a piece of string to sew the body up again, scales to weigh the viscera with, which is a most important matter; a catheter to draw off the urine, a proper note-book, and, in case it should be desirable to preserve any of the viscera, proper vessels, perfectly clean, to put them in. If you take these vessels you must also have the means of securing them, such as string and sealing wax and your own seal. I grant that you may not want some of these things in a hundred cases, but in the one hundred and first you may, and you may be seriously inconvenienced if you have not got them.

Always, if possible, take somebody with you; do not try to make the examination single-handed; take a medical friend with you who also has a fair knowledge of pathology. Then one can make the examination while

the other writes the notes. Moreover, in that case the pathological appearances are submitted to two pair of eyes, and two judgments instead of one. But it is of the utmost importance that the notes should be taken. I think it is very desirable to take these notes of post-mortems in numbered paragraphs, and for this reason, that cross-references are thereby facilitated. The first thing to note in making a post-mortem examination are the signs of identity, therefore you should make a record of any scars. Some of you may have been present at the post-mortem yesterday afternoon on a body I had never seen before, that of a woman. Before the body was opened we were able to say that there was a scar on the left temple, that there was a big vaccination mark on the left arm ; we were able to say that one or two of the teeth were wanting ; we saw that the patient had two black eyes ante-mortem, and on making an incision into these we found distinct evidence of extravasation. We saw that there was œdema on the body, and that the body was fat, bloated, and so forth. There are certain other indications which lead to identity, such as tattoo marks and any deformity or abnormality of the body. Be sure to turn the body over, and look at the back as well as the front. Sometimes there are indications of occupation to be found about the body. I shall not now go into them in detail, but you can tell largely by the hands whether the deceased was a person habituated to hard manual labour, or whether the reverse was the case. One may sometimes get definite evidence of occupation. In works on *Medical Jurisprudence* you will see many indications of occupation put down, and they are more or less true, but remember that handicrafts are every day being supplanted by machine crafts, and the indications of occupation are probably less trustworthy than they were. Next note the state of nutrition. In a woman the presence of lineæ albicantes, a probable evidence of previous pregnancy, would be noted. You must carefully note the signs which indicate the time which has elapsed since death, such as

the temperature, rigor mortis, and putrefaction, which I have been dealing with. In the next place, whether the body be that of a male or female, I strongly advise you to pass a catheter and draw off the urine. Only a short time ago a case was before the courts in which it was alleged that a servant girl had been starved to death. The prisoner was convicted, and got a term of penal servitude. Now it was said that servant girl was exceedingly thin, and that she had a voracious appetite and was very thirsty. The defence set up was a perfectly plausible one, and a very proper one, namely that the deceased might have suffered from diabetes, which would have accounted for the emaciation, for the appetite, and for the thirst. It was a perfectly legitimate defence. The question was one of great importance. Perhaps there was no urine to be got; but if the urine had been examined, however little, there would have been the means of a complete answer. You have to remember that urinary diseases are a cause of death and of sudden death. Granular contracted kidney may give rise to coma and rather sudden death, and the examination of the urine will tell you whether it was albuminous, or whether it contained sugar. The establishment of either of those two facts would be of the greatest possible importance. You will appreciate how important it is to draw off the urine before making the examination on a body, because if the urine is bloody and polluted you cannot properly test for sugar or albumin. As we know very well, pathological conditions of the kidney are sometimes very difficult to appreciate, but the condition of the urine helps us in this direction. Then always examine a body carefully for signs of injuries externally. I would remind you that sometimes these external injuries are hardly noticed. For instance, a stab with a stiletto under a pendulous breast sometimes may pass unnoticed if it is not looked for, and there are cases where sharp instruments have been put up the nostrils. There is a record of a case in which death resulted from the end of a clay pipe

being driven up the nostril and through the ethmoid. That is a thing which requires to be hunted for, as it may easily escape notice.

Then, if there are wounds, note their position, their size, and their direction; pass a probe into them, and examine just as you would during life. To continue with the post-mortem, you have to remember that when you make a post-mortem for the coroner it is obligatory upon you to examine all three cavities of the body — the thorax, abdomen, and the head. That was brought to my attention when I was house-surgeon. A man was admitted to the hospital smashed. He had fallen off a railway engine, and got between the engine and the wall. There were any number of injuries, any of which might have caused death; among other things he had a ruptured liver. The post-mortem was made, we saw ample causes of death, and there was an end of the matter until I was called one afternoon to give evidence to the coroner. Now comes the important point. There is no doubt the injuries I had described caused death, but how came the man to fall off the engine? The evidence went to show that one of his fellow-workmen had negligently left one of those water pipes or hoses, such as are used to fill engines with, in a wrong position, and that the pipe caught this man as he was on his engine and knocked him off it. If that was the case it is possible that the man who had been guilty of this negligence had been guilty of manslaughter. The defence was that he fell off his engine in a fit. The coroner turned to me and asked, "What was the condition of the brain?" I had to say I had not opened it. It is a very good case in point. Therefore, you must always examine the three cavities, because you never know what the defence may be. Fortunately, in this case, the evidence of his ever having had a fit was practically *nil*, and the evidence of his having been knocked off the engine by the pipe was established by eye-witnesses, so that the question of a fit was not of very much importance here. But if there is a man being tried

for his liberty or his life, defences of that kind are put forward, and the most will be made by the defence of any slip made by the doctor at the post-mortem examination.

In making the post-mortem on the two rabbits the other day, we saw the first appearance on opening the abdomen was important. In the drowned rabbit you will remember the intestines were very dark coloured, showing much evidence of congestion. In the examination of the body yesterday afternoon the reverse was the case; the intestines were pale, and when I got the history, it showed that the patient died quite suddenly and unexpectedly. We found there was extreme fatty degeneration of the heart: the heart had stopped suddenly, and the circulation stopped before the respiration; therefore, the intestines were not engorged or congested. She did not die from asphyxia. An important point, and one which is insisted on by Virchow, is that in opening the thorax one should divide the costal cartilages right away down, and turn back the sternum and the cartilages, and then look at the pericardium and the pleura *before dividing the sterno-clavicular articulations.* The reason for that is that when you divide the sterno-clavicular articulations, you are almost sure to divide the great veins, and then you will get the thorax flooded with blood, and that will make you doubtful of the true condition of the pleura and pericardium.

I want to remind you again that the congestion of organs is more often passive than active, and depends upon the mode of death. Be very careful how you say that the parts are inflamed. It is very difficult to say that a part has been inflamed unless there be the products of inflammation—that is, unless there be exudation of lymph or pus. Again, I would say that where parts may have to be preserved, as in cases of poisoning, you must be careful that your vessels are quite clean, and that after the viscera are put into the clean vessel they must be tied and sealed with your own seal.

I do not think you should let a stranger be at a post-mortem examination in doubtful cases unless you are satisfied that there are adequate reasons for his presence. I mention that because, in the noted case of the murder of Cook, by Palmer, the doctor of Rugeley, the murderer was present at the post-mortem. As the stomach was being opened, Palmer jogged against the medical man who was collecting the contents of the stomach and spilled some of them. The contents of the stomach were sent by post-chaise to the nearest railway station to be transmitted to Dr Taylor, and it was proved that Palmer had offered the postboy £5 to upset the carriage. Therefore, be careful who is present at the examination of the body, and remember that a man, who is likely to be tried on the capital charge, will not stick at trifles to escape the punishment which probably awaits him. Use your judgment.

CHAPTER VI

POISONING

What is a Poison?—Poisoning according to Law—Legislation on the Prevention of Poisoning—The Sale of Poisons—Two Classes of Poisons: the Law on their Sale—Evasion of the Law: an Instance — Toxicology — Historical Remarks — Chemical and Physiological Tests — Poisons used Criminally — Absorption through Various Channels—Elimination by the Bowel—The Liver—Chemical Analysis—Effects of Poisons—Classification of Poisons—Examples of Selective Action of Poisons—Influence of Dose and Form—Habituation—Idiosyncrasy—Susceptibility —Faulty Elimination.

NOW, passing from generalities we come to particulars, and the first class of deaths which I take up are *deaths from poisoning*. First of all, we may ask what is a poison? Taylor's definition is "a poison is a substance which, when absorbed into the blood, is capable of seriously affecting health or destroying life." The law does not define a poison, and the words of the statute directed against the crime of poisoning are: "Whoever shall adminster or cause to be administered to or taken by any person any poison or other destructive thing with intent to commit murder, shall be guilty of felony." Therefore, if one administers, as has been done in India, powdered diamonds or glass, which is not a thing which will be absorbed into the blood, it would nevertheless be taken to be a "destructive thing." Then, "the adminstration of poison or noxious thing with intent to annoy or injure"

is now a felony or misdemeanour, as the case may be. If a man insults you in the street and you knock him down, you may be punished, as you must not take the law into your own hands. And if, as sometimes has happened, servants have been suspected by their mistresses of purloining the whisky, and if into the whisky bottle is put a little tartar emetic, and if the person who drinks the whisky is made ill by that tartar emetic, she (or he) can be made answerable in a court of law. In this course I shall deal almost exclusively with poisons which have been used criminally. In these days we talk of toxins, which are poisons brewed in the body by pathogenic micro-organisms. I may say I do not intend to deal with those poisons.

Now, in order to prevent poisoning, there has been legislation, and I daresay legislation does prevent poisoning to a certain extent, and it is certain that now for some few years past the number of cases of criminal poisoning which have been the subjects of judicial investigation have been singularly small. In order to prevent poisoning, the law tries to make it difficult to get a poison without having the fact registered. The sale of poisons is regulated by an Act of Parliament, and this sale of poisons applies to people who keep an open surgery, and of course it applies to druggists. By this law, articles which are to be deemed poisons are scheduled in two parts. Part 1 comprises arsenic and its preparations, prussic acid, cyanide of potassium and other metallic cyanides, strychnine, and all poisonous vegetable alkaloids and their salts, aconite and its preparations, emetic tartar, corrosive sublimate, cantharides, ergot, etc., these latter being put in to meet the crime of abortion. Part 2 comprises oxalic acid, chloroform, belladonna and its preparations, the essential oil of almonds (unless deprived of its prussic acid), opium, poppies, and their preparations. You will note that Part 1 contains more deadly poisons than Part 2. On the sale of any poisons contained in Part 1 or Part 2, the box, vessel, or

cover in which it is contained must be labelled with the name of the article, the word "poison," and the name and address of the seller. No poison in Part 1 may be sold to any person unknown to the seller, unless introduced by a person known to the seller, and upon every such sale the seller must, before delivery, enter into a book, to be kept for the purpose, the date, name, and address of the purchaser, the name and quantity of the poison, and the purpose for which it is required; and he shall also cause the purchaser to sign his name therein. Therefore, you cannot get a deadly poison without considerable difficulty. A penalty of £20 may be inflicted upon any one not conforming to the necessary regulations. Poisons must not be sold by people who have not passed a qualifying examination in pharmacy or medicine. A year or so ago a case happened which was of interest in this connection. A druggist went away for the afternoon on some private business, and he left a boy in the shop. While he was away somebody came into the shop, whom the boy knew, for a packet of vermin killer, price 3d., containing strychnine. He sold it to him after going through all the necessary formalities, but the chemist was fined £5 because the boy was not qualified.

But the law may be evaded. One noted instance of this was Eliza Edmunds, of Brighton, who gave strychnine to a medical man in chocolate creams. Eliza Edmunds got her strychnine in the following way: She waylaid a little boy in the street, and said, "I wish you would go to Mr So-and-so, the druggist, take that note, and bring the answer back to me." The letter pretended to be from a doctor in Brighton, and was to this effect: "Will you kindly let bearer have so much strychnine; I am suddenly quite out of it. Signed, ——." The strychnine was sent, and so Eliza Edmunds got the poison. I take it that if a person is determined to get a poison, in a case of deliberate murder, he or she will find out a way. But undoubtedly the Poisons Act is of very great value in

giving a hot-tempered, impetuous sinner, a little time for reflection.

Toxicology is the science of poisoning, and I need hardly remind you that the word comes about in a round-about way. It is derived from τόξον, "a bow," because poisons were first used upon arrows. Allusions are made to poisons of this kind as early as Homer, and throughout ancient history you find constant reference to poisoning. Poisons have been used a good deal for the execution of criminals, and a noted instance was that of Socrates, whose case I shall read to you in due course. He was poisoned by conium or hemlock, which has been largely used. At the present day we hear a good deal about euthanasia from a certain class of writers, who contend that it is proper and advisable, when people are hopelessly diseased, that some painless form of death should be provided for them. It is reported that the old men of Cos, when tired of life, used to assemble at a banquet and drink a happy despatch to each other in draughts of hemlock. Poisoning, therefore, is not a new thing. Poisons were common in the ancient days, and people in eminent positions were liable to poisoning. It is said that Hannibal always carried poison with him, in order that he might despatch himself if he got into trouble with his enemies. Mithridates, king of Pontus, earned great fame because he invented a universal antidote. If anything were wanted to show that poisoning was common, it would be the fact that there should be need for a universal antidote. Amongst early criminal poisonings we find it on record that Parysatis, the wife of Darius, killed Statira, the wife of Artaxerxes, by carving a fowl with a knife smeared with poison on one side only. That is a fact which shows that the higher education of women is no new thing. As early as 330 B.C. there is an account of a society of women who took to poisoning obnoxious senators of Rome. Nero retained the services of a lady named Locusta, whose duty it was to do his poisoning for him. Amongst the poisons aconite was frequently

used, and there is a line in Juvenal in which Pontia, who killed her two children, is represented as saying, "Confiteor puerisque meis aconita paravi." With the advance of chemistry and the preparation of new bodies poisoning became more general. When white arsenic became tolerably common there was an increase in the amount of poisoning. It is said that some of the poisonings early in the seventeenth century in Italy were done by white arsenic; and some of the poisoners in Paris, such as the Marquise de Brinvilliers, who is commemorated in one of Dumas's novels, used white arsenic. You will find that with the advance of chemistry the poisoner has been quite ready to use the latest new drug. One cause of the decline of poisoning is that the analytical chemist has been able to cry "Check" to the poisoner. All the poisons are detected with greater ease now than formerly. When strychnine was discovered, there is no doubt it was used many times without being detected. The cases were regarded as tetanus, but at the trial of William Palmer the whole question of the detection of strychnine was thrashed out, and that marked the decline of the use of strychnine as a poison. Lamson, another medical poisoner, used aconitine. It was thought that that could not be detected chemically. It is said that the chemical tests for aconitine are very doubtful. Quite true, but the physiological tests are of another kind, and Lamson's crime was brought home to him, and the analyst was again able to say "Check" to the criminal. Therefore the knowledge of the analyst and physiologist has been of great value in arresting the growth of criminal poisoning.

In speaking of poisons I shall limit myself very largely to poisons which have been used criminally. If I were to deal with every "poisonous thing," I should be trenching upon the domain of the pharmacologist, and I have no intention of doing that—at all events, not to a greater extent than I can help. If a poison is something which is absorbed, we must remember

that it may be absorbed from many points. It is usually absorbed from the stomach, or let us say from the alimentary tract, but it may be absorbed from any other mucous membrane. Some poisons are absorbed from the skin, or from a mere scratch upon the skin. Poisons may be absorbed from the subcutaneous tissue. I need not dilate upon the use and abuse of the hypodermic syringe. Absorption from the unbroken skin is very limited in its range; comparatively few things are absorbed from the skin. It is doubtful to what extent the soluble salts are absorbed by it; some would say not at all. For instance, if sodium chloride were absorbed by the skin, it is tolerably certain that sea bathing would not be the pleasure that it is. We know that mercury is absorbed from the skin, and that mercurial inunctions are common. We know that the constitutional effects of belladonna are obtained when it is applied as an ointment; and it is possible that the greasy medium in which the medicament is incorporated helps its assimilation. But you may take it in a general way that absorption by the unbroken skin is rare. Poisons do not act until absorption takes place, and the more rapidly the poison is brought into contact with the blood-vessels by which it is absorbed, the quicker it acts. A dose of morphia acts far more quickly given hypodermically than when given by the mouth; and occasionally, when hypodermic injections were very much more common than they are now, when an injection was accidentally administered into a superficial vein the effect of the injection was almost instantaneous. Absorption is quickest when the poison is introduced directly into a vein, but it can hardly be called absorption then. It is very rapid when given under the skin, and is rapid from the alimentary mucous membrane. Of course if you put say a dose of crude opium into the middle of a dumpling, and put some of that into the stomach with a big meal, it will be a long time before the patient is

under the influence of the poison. But if you put a solution of morphia into a comparatively empty stomach, the action of the poison is much more rapid. The action of a poison is rapid according to the area of absorption; there are poisons which act exceedingly rapidly, which presumably are absorbed from the pulmonary area as well as from the alimentary surfaces. I allude to such a substance as strong prussic acid. Chemically pure prussic acid is a thing which most of us do not know; it does not exist except as a chemical curiosity, but it has been said that people have been killed by smelling perfectly pure prussic acid, and there is no doubt it acts so quickly owing to its great volatility and to the large surface to which it is exposed for absorption. Again, absorption from a serous membrane is very quick, and experiments have shown that septic poisons particularly are absorbed with great rapidity from the peritoneum. The operative dose of a poison is the balance left between absorption and elimination. As soon as a poison is absorbed it begins to be eliminated, and your physiological lecturers have told you how very rapidly after injection into a vein certain salts appear in the urine; elimination commences at once, and mainly by the urinary tract. Elimination is so rapid that poisoning under certain circumstances does not take place. Amongst the most rapidly acting poisons are snake poisons. Take a venomous snake in an active condition, and use the poison from it, and the symptoms set in in a few minutes. It is a well-known fact that there is very little danger in sucking a snake wound if you have no cracks upon your lips. The explanation which is offered is that under those circumstances elimination by the urine takes place as quickly as absorption. So with regard to another organic poison, curara; that acts very much more vigorously when injected subcutaneously than when given by the stomach, elimination by the urine being rapid, so that there is not an operative

dose circulating in the blood. The channels for the elimination of poisons are many. After a poison has been taken you can detect it in the saliva, for instance, or in the fæces, or in the urine, and possibly there may be elimination of some poisons by the sweat. The latter I believe is only a possibility, not a proved fact.

Elimination by the Bowel.—With regard to the alimentary tract as an eliminating channel, that perhaps requires a few words. When a poison such as arsenic is taken, it is very common indeed post-mortem to find evidence of the irritation of the poison in the gullet, in the stomach, or in the duodenum and upper part of the small intestine. As a rule, the rest of the small intestine is free from symptoms of irritation, but sometimes those symptoms are evident again in the large intestine. I think there can be no doubt that the large intestine is a powerful eliminating organ. I call to your mind here that one of the symptoms of chronic mercurial poisoning is indistinguishable from dysentery. You get intense inflammation of the large intestine, dysentery is set up, mucus is discharged, and in this discharge from the large intestine mercury can be detected. That is the case also, I take it, with regard to some other mineral and organic poisons.

The Liver in Poisoning.—Now, when poisons are absorbed from the alimentary canal they are taken up by the portal circulation to the liver, and it is not surprising to anybody that a poison may have been absorbed from the alimentary tract, and yet may not be present in the alimentary tract, or may not be detected there, but may be detected in the liver, and when you make a post-mortem you must of all the viscera be most careful about the liver, because it has happened again and again that a poison such as arsenic has been detected in the liver when it has been got rid of by the alimentary tract, either by purging, vomiting, or natural absorption, or by the three processes together.

Then I take it that a poison may be eliminated not only from the large intestine, but also from any part of the alimentary mucous membrane. And it may happen, and has happened, that a poison given hypodermically has been detected in the stomach in small quantity. Therefore, you will need to be on your guard about this.

Chemical Analysis. — Now it is obvious that the detection of small quantities of organic poisons in the tissues of the body is a chemical matter of very great delicacy and very great difficulty. And I should like to say that I do not think anybody ought to undertake a toxicological analysis for judicial purposes who is not a chemist; that is to say, nobody should undertake it who does not make chemistry his profession and his first work in life. There are no more difficult problems than the detection of an alkaloid in a liver or in the tissues of the stomach, and such analyses have to be done with the greatest care; and unless a man is working all day and every day in the laboratory he ought not to undertake such work. In the old days, before the chemist's was a recognised profession, the medical man was the only person who knew any chemistry. But I remind you that the best that you can do, or the best that I can do, is not the best that can be done by a man whose principal work in life is in the chemical laboratory. But you as medical men want to know something about the chemistry of poisons, because, perhaps, you are confronted with a case which arouses your suspicions as to poisoning, and you want to be able to see whether your suspicions are at all justified; you want to know how to be able to test fluids which the patient is taking; how to test vomit, urine, and so forth. These and other tests I shall hope to show you.

Effects of Poisons.—Now I will say a few words about the effects of poisons. Most poisons act upon many organs, and not only upon one. But it is nevertheless

true that poisons have their seats of election for manifesting their action, and that poisons are taken up by the cells of one part more readily than they are by the cells of another part. You often hear it said that a certain poison acts, let us say, upon the spinal cord, and that another poison acts upon the nerve-endings in the muscles, and that it is eliminated by the saliva or urine; or that another poison acts upon the kidneys, and not upon other parts; that others act upon the uterus, and so forth. But I take it that the conclusion we must come to is that that is true, but true only in a limited sense. If I take a dose of curara I get the motor nerve-endings in my muscles paralysed, but when the end-plates of my motor nerves on the muscles have had their dose, it is tolerably certain, and may almost be conclusively shown, that other parts of the body and other cells then come in for their dose. I am inclined to say that certain cells in the body stand in relation to certain poisons just as does a preference shareholder in a limited company to the dividend. The preference shareholder is a person who has the first draw upon the earnings of any commercial concern, and when the preference shareholder has had his dividend, then the holders of the deferred shares get theirs. For instance, you may get belladonna given you in only sufficient quantity to dilate the pupil, which is a preference shareholder; and when you get a bigger dose there is not only dilatation of the pupil, but delirium, quickening of the heart, and so on; and you get many parts of the body affected.

Classification of Poisons. — Now it is very useful to have some kind of classification of poisons, but I should rather warn you that no classification of poisons I have ever seen is from every point of view satisfactory. I think it may help us in our grasp of the whole subject if I just draw up a scheme of the effects of poisons.

First of all the effects of poisons are of two kinds: they are *local* or they are *remote.* Let me explain what

I mean. A person takes a dose of oxalic acid, which irritates the stomach and may cause perforation of it. That is a local effect.

EFFECTS OF POISONS.

- Effects of poisons
  - Local
    - Common
      - Corrosive.
    - Specific
      - Inflammatory.
  - Remote
    - Common (only in time).
    - Specific
      - Brain.
      - Spinal cord.
      - Motor nerves.
      - Sensory nerves.
      - Heart.
      - Blood-vessels.
      - Kidneys.
      - Sexual organs.
      - Liver.
      - Salivary glands.
      - Blood.

But after the local effect there is the remote effect, viz., great depression of the heart's action. Or, again, you may take carbolic acid. Carbolic acid is a violent irritant to the stomach, but after absorption it is a narcotic poison. With regard to the local effects of poisons, they may be corrosive or irritant. Then the local effects may not only be inflammatory but they may be specific, such as tingling of the lips and tongue produced by aconite, dilatation of the pupil by atropine, etc. With regard to the remote effects of poisons, these again may be classified. By common remote effect I mean the effect which is not specific, but is only remote in time. The best instance of that is stricture of the œsophagus following a dose of mineral acid. In specific remote effects we come to a list of the preference shareholders; for instance, take the brain. I suppose the brain is a preference shareholder in regard to alcohol. You take alcohol into the stomach, and it causes a warm sensation: that is a local effect; the specific remote effect is delirium. Amongst the obvious spinal poisons is strychnia, which causes convulsions. Then we may have the motor nerves acted upon

and the best instance of this action is with curara, which acts on the motor nerve-endings, and possibly on the sensory nerves. Then there are some poisons which undoubtedly have a specific effect upon the circulation, first upon the heart and then upon the blood-vessels. The best example of these is digitalis, and the other so-called cardiac tonics. Then there are some which seem to act more upon the blood-vessels than upon the heart, and the best instance I can give you is ergot, which is a hæmostatic, but by no means exclusively. We know digitalis acts upon the vessels as well as upon the heart, and we know that ergot acts upon the heart as well as upon the vessels. Then there are some which act upon the kidneys, and produce violent irritation of those organs; and the best example I can give you is turpentine and bodies of that class. With regard to the sexual organs, that is rather more doubtful. Cantharides is said to cause priapism, and ergot and savin to cause contraction of the uterus. Ergot clearly must be classed among the bodies which act upon the uterus, but in regard to cantharides and savin it is very doubtful if the sexual stimulation which takes place is not merely a result of the violent irritation in the adjoining viscera.

Then with regard to the liver. Are there any poisons which act particularly upon the liver? A few years ago one would have said that mercury was one. Clearly phosphorus produces its most marked effects upon the liver. You must remember that almost everything goes to the liver. For the salivary glands, mercury and iodide of potassium seem to have a selective action. Lastly we come to the blood. The best example of a poison which acts directly upon the blood is carbon monoxide. This enters into combination with the hæmoglobin, and brings about death in that way by a positive act, and not merely by the negative act of depriving hæmoglobin of oxygen. I would repeat that though I have given you this table, no one is more conscious than I am of its shortcomings.

There are certain things which modify the action of poisons. For instance, nothing modifies the action of a poison more than quantity. As a rule, the bigger the dose the more intense is the action, but that is not an absolute rule. You may give a moderate dose of antimony and the person dies of cardiac depression; if you give a big dose he vomits the whole lot. The same with turpentine. If you give a big dose it sets up peristalsis, and the whole of it is voided as by a purgative; but if you give a small dose urinary symptoms supervene. With mercury, again, the same thing holds good; if you give a big dose of mercury the patient is liable to be purged, and there are no later toxic symptoms. It is a fine line which divides toxicology from pharmacology, and you must not be surprised if I do not always keep to one side of the division.

Repeated small doses of a poison sometimes produce an accumulative effect. That is very much the case with lead. The next matter which influences the action of the poison is its form, the form in which it is given. A gaseous poison acts very quickly; such, for instance, as chloroform. A volatile fluid, again, like prussic acid, acts very quickly indeed. Then, as a rule, poisons act more quickly in solution than when given in the solid form. It goes without saying that the state of chemical combination affects the action of the substance on the body; for instance, strong sulphuric acid will poison, but some sulphates will not. A poison acts most quickly when it is given in the form of a solution into the stomach. A poison may not act because it is not dissolved. Poisons given in capsules may course through the alimentary tract without liberating the poison. Such a thing as a croton oil seed, if given whole, may go through the alimentary tract. The action of a poison is modified by the condition of the body. First of all as to habit, there is no doubt that we all of us do get habituated to certain poisons. The poison to which most of us get habituated is tobacco. We know that tobacco always

makes a novice ill; he not only vomits, but he also gets severe cardiac depression, but that effect ceases to be produced in an incredibly short space of time. Opium is another poison which is very soon tolerated, and it is hardly too much to say that the opium-eater or the person who has the morphia craze cannot be killed by the drug. It seems as if they can take any amount. It is said that De Quincey took 333 grains of opium a day. Then we have to take note of such a thing as idiosyncrasy.

Idiosyncrasy.—Now, idiosyncrasy pure and simple, apart from disease, must probably be accepted as a fact. Some people are very sensitive to the effects of such things as opium, mercury, or arsenic. I know one lady intimately who is a great invalid, and has been seen by very many physicians. Not a few of those who have seen her have said she ought to have arsenic. I know for a fact, however, that it would be perfectly useless to try and give her arsenic. As little as a quarter of a minim of liquor arsenicalis will set up gastric irritation; she cannot tolerate even the smallest dose. You know there are patients in the hospital across the way who can tolerate one hundred times that dose. I take it that arsenic is one of those drugs which people do learn to tolerate, and there seems no doubt that in Styria, and in other parts of the earth, arsenic-eating is not uncommon. While on the subject of idiosyncrasy I would mention that I know a lady very well who twice in her life has been nearly killed by eating a Brazil nut. On the first occasion the act was followed in half an hour by an extreme nettlerash and swelling of the tongue, so much so as to threaten suffocation. Many years later she was telling her experience to some friends, and they said it must have been a bad nut. She then took the least little bit of another and the same symptoms came on. There are certain articles of diet which some people cannot tolerate, honey being a common one. I need hardly say that disease makes a great deal of difference to the action of a poison,

and the most important thing is the condition of the kidney. I have told you that the operative dose of a poison is the balance between what is absorbed and what is eliminated, and if the eliminating channels be blocked or in an unhealthy condition, the poisons will act very much more vigorously. It is very dangerous indeed to give certain poisons, such as mercury, to a man who is the subject of granular contracted kidney. I remember when I was clinical clerk there was a man under my care in the wards who had granular contracted kidney, and he had lost all his teeth. That happened in this way. He was in another hospital for some surgical trouble, and the man in the next bed was ordered a mercurial plaster for his testicle. By some mistake the mercurial plaster was put upon this man's testicle, and it brought on intense salivation, and he lost all his teeth. If you want to give mercury to a man with contracted granular kidney, give him a good dose and follow it up with a saline purgative, and then it will very likely do considerable good. It is certain that alcohol, when given to a patient with acute fevers, does not have the same effect as when given to a man in health; it does not produce drunkenness or delirium, and if delirium is present it is usually diminished by the alcohol. Moreover, if you are giving only enough alcohol, and not too much, you do not get the alcoholic smell in the breath.

CHAPTER VII

SYMPTOMS OF POISONING

Differential Diagnosis—Cholera—Perforation of the Stomach—Accidental Poisoning through Articles of Diet—Poisoning a Common Delusion of the Insane—Mode of Procedure in Suspected Poisoning—Fatal Period of Poisons—Post-mortem Appearances—Precautions with the Viscera—Fatal Dose of Poisons—The Physiological *versus* the Chemical Test—Treatment, especially from Medico-legal Point of View—Chemical Antidotes and Physiological Antagonists.

NOW what are the symptoms of poisoning generally, and what circumstances should cause you to suspect poisoning in a patient? That is a very important matter. The effects of poisoning appear suddenly, and they usually follow eating or drinking or the taking of medicine. The acute effects of poisoning appear suddenly in health. There, again, we must be extremely careful. There are many diseases which appear suddenly, such as cholera. In a severe cholera epidemic a man may be well now, and dead in three hours; and during the great epidemics of 1854 and 1866 there were cases, even in this country, where the course was as rapid. Therefore do not rush to conclusions. You must remember that there is a condition which has often been mistaken for poisoning, namely, acute perforating ulcer of the stomach. Perforation of the stomach from this cause usually occurs after a meal, and some of these cases may simulate poisoning very closely indeed. When poisoning follows a meal we can often get

some clue, whether it be accidental or criminal poisoning, by cross-examining everybody who was at the table, and ascertaining what the poisoned ones ate and what the non-poisoned ones did not eat. By these means you may sometimes be able to fix the channels through which the poison came. I need hardly remind you that sometimes food may be accidentally poisonous, and that such things as mushrooms and shellfish and pork may be in a very poisonous condition from what one may call accidental circumstances. Of course, when you suspect poisoning, that which clinches the diagnosis is the detection of poison in some article of food or in the excreta, and that is a matter which we shall have to give attention to when we deal with the poisons *seriatim*.

You must remember that poisoning is a common delusion of the insane, who say they are being poisoned, and that their friends, often members of their family, are putting poison into their food or drink, and so forth; and sometimes it is a difficult matter to deal with these people. I once came home in the afternoon and found a box had been left, and that the person would call for it again. It was locked, and I did not at all approve of having a box of this kind left in my house by a stranger; therefore I called in a policeman and broke it open. It was filled with jars and saucers containing slices of mutton, vomit, fæces, and urine; and presently the lunatic to whom the box belonged turned up. It was a woman who thought she had been poisoned. I referred her to a chemist, and told her that if she wanted the things analysed the fees would probably be ten guineas for each analysis. The analyst never heard anything more of it, nor did I. Sometimes you can check silliness by stern realities. When you suspect poisoning I need hardly say you will watch the case with great care, and you will note the relations of the symptoms to the meals and medicine, and you will note the times of exacerbation and remission. And if death takes place you will notice the exact time of death. If you suspect poisoning

you must take a note of all explanations offered to you, and the circumstances, and you must be careful to reproduce the exact words used. You will also inquire into the nature of the food, into the cooking, the utensils, by whom the food was eaten ; preserve all suspicious food, powders, bottles, etc., and preserve vomited matters. Sometimes a doctor may be put in a very delicate position, and if you believe suspicions which are ill founded you will easily get yourself into trouble. Now if you have those suspicions you will always do well to seek a consultant and tell him what your suspicions are. You must tell the friends that you must make inquiries as to the cooking and storing of the food, and whether there are any unwholesome conditions. You would not mention poisoning, but you would say you were not quite easy whether the trouble was not caused by something in the food. If there is anybody in the house giving any poison, your action will excite their suspicions and do some good. I need not say to a body of sensible men that to breathe the idea that there are murderers in the house is as serious as anything well could be. The detection of poison in the vomit, or the detection of poison in the urine, of course would be a very important matter. I reminded you yesterday that certain diseases resemble irritant poisoning — cholera, acute dyspepsia, gastritis from whatever cause, perforation of the stomach, intussusception of the bowels. And then there are certain conditions which resemble narcotic poisons, such as apoplexy and epilepsy ; and tetanus is very like strychnine poisoning.

Next with regard to convulsions. Convulsions do not occur without cause, and convulsions are very common as a result of stomach irritation, especially in children. It is said that the child has fits as easily as the adult has dreams, and I think it is fairly true. Indigestible food gives an adult uneasy dreams or nightmare, and the child not only has that but convulsions also. One of the worst attacks of convulsions that I

ever saw was that of a child who was in the status epilepticus for hours, and it was due to the swallowing of a piece of slate pencil. Note that. It was nothing in the blood, nothing in the brain, it was purely the irritation of a foreign body in the stomach, insoluble and inabsorbable. It seems to me most important to remember such a possibility, because I think the tendency in the present day is for neuro-pathology to be too exclusively central. Now a person having died of poisoning, we have to consider how long the symptoms have lasted, and that brings me to speak of what is called the fatal period of a poison. After taking a lethal dose of a particular poison, how long may a person live?

Fatal Period.—You will find the fatal period stated in books on medical jurisprudence, but it is so very uncertain that I do not think we can lay down any absolute rule. When we come to particulars I can give you extremes of recorded cases, but it is impossible to lay down any exact rule. Take such a poison as prussic acid, for instance. If it be as strong as the art of the chemist can make it, prussic acid kills instantly, it is said, just as if a man were shot by a bullet. But if we have prussic acid kept in a pharmacy or in a doctor's surgery in the country, it steadily deteriorates. Therefore in one case a man may die instantly, and in another case he may not die at all, or he may only die after many hours. Again, in this connection I would caution you, as I have in connection with other subjects, not to attempt to be precise where precision is impossible.

Post-mortem Appearances.—Now as to the post-mortem appearances in poisoning. Sometimes you will find a discussion as to whether the post-mortem appearance of the stomach is due, for instance, to arsenical poisoning or to gastritis. That is nonsense, because arsenic causes gastritis, and if you find gastro-enteritis, what you have to determine is, what was the cause of that

gastro-enteritis; was it a poison or something else? I show you a preparation of a stomach; you see it is congested; and remember it is not the stomach of gastric irritation nor of poison, but of chronic heart disease. When such a poison as arsenic has been taken, if it has been taken in the solid form you find that wherever a speck of white arsenic is attached to the stomach, the mucous membrane round it is swollen and injected, but you cannot be too careful in coming to conclusions of this kind. I remember once making a post-mortem on a lunatic who had died in a private asylum. Associated with me at the post-mortem was a gentleman who was then and is still one of the best pathologists and morbid anatomists in the country. We found in the stomach little patches of inflammation, and the mucous membrane was gone in places. We came to the conclusion that the lunatic had been fed by the stomach-pump for weeks before, and that the pump had probably caused a little damage here and there.

Then remember that inflammation is known by local injection of the vessels, swelling of the mucous membrane, and the products of inflammation, either cloudy swelling of the mucous membrane or great secretion of mucus or formation of pus. Again, remember to distinguish between post-mortem softening and inflammation, and perforation. When people die suddenly or are killed, that is drop dead in a state of good health, and when the stomach is secreting gastric juice at the moment of death, and if the gastric juice lies in the stomach you get post-mortem digestion of the stomach, and perforation may be caused by that. I think if care is exercised it is not possible to mistake one condition for the other. Here are most beautiful drawings by Sir Robert Carswell; these drawings will remain true for all time. Here is the stomach of a rabbit perforated by post-mortem digestion. There is no injection of the vessels, no swelling around the margin of an ulcer, but a gradual thinning away of mucous membrane to the spot

where the gastric juice has acted most. I need hardly remind you that there are certain conditions which lead to perforation, such as chronic perforating ulcer of the stomach, or cancer; there is a perforation which is met with after burns; and there is the perforation of the intestine so common in enteric fever, and not uncommon in tuberculous disease of the intestines. Then in making a post-mortem on a case of poisoning, or where you suspect poisoning, certain precautions are necessary. First as to the contents of the stomach. When the stomach is opened, notice the odour instantly. Occasionally when you come to the dead body you may detect the odour of the poison which has been taken, such as prussic acid, carbolic acid, or perhaps phosphorus or opium. In opening the stomach you would do well to pour the contents on to a big photographer's dish, and look at them with your naked eye and with a lens, and if there is undigested food in the stomach you will be able to say what the food is, whether it is vegetable or not, and you will know what the patient has eaten. For instance, in one case a large amount of obvious onion was found, and in that particular case the man had been deliberately poisoned by a person who gave him roast duck for dinner, and had poisoned the stuffing and not the duck. The presence of hardened fæces in the intestines would show that no diarrhœa has taken place, it is said. But I think that is rather too strong a statement, because liquid fæces may find their way past scybala and be discharged. In cases of poisoning you must examine all organs with the greatest care, because the counsel for the defence will exert all his ingenuity to find out what you did not do. You must be careful to be able to say that there was no evidence of disease elsewhere than in the stomach.

Sometimes you have to make a post-mortem on an exhumed body. When that is the case there must be somebody present to identify the body. When exhumation is practised it is customary to remove some of the

earth round the coffin, because it has been said in defence that the mineral poison found in the body was really present in the earth alongside. You must also be exceedingly careful if you have to preserve fluids or the contents of the stomach. There is a case on record, I believe, in which the contents of the stomach or the stomach itself, and some of the viscera, were carelessly wrapped up in a piece of wall-paper, there being nothing else at hand. This paper was printed with arsenical pigments. Then a case broke down because, not being provided with perfectly clean vessels or vessels of any kind, the doctors sent hurriedly to the village shop for a brown jar, and it came out in the evidence that the man who sold the jar dealt largely in arsenic which was used for sheep-wash and for mixing with corn before it is sown. Of course counsel for the defence made the most of that circumstance. A further important point is, when you put the contents of a stomach into a vessel, be sure you do not put any preservative fluid with them. Probably a glass stopper is the best thing to close a jar with, and the next best thing is a bung covered on the inside and outside with new gutta-percha tissue. Then you must tie and seal and label the vessel. For tying down bottles such a thing as tinfoil, which is largely composed of lead, should not be used, as it may complicate the analysis. Again, the bottle should not be too big, the tighter the fit the better.

Another point is that poison may be found post-mortem, and the person may not have died of it. For instance, a case of pernicious anæmia may have been taking Fowler's solution. Not only may poison be found in the body and the person not have died of it, but persons may be convicted of poisoning although no poison is found in the stomach. That was the case with William Palmer, who poisoned his victim with strychnine. That was forty years ago, when the mode of detecting strychnine was not properly understood. The victim had vomited a great deal, and the presence of strychnia in deceased's stomach

was not clearly established; nevertheless the symptoms were perfectly clear, and the fact that the murderer had bought strychnine was clear, and the circumstances brought home the crime to the murderer unfailingly. Before making an analysis you ought always to have something to guide you. If you want to succeed you ought to know what to look for, and wherever it is possible you ought to have a statement of the patient's symptoms, whether they were narcotic or tetanic, or whether there was much vomiting and gastric irritation. There is only a limited amount of material to be dealt with, and it is useful to have a clue.

When cases of poisoning come before juries they like to know not only that a poison was present, but that it was present in a fatal amount—that a lethal dose was present. It stands to reason that a man may be poisoned by arsenic, but he may have vomited and got rid of much of it, so that there may not be a lethal dose in his stomach. That has happened again and again and again. Nevertheless when an analysis is made it is very desirable for practical purposes to establish the presence of an amount which is reasonably sufficient to kill. With regard to amount, it has been said that large amounts of poison may be taken to indicate suicide and not murder; the suicide, it has been said, is the person who takes large doses and uses double-shotted pistols, not a murderer. There is something in that, but these speculations you will find have always turned up at notable trials where there has been a large sum of money spent in the defence and counsel have racked their brains for every possible explanation. In the Madeline Smith trial eighty-eight grains of arsenic were found in the victim's stomach and other viscera, which is an enormous amount to find, and the idea was put forward that, being a large amount, it was of course suicide. Then chemistry is sometimes of importance in other ways. In a case of poisoning with sulphuric acid, for instance, it was alleged that the poison had been put into the coffee made for

breakfast, and the coffee was made in a common metal coffee-pot. But when the coffee-pot was examined there was no evidence of sulphate of iron, so that it is hardly possible that sulphuric acid had been put into the coffee. Occasionally the analysis is of value from the negative point of view. People are suspicious that this, that, or the other poison has been given, and an analysis of the food and vomit has revealed nothing to justify their fears.

Occasionally it happens that physiological testing is more valuable than chemical testing. Undoubtedly it was the combined physiological and chemical testing which led to the conviction of Lamson for giving aconitine. First of all an alkaloid was separated from the stomach, and then it was known that not only was it fatal to small animals but that it caused aconitism, tingling of the lips etc., when it was put upon the tongue. Then it is said that the physiological test for strychnia, that is to say putting some of the extract on the back of a frog, is more delicate than the chemical test. So with atropine; putting a drop of the extract of the stomach into a cat's eye to make the pupil dilate is said to be more delicate than a chemical test. But in physiological tests of this kind you must be careful against arguing from animals to man, because there are some animals which seem immune to certain poisons. The most notable of these, perhaps, is the rabbit with regard to atropine. Rabbits seem able to browse upon belladonna without harm.

Then there is another possibility. You must bear in mind that the flesh of poisoned animals may be poisonous to human beings. Sometimes the detection of a poison is made *viâ* the lower animals. For instance, there is on record a case where a man vomited into the chicken yard and arsenic was found in the chickens.

Treatment.—So much for generalities, except a few generalities as to treatment of cases of poisoning. That, of course, is very important to you as medical practitioners; perhaps more so than it is to you as medical jurists.

But the principles of treatment for poisoning are mainly three. When you are called to a case of acute poisoning your first duty is to get rid of the poison. Sometimes you find the patient vomiting and purged, and occasionally it has happened that the doctor, being called in to see the patient in this condition, and not recognising the fact that the vomiting and purging might be due to an irritant poison such as arsenic, has tried to stop the vomiting and purging by the administration of another poison—opium. Therefore, when trying to get rid of the poison be careful not to throw an obstacle in the way of its elimination. Then to get rid of the poison you may give emetics, and in giving emetics I would say that it is advisable, if you have a choice—sometimes you have no choice—to give emetics which are not likely to complicate the analysis.

Tickling the back of the throat with a feather or with your finger, or the use of hot water, will not complicate the analysis ; neither would mustard and water, I take it. Possibly ipecacuanha would not. But sulphate of zinc, which is a powerful emetic, may complicate the analysis. Possibly apomorphia, hypodermically injected, does not complicate the analysis, but that is one of those things which is not very often at hand. When we come to speak of particular poisons you will see that there are reasons against this or that line of action, and there are very often reasons why the stomach-pump must not be used. The stomach-pump does not complicate an analysis ; but, as I pointed out just now, it might complicate a post-mortem. Remember that in passing a stomach-tube in a hurry you may injure the mucous membrane of the organ, and traumatic inflammation may come on, which you must keep in mind.

Having first of all tried to get rid of the poison, the next thing is to stop its action. You can stop the action of a poison by rendering it less soluble and absorbable than otherwise would be the case. Perhaps the best

example of stopping the action of a poison which I can give you is the administration of white of egg when a person has taken corrosive sublimate into the stomach. The result of that is that the albumen of the egg is coagulated by the corrosive sublimate, and you get the stomach full of albuminate of mercury. You must remember that you have then albuminate of mercury, insoluble in water, but perfectly soluble and digestible in the stomach. If you leave albuminate of mercury in the stomach you get the symptoms of mercurial poisoning inevitably. One day a man was admitted into my ward who had been poisoned by the application of corrosive sublimate *externally* to a raw eczematous surface, and he had acute dysenteric diarrhœa, and was very bad. The then house-physician, who was a very able and highly educated man, for whom I have great respect medically, had given this patient white of egg with a view of its acting as an antidote to the mercury. It could not possibly do anything of the kind, because the mercury was not in the man's stomach, where it could meet the white of egg; the poison was in his blood, and, being in his blood, it had albumen enough there. I mention this to you because it was a revelation to me as to what a sensible man could do. The white of egg acted as food, and did no harm in this case; but under such circumstances it was no antidote. Now if an acid has been taken, you give an alkali to correct it, and if an alkali has been taken you give an acid; but there are limitations to that line of action, as I shall have occasion to show you when I deal with the poisons *seriatim*. Most antidotes, then, for stopping the actions of poisons are chemical antidotes. But there are also physiological antagonists, and I would say that here we are on very much more delicate ground. One of the most often quoted instances of physiological antagonism is morphia and atropine, but I shall show that the physiological antagonism of these two is probably not complete. When you give a physiological antagonist I would warn you to be very careful indeed not

to give a lethal dose of your antagonist, because you are not acting on very sure ground; and a counsel for the defence, if he should find that the doctor in attendance had given a lethal dose of a second poison to stop the action of the first, would have, I think, a very good defence, and a very disagreeable defence for the doctor.

CHAPTER VIII

CORROSIVE ACIDS

Sulphuric Acid.—Symptoms—Post-mortem Appearances—Treatment—Remarks on the Fatal Dose and the Fatal Period—Special Points.

Nitric Acid.—Symptoms—Fatal Effects of its Fumes: Cases in Point—Post-mortem Appearances—Fatal Dose and Fatal Period—Treatment.

Hydrochloric Acid.—Its Presence in the Healthy Stomach—Post-mortem Appearances—Fatal Dose in a Recorded Case.

Hydrofluoric Acid.—Rarity of Poisoning by this Acid—Symptoms and Post-mortem Appearances in Dr King's Case.

The Detection of Acids.—Qualitative Tests for Sulphuric, Hydrochloric, Nitric Acid.

Oxalic Acid Poisoning.—Symptoms—Treatment—Post-mortem Signs—Tests.

Sulphuric Acid.—To-day I begin to deal with poisons *seriatim*, and the first class I shall speak of are irritant poisons. The most irritant poisons are the corrosive poisons, and the most corrosive poisons are the *mineral acids*—sulphuric acid, nitric acid, hydrochloric acid. Now these have been used for poisoning accidentally and intentionally again and again. That which has been most frequently used is sulphuric acid or oil of vitriol. I may remind you that this acid is used a good deal for manufacturing purposes. I need not go through all the uses to which this acid is put, but we must remember that it can easily be obtained. An acquaintance with the fluid will remind you that it may be mistaken for other oily

or syrupy fluids; and sometimes oil of vitriol has been taken by a drunkard in mistake for something different. It would be difficult to murder a man with these strong acids unless he were insensible at the time. Of course it is only the strong acids we deal with. Strong sulphuric acid combines with water with great energy, as you know, and generates a good deal of heat as it does so. It has the faculty of charring all kinds of tissues; all tissues containing carbon are blackened by strong sulphuric acid. When a dose of strong sulphuric acid is taken, the first symptom is intense pain in the throat and gullet, and a little later, pain referred to the stomach. Apparently the pain is of an awful burning character, which burning is not only due to the action of the acid, but to the vigorous combination with water which takes place, and to the heat which is generated on that account. When sulphuric acid is swallowed it occasionally has happened that the suffering is not so immediate as one might expect. I think that holds good with all these very strong acids; and the reason is that the mucous membrane can, when the need arises, secrete mucus with most wonderful rapidity. You know that if something gets into your eye the eye waters copiously and immediately, and washes it out. Also if something is irritating your throat, almost immediately there is an accumulation of mucus, and you cough the substance up. So it is in the stomach; when these substances are taken into the stomach, amongst the vomited matter is a large amount of stringy mucus. The power which the mucous membranes have of protecting themselves is very remarkable. A slug is one of those creatures which wears its mucous membrane outside, and those of you who have watched a gardener killing slugs with quicklime will have noticed that one sprinkling with the quicklime is not enough, because the mucus secreted throws off the lime and the slug escapes; but it cannot do that twice. So it is with the strong acids in the stomach; sometimes a quick secretion in the stomach will

protect the organ in a way that is simply marvellous Next there is vomiting, and the vomited material consists of the contents of the stomach and mucus. The vomited matter is intensely acid, and if the patient vomits on a limestone pavement effervescence will take place. That is important, because limestone pavements are ubiquitous, and effervescence under such circumstances will give you a clue instantaneously. Now with regard to the pain, that does not always seem to be instantaneous or anything like it; and there is a case on record of a suicide taking a dose of oil of vitriol in the street, tossing his head back during the process, just as you may have seen people do when they take a dose of castor oil, and hailing a cab, getting into it, and telling the man to drive him to the nearest hospital. That will probably enable you to remember that the symptoms are not always instantaneous, and for the reason which I have given you.

Soon after the poison has been taken the patient vomits and is collapsed. What I understand by being collapsed is that he is pale, has an exceedingly weak pulse, and that he can hardly do anything. He is not insensible, and I hope you have all got a clear distinction in your minds between a state of collapse and a condition of coma. Collapse is the condition to which a patient is brought by a severe injury; coma is the condition to which he is reduced by something which poisons the brain, or injures it so as to cause insensibility. Usually when sulphuric acid is taken there is constipation, but it has been known to cause excessive action of the bowels. Usually there is diminution of urine, and the urine has often been albuminous. The patient is very apt to get some of the corrosive upon his lips, leaving marks upon them, and he is likely to get some corrosive fluid on his clothing, leaving red marks or rotten holes. The person who takes a corrosive may injure his mouth or tongue. Then as the fluid goes backwards he may get his glottis and his epiglottis

attacked, in which case there is swelling of those parts, and you may get as a consequence occlusion of the glottic aperture, and death from asphyxia. It is very important to remember that. If any of the corrosive fluid goes down the windpipe, you not only get a whispering voice from the state of collapse, but you get in addition aphonia from the injury to the vocal cords and the larynx itself. After the extreme stage of collapse a reaction may set in, and then you get rise of temperature and fever, and the spots of corrosion on the mucous membrane begin to swell.

There are exceptional cases on record where casts of the intestine have been passed in sulphuric acid poisoning. That is not so common in sulphuric acid poisoning as it is in nitric acid poisoning. After all these things there may be nervous symptoms. A man may be convulsed, and the convulsions will probably occur just in proportion to the youth of the subject. It is said that you may get all sorts of nervous troubles if the patient lives, sensory troubles among others; and whether they are reflex or not it is difficult to say.

Post-mortem, as a rule, you get dirty yellowish brown stainings about the angles of the mouth, and you often get similar spots on the tongue and gullet. The stomach very often contains a black tarry fluid. Now you might be ready to assume that as sulphuric acid chars very markedly, the effect is always to produce blackness and charring. That is not the case. I have here some specimens of gullets, and I cannot tell from their appearance whether they are cases of sulphuric acid poisoning or not. I see by the catalogue that this comparatively light-coloured one is a case of sulphuric acid poisoning; I should have thought by the appearance of the gullet it would have been nitric acid. If you were shown these specimens, and asked to speak about them, you would be right in saying that the condition was due to a corrosive fluid, but you could

not say much more with certainty. The specimen which is the deepest yellow is a case of poisoning by nitric acid. In the latter stages you may get stricture of the œsophagus and cicatricial tissues formed wherever the sloughs have previously been.

As regards the treatment of cases of poisoning by sulphuric acid, you have to remember that the patient has taken a very corrosive fluid into the stomach, and it is exceedingly common in these cases to have perforation of the stomach, and that being the case you must not use the stomach-pump. What can you do for the patient? You must neutralise the acid. Here, however, you are in rather a difficulty, because if you give a carbonate you cause such a sudden and voluminous evolution of carbonic acid that you may burst the stomach. Therefore, if you can get them, you must use the alkalies, and not the carbonates of the alkalies. If your surgery is handy you will use a weak solution of potash, or calcined magnesia stirred up in a little water. Of course, if you have not alkaline earths handy, you can give carbonates and run your risk. These cases of mineral poisons are just those in which the classic direction to scrape the ceiling with a fire-shovel and give the patient plaster is applicable; you can get a little lime whiting off most walls. There are alkalies in most houses, and in the kitchen you will find carbonate of soda for cooking purposes or for washing purposes. If you cannot get anything of which you know the composition with any certainty, I take it you would be right in using baking powders, because I dare say most of them have alkaline carbonates in them. Then you may give oil or gruel, which text-books say does a certain amount of good. If the amount of acid taken has not been very great you probably would be right in giving water. Of course, if the amount of water is not enough to copiously dilute the acid, but only enough to generate heat, the effects would be very painful. Therefore you must give large quantities of water if you give any. In regard to

poisons you are asked what is a fatal dose. The fatal dose of sulphuric acid depends very much on the degree of concentration. One is not prepared to say that a drop of sulphuric acid, if it gets on the right spot, would not burn a hole through the stomach or œsophagus and kill a man, but that is not very likely to be the case. A teaspoonful has undoubtedly killed a person, and people have recovered after taking larger quantities. Then with regard to the fatal period, that is very uncertain ; indeed, to expect a definite answer as to the fatal dose and the fatal period is somewhat nonsensical. The fatal period depends upon the dose. Usually it is thought a man lives about ten hours after a draught of sulphuric acid, but I do not see what good a statement of that kind is. That the mortality is very great indeed need hardly be said.

There are certain points about sulphuric acid which are of interest. First of all there is the heat which it produces. It has been suggested that sulphuric acid was put into cold water in mistake for whisky. But the generation of heat is so tremendous that it would be detected. Again, the charring is an important matter, and there is a case on record of a child being killed with oil of vitriol, and the question was whether it was a case of murder or of accident. The defence was that the oil of vitriol was given instead of aniseed ; that the woman put a lump of sugar in a teacup and poured accidentally oil of vitriol upon it instead of the preparation of aniseed. In answer to that it was stated that this was impossible, because the strong sulphuric acid would have blackened the sugar immediately, and she must have seen it turn black. I have here a piece of ordinary loaf sugar, and I will pour a little oil of vitriol upon it, and I ask you to note the time which the change occupies. You see it is an appreciable time before the sugar turns brown, and that it is some minutes before it turns black. Therefore it is possible for the liquid to have dissolved the sugar before anything in the nature of a blackening was noticed.

Nitric Acid.—Before I take the chemistry of these substances I will go to the next mineral acid — nitric acid. Aquafortis, red spirit of nitre, or crude nitric acid, differs from sulphuric acid in that it fumes. The nitrous fumes which are given off by nitric acid are very important. If you take a strong dose of nitric acid into the stomach the symptoms are practically the same as when you take a strong dose of sulphuric acid, so that I shall not take the trouble to again describe to you the vomiting and the pain and the collapse. But there are certain differences with nitric acid which it is well for you to remember. First of all there is the fuming quality of nitric acid, and the action of these fumes is exceedingly insidious. It is a peculiarity of nitric acid that if people inhale these fumes they die from a form of bronchitis, and usually the end comes in twenty-four to thirty-six hours. You will remember that it is very dangerous to be exposed to the fumes of strong nitric acid. There is a case on record in which a Scotch Professor of Chemistry—Mr Stewart—and his janitor, as they call the porters in Scotland, broke a large carboy of nitric acid, and instead of leaving the room they stopped in it, and tried to mop up and collect the acid. They thus inhaled the fumes, which were immediately diffused. Mr Stewart returned home, unconscious of the mischief which had been done. After an hour or two difficulty of breathing came on, and in spite of every medical effort to save his life he died ten hours after the accident. His janitor suffered from similar symptoms, and died the day following. Then I find another case. Four persons exposed to the fumes while trying to remove a broken carboy of acid. No. 1 was laid up with pneumonia, Nos. 2 and 3 had bronchial trouble. No. 4 after the exposure did not feel right; five and a half hours afterwards he had cough and pain, the pulse failed, and he died thirty hours after the accident. Post-mortem there were catarrh of the larynx, trachea, and bronchi, œdema of the lungs, and ecchymosis of the heart. The post-mortem signs were those of

asphyxia. It is very important to remember that the onset of the symptoms in nitric acid poisoning may be insidious. Again, as we all know, nitric acid stains the skin yellow. It will also stain mucous membrane yellow. Another property which it has is that of coagulating albumen. It is one of the tests for albumen in urine. Owing to nitric acid coagulating albumen, it makes the tissues which it touches hard and firm. Therefore perforation of the stomach, as a result of swallowing nitric acid, is not so common as with sulphuric acid. In the case of nitric acid poisoning the tissues are first of all coagulated, and then, of course, necrosis takes place and a slow process of sloughing. Indeed, in some of these cases of nitric acid poisoning which have lived a considerable time, it has been found that, instead of the stomach, there is a cavity of the shape of the stomach, formed of inflammatory exudation and adhesions of the neighbouring viscera and cellular tissue. There is a case described by Puchelt, of Heidelberg, in which a man swallowed nitric acid, and died on the twenty-third day. The acid was not very strong. It was only on the fifteenth day that he began to vomit, and on the seventeenth day he vomited a membrane, which, when spread out, was a foot in breadth ; that is to say, he had vomited the whole of the coats of the stomach, which had been first coagulated and then separated from the living tissue beneath.

I remember making a post-mortem examination on a case of nitric acid poisoning, and in doing so and opening the gullet the first thing that struck us was that the muscles around the top of the pharynx and at the back of the windpipe were exposed, and we could plainly see the posterior crico-arytænoids and the constrictors ; they were laid bare as though they were a dissecting-room preparation. The mucous membrane was gone, and when we opened the stomach we found in it a perfect cast of the gullet and the back part of the glottis. It had got loosened, and had subsided into the stomach. That might have been vomited

had the patient lived. In the same way casts of the bowels have been passed.

With regard to the fatal dose of nitric acid, again we must say that it depends on the strength of the acid; it depends also upon the extent to which the patient has been exposed to the fumes. It is not so dangerous as sulphuric acid, and two drachms seems to be the smallest dose which has certainly killed. In one of these cases death resulted in one and a half hours. The treatment is practically the same as for sulphuric acid.

Hydrochloric Acid.—The next acid I have to deal with is hydrochloric. That is an uncommon poison. Again I would remind you that hydrochloric is an acid which is found habitually free in the contents of the healthy stomach. That is an important matter. The fumes of hydrochloric acid are particularly fatal to plant life, and the fumes of hydrochloric acid may cause more or less inconvenience, just as the fumes of nitric acid do, but to nothing like the same extent. Post-mortem there are signs of corrosion, and perforation is not very common. It does not seem to be so dangerous as the other two. A case is recorded from King's College Hospital in which half an ounce killed a man in eighteen hours.

Hydrofluoric Acid.—I think I may also mention hydrofluoric acid, but I can only find the record of one case of poisoning by it.

This is reported by Dr Robert King in the twenty-fourth volume of the *Pathological Transactions* (1873). The patient, accustomed to the use of hydrofluoric acid for etching glass, was a drunkard aged forty-six. He drank about half an ounce of the poison from a gutta-percha bottle. He died in thirty-five minutes in agony, with retching, cold clammy perspiration, pulse small and rapid, pupils contracted, inability to swallow. It was noticed that breathing continued after the radial pulse and heart had apparently failed.

Post-mortem.—Mucous membrane of mouth white and

softened, and denuded in parts of epithelium, which hung in dirty shreds. The stomach contained a large quantity of thick blackened material resembling treacle; when this was removed and the stomach washed, a reticulated surface was seen, the branches of which were perfectly black and slightly raised, the intermediate sulci being highly injected and speckled with minute ecchymoses. There was no perforation.

With regard to the detection of the acids, I shall only attempt to show you the qualitative tests, and only those qualitative tests which are easily applied, and the materials for which you are likely to have at hand, speaking to you as general practitioners of medicine.

Tests.—I have put strong sulphuric acid into that test-tube containing distilled water, and I need not say that I have generated a considerable amount of heat by so doing. Here is a simple fluid, and in analysing it you have to use your tests and your senses. First of all it is colourless. This fact excludes the salts of iron and copper and chromates. The next point is the absence of odour. This practically excludes chloroform, chloral, alcohol, nitro-benzol, aniline, carbolic acid, and prussic acid. Next we find that blue litmus paper is turned so vigorously red that we must have a free acid or an acid salt to deal with.

Next let us evaporate some of the solution to dryness on a piece of platinum foil. We get no residue. That is a very important matter indeed. You get no residue with any simple solution of a mineral acid, neither do you get any permanent residue with a simple solution of oxalic acid, although you may get something upon your platinum foil before the oxalic acid is finally decomposed into carbon dioxide and carbon monoxide. Having, then, this very acid solution leaving no residue, it is highly probable that you have a free acid to deal with. You may not be so certain, especially if you have your acid in an organic

fluid. There are certain tests proposed, one in particular for the free mineral acids as a group. I will try and show you this test. Here is a solution of acetate of iron, and I add to that a few drops of a solution of sulphocyanide of potassium. I get a very deeply coloured red solution, which I freely dilute with water, and into each of the four tubes I have here, I will put some of this mixture. This dilute mixture of ferric acetate and potassium sulphocyanide is uniform in tint, and looks like pale sherry. I next make ready a solution of each of these acids: sulphuric, nitric, hydrochloric, and oxalic. I now moisten this glass rod with sulphuric acid and transfer it to the first tube. You see I have immediately a dark streak of blood-red falling through the mixture. I now do the same with the nitric and hydrochloric, and get the same result. It is said you do not get it with oxalic acid; I am using the oxalic acid very much stronger; it is a saturated solution, for a weak solution yields nothing. But you see that even the stronger solution yields nothing, which is very characteristic. That is not a test for any acid in particular, but for a free mineral acid, and may be used with organic mixtures. Now what acid have we here, —nitric, sulphuric, or hydrochloric? There are certain tests for the mineral acids which are exceedingly simple, and which you are no doubt quite familiar with. The test for sulphuric acid is the obtaining of an insoluble precipitate with a soluble salt of barium. I have here some barium chloride, and on putting it into the first tube I have immediately a white precipitate, but none in the second tube and none in the third. (I warn you when you are using acids diluted with tap water, as we are here, that you may sometimes get a slight turbidity caused by calcium sulphate in the water.) This white precipitate is insoluble then, as you see, even when I add some strong nitric acid. You may want to carry the test a little further, and to demonstrate that

there is sulphur in your precipitate. I take some of the barium sulphate precipitate and mix it with some pure sodium carbonate. Next I place it in a hollow scraped out of a lump of charcoal, and then use the inner flame of the blowpipe upon it. After a time you observe that it melts into a glassy bead. I now put this bead into a test-tube, add a little water to it, then a little hydrochloric acid, and then you can detect the smell of sulphuretted hydrogen. If you cannot trust your nose, expose a little acetate of lead paper to the fumes, and you get a black coloration. Thus we have proved clearly that the acid we had to deal with contained sulphur.

The next acid I will take is hydrochloric, and I do so for this reason, that the tests are positive ones, and not negative. Here I have the hydrochloric acid in a dilute solution. In this case, again, we have a solution which is colourless and odourless, and acid in reaction. I put a drop of that liquid on the platinum foil and hold it over the spirit lamp. It evaporates and leaves no residue. That is a very important matter. To show you what that means, here is some solution of bin-oxalate; you see it is colourless, odourless, and in dipping a blue litmus-paper into it I have an intensely red coloration, just as I did with the free mineral acid. But when I put a drop on the foil and evaporate, a white residue remains. To my solution of hydrochloric acid I add barium chloride, and get no precipitate; but with silver nitrate a very dense clotted precipitate is produced, which instantly falls to the bottom of the tube. With oxalic acid I get a dense precipitate of silver oxalate, but it is not so clotted, and does not fall in such masses to the bottom of the tube as does the silver chloride. The way in which it falls is not a test, but is one of those points which you should take notice of. To the white precipitate of silver chloride I now add some solution of ammonia; you see it is dissolved

instantly. I now take the precipitate of silver oxalate and again add some ammonia solution; that also is dissolved instantly. Next I filter off some of my precipitates and collect them on filter-paper, and to what I have left in the tube I add some nitric acid; you now notice that the silver chloride, which was soluble in ammonia, does not dissolve in nitric acid, but the silver oxalate dissolves after a short time. I have now got my two precipitates with silver nitrate, which have been filtered off. One of these was clotted and the other not clotted, one soluble in cold nitric acid, the other not, but both soluble in ammonia. I will now take some of that precipitate of the silver chloride and heat it upon platinum foil, and for that I will use the stronger flame of a Bunsen burner. The water is driven off first of all, and you will notice how quietly this silver chloride behaves and submits to the heating process. My platinum foil is now red-hot, and I see the precipitate melting and spreading all round. I then take it off the burner, and find it is dried up to what the text-books call a "horny sectile mass." I get my knife to it, but cannot get it off the foil, though I can cut it with the knife. I will now take the oxalate from the filter-paper, and note that the oxalate is not so bulky. I now put that over the Bunsen burner, and ask you to watch it. There are fumes, and the substance spits a good deal, and explodes with little rockety offshoots in all directions.

I now go to the third mineral acid—namely, nitric. Here is some strong nitric acid. Notice the fumes. Next I dilute it. Here we have, as we have said with the other acids, a clear solution, without odour, leaving no residue on evaporation, and intensely acid, giving the test for a free mineral acid. The next thing is to determine which acid it is. The tests for nitric acid are mainly negative, that is an important point; there is no precipitant for it. The nitrates are soluble. You get no precipitate with the barium salt, nor with nitrate of silver, as I will show you. Now, how

are we to proceed? One of the best ways is to neutralise. I will put that dilute nitric acid into a dish, and add to it some potassium carbonate. You see it is effervescing. The reason I advise you to neutralise with potassium carbonate rather than with potassium hydrate is, that the subsidence of the effervescence is a sure sign that you have accomplished your end. Next take a piece of bibulous paper, and moisten it with the solution, and dry it over the flame. You will find it will dry tolerably quickly. You now see that as it becomes dry in the flame it burns and fizzes like touch-paper. Another test which is sometimes useful is to take a piece of gold-leaf and put it into an evaporating dish with the dilute nitric acid, and then add a little hydrochloric acid. We immediately get solution of the gold-leaf taking place, fumes are given off, and a deep yellow liquid left.

There is yet another test. I have here some of the solution of potassium nitrate, which I have put into a tube, and to the tube I add a crystal of sulphate of iron. Then, in order to liberate the nitric acid from the potassium nitrate, I let a drop of strong sulphuric acid slide down the side of the tube. In a little time you see the crystal gets discoloured, and there are dark fumes accumulating round it. That is not a bad test. What I want to insist on is that the best test for nitric acid is the negative test. We have a free mineral acid which gives no precipitate, and we can form touch-paper with the nitrate.

Oxalic Acid.—Oxalic acid is a poison of considerable practical importance. It is largely used in trade, especially by leather workers and straw workers, and is easily obtained. It has occasionally been taken in mistake for Epsom salts, or other crystalline saline purgative. It is usually sold as a crystalline solid, and is readily soluble in water. Like the mineral acids it is corrosive and irritant in a high degree, but in addition to its local effect it acts, after absorption, as a powerful cardiac depressant. It is

less corrosive and less likely to cause perforation of the stomach than, let us say, sulphuric acid, but it must be remembered that it kills more quickly than any of the mineral acids. The following is a case in which the symptoms were severe, but ended in recovery. It is taken from the *British Medical Journal* of April 23rd, 1881.

Oxalic Acid Poisoning.—C. P., æt. 30, at 9.30 A.M. on February 28th, 1881, swallowed one and a half ounces (threepenny worth) of crystallized oxalic acid dissolved in hot water. This was followed by heat and burning of the throat and belly, and in ten minutes by vomiting of a yellow fluid mixed with blood.

At 11 A.M. he was admitted to King's College Hospital. There was a griping and a "feeling of swelling of the belly." Throat swollen and sore. Skin of lips swollen and raw. Tongue swollen and red, ditto fauces, uvula as big as a forefinger, general prostration. Pulse small and thready, tympanites, a few reddish papules over chest and back, but no regular rash. At 4 P.M. and at 7 P.M. he vomited, at 9.30 P.M. the expression was more bloated. Pain in back. Bowels acted once in the day, tenesmus, no blood. He had passed twenty ounces of pale urine with difficulty, containing abundance of crystals of oxalate of lime, a decided trace of albumen, but no blood. At 9.30 P.M. pulse fell to 108, temperature 100.6°. From this time he improved. The sickness continued four or five days. The vomit never contained blood. Bowels constipated. Dysuria and albuminuria ended on seventh day. There was some dysphagia at first.

Treatment. — Chalk and lime salts. Opiates and bromide to relieve symptoms.

It is characteristic that nervous symptoms and cutaneous eruptions often occur. Here is a case in point. An individual took half an ounce of oxalic acid in solution instead of salts. He instantly became conscious of the mistake from perceiving the acid taste. Pain and vomiting

ensued, and although they were mitigated in some degree by alkaline remedies, yet they recurred with violence. Spasms impeded respiration, and general numbness were complained of; the pulse was scarcely perceptible at the wrists or temples; the extremities were cold, and the matter vomited became tinged with blood; after a short time he brought up a large quantity of blood. Diluents were freely administered, together with anodynes, and his condition gradually became more tolerable. Numbness, however, occasionally occurred, and was relieved by warm applications, and a drink of sago and wine. On the second day, vomiting, retching, spasms, and singultus supervened; the pulse was nearly 100 and feeble, and numbness and chilliness of the feet were present. A repetition of previous remedies gradually moderated these; but the hiccup continued for several days. On the sixth day he felt himself so well as, contrary to directions, to ride out in a gig. After this debility came on gradually, an eruption appeared over the whole body, and hiccup was occasionally present. He retained his senses until the day before his death, and complained often on swallowing any article which was not perfectly bland. He expired fourteen days after taking the poison in a state of perfect exhaustion.

The post-mortem signs are those of irritation and corrosion. There is often a good deal of blood effused in the stomach or elsewhere, and the altered blood in the stomach is often black, so as to remind one of sulphuric acid poisoning. After absorption it is eliminated by the urine in the form of oxalates, and occasionally there is albuminuria or hæmaturia with strangury and pain in the loins.

The treatment consists in the administration of lime salts. Alkali must not be given, as the oxalates of the alkali are scarcely, if at all, less poisonous than the pure acid.

Tests.—With regard to the tests for oxalic acid, it may be well to remind you that although it contains carbon it

is entirely dissipated by heat. Placing some of the crystals on platinum foil over a spirit lamp you will see that it is entirely dissipated, and that potassium binoxalate treated in the same way leaves a white residue, but no blackening.

Oxalic acid disappears in the form of CO and CO_2.

Oxalic acid discharges the colour of ink, and it is largely used for removing ink stains.

Oxalic acid forms a characteristic silver oxalate with nitrate of silver, and when treating of hydrochloric acid I showed you how to distinguish between silver chloride and silver oxalate, so that I need not now repeat the test.

Solution of calcium sulphate added in considerable quantity to a solution of oxalic acid or an alkaline oxalate gives a white precipitate, which is somewhat slow in forming, and which is soluble in nitric and hydrochloric acids. Lead salts give a white precipitate, and copper sulphate a greenish-white precipitate.

Oxalic acid is easily separated from organic matter by dialysis.

CHAPTER IX

CAUSTIC ALKALIES AND IRRITANT SALTS

The Fixed Caustic Alkalies.
Potassa Poisoning. — Cases in Point — Symptoms — Post-mortem Appearances—Treatment.
Ammonia.—Its Vapour Dangerous: Illustrative Cases—Symptoms—Post-mortem Appearances.
Tests for the Caustic Alkalies.—Potash—Soda—Ammonia.
Irritant Salts — Potassium Nitrate — Potassium Sulphate — Barium Salts—Tests for Barium Salts—Iodine—Bromine.

The Fixed Caustic Alkalies.—Potassa and soda are seldom used as poisons. Cases of poisoning by them are generally accidental. They cause pain and violent irritation, just as do the corrosive acids. The amount of mucus brought up is often very large, and their destructive power on the mucous membrane of the gullet and stomach is very marked.

The following cases from Beck's *Jurisprudence* are fairly illustrative.

Potassa.—Two females, of the age of sixteen and twelve, each took, by mistake, half an ounce of subcarbonate of potash. Violent sickness immediately ensued, but the error was not discovered until two hours and a half afterwards. The vomiting and sickness scarcely ever ceased entirely with the elder, and she also experienced pain in the epigastric region. Leeches were applied, and various curative means, but with little success. The vomiting, though occasionally checked, yet returned with violence,

and she died in about two months after taking it. The other suffered under sickness for three days, and it then ceased. She appeared to grow better, but in a few weeks the sickness returned, and she was confined to her bed. Death ensued about three weeks after that of her sister.

The appearances of disease were similar in both, although most striking in the elder. The stomach was much thickened, and the villous coat was almost wholly destroyed; what remained was in a state of high inflammation. The pylorus in one was much ulcerated, and in the other contracted and gangrenous. The intestines were gangrenous, and adhered together by thin threads of coagulable lymph.

The treatment is to give dilute acids. The stomach-pump must be used, if at all, with the greatest caution.

Ammonia. — Strong ammonia is a very dangerous poison. The vapour is extremely irritating, and often causes death by blocking the trachea and bronchi by the growth of a false membrane. Ammonia is among the alkaline corrosives what fuming nitric acid is among the corrosive acids, and the strong vapour has killed.

A case confirming this statement is mentioned in the *Edinburgh Medical and Surgical Journal*, vol. xiv., p. 642. "A patient was recovering from a severe attack of fever; during convalescence he was, without any evident cause, seized with convulsions apparently of the epileptic kind, which became more and more frequent, and ultimately were so severe as to cause great apprehension of a fatal result. In order to rouse him from the stupor succeeding one of these fits, an attendant most imprudently held aqua ammoniæ to his nose, with such unwearied but destructive benevolence that suffocation had almost resulted. As it was, dyspnœa, with severe pain in the throat, immediately succeeded, and death took place forty-eight hours afterwards. In the actual condition of the patient there was little else than death to be expected, yet there is equally

little room to doubt that the fatal event was hastened by this unhappy ministration."

Hamilton and Godkin mention the following cases:

Three men were killed by ammonia, caused by the upsetting of an ammonia ice-machine. They were exposed to the gas for three minutes.

No. 1 was comatose and unconscious, and died in fifteen minutes.

No. 2 was delirious and unconscious (as from chloroform), and died in two hours.

No. 3 was conscious and walked home, but died suddenly in a fit of dyspnœa in five hours' time.

Finally I will read you a case recorded by Hilton, and given by Taylor.

A gentleman liable to attacks of fainting died in three days, after swallowing a quantity of a liquid administered to him by his son. This liquid, which was at the time believed to be *sal volatile*, was, in fact, a strong solution of ammonia. The deceased complained immediately of a sensation of choking and strangling in the act of vomiting. Symptoms of difficulty of breathing set in, with other signs of irritation in the throat and stomach. The mucous membrane of the mouth and throat was corroded and dissolved, and it was evident that the liquid had caused great local irritation. The difficulty of breathing was such as to threaten suffocation, and at one time it was thought that an operation must be resorted to. The state of the patient, however, precluded its performance, and he died on the third day. On inspection the viscera presented strong marks of corrosion. The covering of the tongue was softened, and had peeled off; the lining membrane of the trachea and bronchi was softened and covered with layers of false membrane—the result of inflammation; the larger bronchial tubes were completely obstructed by casts or cylinders of this membrane.

Tests.—I will now take one of the caustic alkalies and go through the tests. Here is a solution of potassium

carbonate. You find that to the eyes and to the nose it is quite negative; that it is alkaline in reaction. I hold it over the spirit lamp on a piece of platinum foil, and find that it leaves a very distinct residue. There is no blackening—a fact which excludes all the alkaloids and some organic salts, such as lead acetate and tartar emetic. You know that in testing solutions you proceed methodically.* I add hydrochloric acid, with which I get no precipitate, but I get effervescence, so that there is carbonic acid present, and I may practically assume that the body I was dealing with is a carbonate. The fact that there is no precipitate with hydrochloric acid excludes lead, the subsalts of mercury, and silver—three things which you have to deal with. Then I add a solution of sulphuretted hydrogen to the acid solution, and get no precipitate. Then I add ammonium sulphide to a solution which I know to be alkaline, and I get no precipitate. That excludes practically all the metals with which we are concerned as toxicologists. Next I add some ammonium carbonate, and again I have no precipitate; which fact excludes all the alkaline earths. Therefore it can only be one of two things; it is not ammonia, because it leaves a fixed residue; so that it can only be soda or potash. One of the tests for potash is platinic chloride, with which I get a precipitate; therefore I am perfectly sure that the base is potassium. Both potassium and ammonium give precipitates with platinic chloride, also some of the alkaloids.

Another test for potash is a saturated solution of tartaric acid, which will give you a precipitate. The tests for soda are mainly negative. If I had a solution alkaline in reaction, which gave me a solid residue, and I was quite sure I had a fixed alkali, and if I proved that that alkali was not potash, what could it be but soda? The best positive test for soda is, probably, the shape of the crystals of sodium nitrate.

* See Appendix, p. 500.

Potassium gives a violet colour, and sodium a yellow colour to flame.

Ammonia is precipitated also by Nessler's reagent, and the alkaloids by Mayer's reagent. The difference between Nessler's and Mayer's reagents is that while they both contain potassio-mercuric iodide, Nessler's reagent contains in addition some caustic soda whereas Meyer's reagent does not. The two reagents are very much alike, and you must remember that alkaloids are so called because in their reactions they resemble the alkalies.

Irritant Salts.—There are sundry salts which, given in large quantities, are poisonous, and I shall not detain you very long with them. One of them is nitre—*potassium nitrate.* I take it sodium nitrate would behave in much the same way. Sodium nitrate is extensively used at the present time in agriculture, and therefore it is easily got, and may be taken accidentally. I do not find any record of poisoning with it, however. When a big dose of salt such as nitre is taken, you get symptoms of gastric irritation accompanied by very great collapse, and it is said that with nitre there has been recorded perforation of the stomach. Another salt which sometimes has caused gastric irritation is *potassium sulphate;* and it is said that in France potassium sulphate has been given in large quantities, with the idea of procuring abortion. It does not seem to have been used in this country for that purpose. It acts as an irritant, and I do not think it need detain us.

I need hardly do more than mention the fact that any common purgative drug if given in excessive quantity may cause violent purging and collapse. For instance, Epsom salts or Glauber's salts given in excessive quantity will have that effect; and alum is one of those bodies which has caused the same thing.

Barium.—There is another body I want to refer to, which is used in the arts a great deal, namely *barium*, and the salts of barium are said to be very poisonous. For instance, there is recorded a case of death with vomit-

ing, purging, and collapse in seventeen hours after taking 100 grains of barium chloride. An assertion has also been made that very small quantities of barium chloride, even a grain or so, will produce violent irritation. I think, however, that that is a statement which rather wants confirming. It is said that salts of barium have a specific action upon the heart, and that they act upon the heart not unlike digitalis, and that they bring the heart to a standstill in systole. Barium is used, amongst other things, for sizing cotton warps; that is, I believe, for giving a white appearance and a heavy weight to bodies which have no legitimate right to either of those qualities. There is recorded a case of a man who died in fourteen hours from eating a piece of barium nitrate as big as a bean. But I warn you that some of these out-of-the-way cases must be received with caution, and we must always have an open mind on the question of how "ripe," so to say, the victim was for death before he took the material which immediately preceded the catastrophe. Now the salts of barium are amongst the things for which you must know the reactions. I will put a little barium nitrate in each of these tubes. We have a clear solution, and if I evaporate a drop on platinum foil over the spirit-lamp I get a fixed residue. There is but little change upon the blue litmus paper, nor upon the red. Therefore I have practically a neutral solution which gives a white solid residue, but no blackening. By adding a drop of hydrochloric acid I get neither precipitate nor effervescence; whatever I have got there, it is not a carbonate. Then I proceed *seriatim* with my sulphuretted hydrogen and ammonium sulphide but with negative results, but when I come to the addition of ammonia and carbonate of ammonia I get a dense precipitate immediately. Therefore we have one of the alkaline earths, and the only alkaline earth with which we are concerned is barium. I now add to my original solution some sulphuric acid. We get a dense precipitate which is insoluble in

nitric acid. That is test enough, I take it, but we will put a drop of barium chloride upon the platinum foil and hold it in the flame. If the room were darkened you would perhaps see, as I do, a green colour, but flame tests are not of much value.

Iodine.—Iodine has caused death with all the symptoms of irritation and purging. Iodine has this peculiarity, that if the man vomits and there be any starchy food in the vomit you get a blue coloration. Death has been caused by drinking the tincture of iodine or the liquor iodi, and there have been cases of death from injecting ovarian cysts with the tincture, and one case after injecting a spina bifida with the strong tincture. In one case death occurred thirty-six hours afterwards, in two cases on the tenth day without warning. In chronic cases of iodine poisoning we get a condition of iodism, with which you are familiar. When patients take large doses of iodide of potassium they water at the eyes, there is running at the nose, and sometimes there is salivation. Not infrequently there are exanthemata, which are papular or pustular. You may remember one of my patients who was taking iodide of potassium had a group of pustules across the centre of his face which looked very much like an eruption of small-pox. It is said that when iodine is taken for a long time you are apt to get atrophy of the mammæ and testicles, but it has not fallen to my lot to see either condition from the use of the drug. The treatment is by means of the stomach-tube, and you must counteract the collapse by giving stimulants. It is said that starchy food is in some sense an antidote. If a patient is taking iodine it is eliminated by the saliva, and many of you must have seen me in the wards, more than once, demonstrate the presence of iodine in a man's saliva by a very simple manœuvre. Let the patient spit into a white porcelain vessel of any kind, mix that saliva with a little starch—there is always some arrowroot or something starchy in the ward—then pass the electric current through

it and electrolyse the mixed fluid. The iodine is then liberated at the positive pole, and the starch is coloured blue. We have been able to demonstrate that fact in a patient nearly a week after he had ceased to take the drug. In trying an experiment upon myself once I found I could detect iodine in the saliva thirty-six hours after the administration of two grains; therefore the test is a very delicate one indeed. One caution is that you must use unpolarisable electrodes; if you use ordinary copper wire you will get green staining, and if you use iron wire you will get red colorations which interfere with the reaction. Platinum wire is the best to use. Or you can use gold, hooking the wire round a couple of sovereigns, or, better still, round two breast pins.

Bromine.—Bromine is another element which I do not think need detain us. It is said that a man has killed himself by drinking one ounce of pure bromine. Strong bromine water coagulates albumen and destroys the skin. It is said that workmen who have been splashed with strong bromine water have suffered in this way. Again, the symptoms of bromism are seen in those who are taking bromide of potassium—such, for instance, as epileptics;—and bromine, like iodine, causes eruptions on the skin, and an eruption quite indistinguishable from ordinary acne on the face. An epileptic, therefore, often has to take the choice between acne and fits, and there is not much doubt as to which he would choose. The other symptoms of bromism are said to be dizziness, somnolence, and depression. The acuteness of intellect is somewhat blunted; and there is diminished irritability and diminished sensibility, especially about the pharynx and palate. It is said that people who take bromine become very aphasic, and that after a time they suffer from definite cerebral degeneration. There, again, we have a complication, the complication being that almost everybody who takes bromide continuously is an epileptic.

CHAPTER X

PHOSPHORUS

Historical—Forms of Phosphorus—Its Common Uses—Its Properties —Symptoms of Phosphorus Poisoning—The Liver in Phosphorus Poisoning—Fatal Period in Children—Fatal Quantity—Post-mortem Appearances—The Marked Fatty Degeneration Found —Phosphorus compared with Arsenic and Antimony—Acute Yellow Atrophy of the Liver—Its Course in Phosphorus Poisoning: Cases in Point—Leucin and Tyrosin in the Urine—Women and Phosphorus Poisoning — Indirect Phosphorus Poisoning—Treatment — Chronic Phosphorus Poisoning—"Phossy Jaw"—The Detection of Phosphorus.

LEAVING now these materials of small importance —that is to say, the salts of the alkalies and the alkaline earths, iodine, bromine, and chlorine—we come to a poison which is more important, and which well merits our attention, namely, *phosphorus*. Of course, phosphorus is a modern poison. Phosphorus was discovered at the end of the seventeenth century—1669—by a German alchemist named Brandt. It was nearly another century before it was rediscovered or obtained in a different fashion by Scheele, a Swedish chemist. But for a long time, even after Scheele's discovery, phosphorus remained a chemical curiosity rather than anything else, and phosphorus did not become to any extent an article of commerce until the invention of the lucifer match, when we said good-bye to the tinder-box. With the invention of the lucifer match phosphorus became a common article of commerce. The lucifer match was first made in Vienna in the thirties. So rare was phosphorus as a poison that it is mentioned by

Orfila only in connection with a few experiments on animals. Then I may note that phosphorus as a poison was not included in the first edition of Guy's *Forensic Medicine*, published in 1854. We now know that phosphorus is a very great cause of fatty degeneration, especially of the liver; and again I may mention it as an interesting fact that in Sir Samuel Wilks's book on *Morbid Anatomy*—as good a book of its kind as was ever published—the first edition of which appeared in 1859, the fact that phosphorus produces fatty degeneration is not mentioned. You will see the bearing of all this presently. We come to the year 1860 before the fact that phosphorus produces fatty degeneration is what I may call common knowledge. Medicine is so wide a subject, and there are so many workers in it, that it progresses from one day to another; and one feels, in consequence of the enormous army of workers, that one's ignorance of the last thing which has been done is something which it is almost hopeless to try to grapple with. If, therefore, I say that the connection of phosphorus with fatty degeneration was not known till 1860, I may be contradicted, and some one may say, "So-and-so pointed it out thirty years earlier." But if a man of Wilks's observation and experience, working regularly in Guy's Hospital, does not mention it, I think I am right in saying it was not then a matter of common knowledge.

Phosphorus is obtainable in two forms—there is the common yellow phosphorus and the amorphous red phosphorus. Common yellow phosphorus has the property of fuming in the air, which amorphous phosphorus has not; and, as far as we know, the poisonous properties of phosphorus are restricted to yellow phosphorus. The phosphorus can be swallowed in many forms. It may be swallowed in the form of stick, and it is said that stick phosphorus in bulk is not so dangerous as phosphorus in a state of fine comminution. I may remind you that people have taken large doses of mercury to overcome obstruction of the bowels without being poisoned, whereas had they taken

one hundredth or one thousandth of that dose in the form of grey powder or blue pill, they would have suffered severely from mercurial symptoms. Phosphorus has been taken in the form of match heads (made with yellow phosphorus), and there have been many cases of death in children from sucking match heads. Sometimes match heads have been pounded into a paste, and taken in that way deliberately. Phosphorus is one of those poisons which is easily obtained. Here I have a bottle of so-called phosphorus paste, which is used for killing black-beetles and other animals of that kind. The instructions say, "Spread the paste rather thick on small slices of bread, and place them overnight in or near their haunts—in the morning remove all the remains, and renew with fresh paste the following night till the place is clear. Dogs and cats will not eat it. To prevent accident, be cautious to place the paste or any vermin found dead from its effects beyond the reach of children and domestic animals."

That is a very important matter, and I shall allude to the fact because it is conceivable, although I do not know that it has ever been proved, that you may have second-hand phosphorus poisoning. For instance, some of you may be able to tell me whether chickens will eat black-beetles. If they were to eat phosphorus-killed black-beetles, they might become tainted with phosphorus themselves, and a human being eating the chicken might become tainted with phosphorus. That is a very important possibility, and it is one of those things which has to be determined. The fact whether a person has had phosphorus or not is sometimes difficult to make out, and you will do well to cross-examine, and to look to all of the out-of-the-way channels by which the person may have got it. Phosphorus is soluble in oil and in ether, and some of the ethereal solutions of phosphorus have produced poisoning. As we all know, phosphorus fumes in the air, and in the dark is seen to be luminous, the luminosity being due to its rapid oxidation. Therefore people have said that phos-

phorus "burns"; and writers on phosphorus poisoning have rather dwelt upon the initial symptoms of irritation. But it is not very clear whether the symptoms of early irritation are very strongly marked, at all events whether they are always so marked. People have taken a poisonous dose of phosphorus without suffering from symptoms of severe gastric irritation. If you get the idea that a man who swallows a bit of phosphorus has got something like a stove lighted in his stomach, you would be carried away with an idea of an amount of irritation which is not always certain. Irritation is, however, present in some of the cases, and you get the phosphorous odour of the breath, and the vomit may be bloody and it may be luminous if the vomiting be in the dark. Or the vomit may be mixed with colouring matter, because the phosphorus pastes are mixed with colouring matter. After the initial symptoms of phosphorus poisoning have passed off there is a lull, and the patient is thought to be well. You may be called to somebody who has taken phosphorus, and you may find the symptoms of gastric irritation; you may go to-morrow and find the symptoms less severe. Next day you may find the patient pretty well. Now be not deceived. That lull in phosphorus poisoning is altogether fallacious; it does not at all mean that the poison is out of the body. The next symptoms which present themselves are very startling, consisting first of all of jaundice, within four or five days or a week of taking the phosphorus. The jaundice gradually deepens, and it is accompanied by all the usual symptoms of jaundice. In the early days there is pallor of the stools and high colour of the urine, but the coloration of the urine usually subsides before the jaundice. Then with the jaundice there is sometimes irritation of the skin and urticaria, and there is often great pain over the liver. The only two cases of phosphorus poisoning I have seen had one symptom in common, namely, that they both cried out in agony at any accidental jog of the bed. Anybody accidentally knocking against the rail of the bed caused the

patients very great pain, and made them cry out. Probably the pain was caused by imparting motion to the swollen liver, and in these cases the liver is usually enlarged. With the enlargement of the liver there are other symptoms, and one of the symptoms which is common is hæmorrhage. You may get hæmorrhage from various points; you may get petechiæ under the skin, you may get blood in the vomit, or you may find blood in the urine; and very often there has been bloody discharge from the vagina in females. Again, there is great weakness, the prostration is almost absolute; the first sound of the heart gets exceedingly weak, the pulse is fluttering and variable, and the tendency to hæmorrhage increases. It is said that a leech-bite in a case of phosphorus poisoning has been known to bleed to a dangerous extent. The intellect remains clear almost up to the last, and death is very often ushered in by coma and convulsions. The urine is scanty, often bloody and albuminous, the urea is diminished, and it is a question as to what extent you find leucin and tyrosin in the urine. It is said that you find paralactic acid if the patient lives some time. It is undoubtedly the fact that the liver may diminish in size, or it may remain enlarged.

Now with regard to death. Death has occurred rapidly when children have taken phosphorus, probably a relatively large dose, and that which has killed them has been the immediate collapse. It is said that they have died in nine hours, but it is not the rule; they usually die in a week or ten days.

With regard to the quantity which will kill, that is a very important matter. It is said that a child has died after sucking two matches; while, on the other hand, it is said that the French juggler "Jabert, the fire king," could swallow sixteen grains; that is of course a very big dose. He took it in a lump and swallowed it, so that he might have luminous breath and so astonish his audience. Parrots, it is said, can take phosphorus with impunity.

Post-mortem the most noticeable fact is the jaundice. In the only post-mortem I have done on a case of phosphorus poisoning the body certainly smelt peculiarly; that is all I can say, for it is an odour I cannot describe. Another medical man of large experience assisted me, and his assistant and our late deadhouse porter Sainsbury, who had had enormous experience of post-mortem work. We all agreed that the odour was peculiar. Another important fact which is noticeable in these cases is the fatty degeneration. On opening the body the first thing which strikes one is the look of the liver. In the case I am particularly referring to it looked like a mass of baby's fæces; it was smooth but small, and bright yellow in colour. The next point is the fatty degeneration of the heart. The heart in this case was obviously yellow in colour, and fatty degeneration had advanced to a great extent. There is also fatty degeneration of the muscles, which are pale, and in the kidneys the epithelium is undergoing change; if the patient has lived long enough the kidneys change colour. In fact, if I may say so, phosphorus is the genius of fatty degeneration. You also find ecchymoses internally just as you do externally, and I take it that in all probability these ecchymoses are due to fatty degeneration of the vessels. In the case to which I have alluded there was no hæmorrhage anywhere except in the uterus, and that was not excessive. The gastric mucous membrane may be swollen, ulcerated, or ecchymotic; but in the case I saw there was nothing amiss with the stomach. Neither, in that particular case, could we determine the presence of any luminosity; but it should be remembered that the patient lived eight or nine days. Casper records a case in which a body within twenty-four hours of death was found luminous all over, and he says there was a luminous vapour streaming from the vagina. Therefore you will see there is no rule in these matters; you may get great luminosity, or you may have no luminosity. Whether there is or is not luminosity probably

depends on the quantity taken, and the time which has elapsed since the poison was taken more than anything else.

This fatty degeneration is practically universal, and although it is most strikingly marked in the liver, it is still observable in the heart, in the voluntary muscles, in the kidneys, and in the blood-vessels. Now the question is, Why do you get fatty degeneration when a person takes phosphorus? That is a question which I do not think we are able to answer. Fatty degeneration is only caused by fuming phosphorus, and whether the fact of the fatty degeneration is in connection with the greediness of the phosphorus for oxygen is not solved. I should think, however, that it is a very unlikely explanation. Phosphorus, like arsenic and antimony, combines with hydrogen; and phosphorus, arsenic, and antimony are chemically allied, and all three of these bodies seem to have the power of producing fatty degeneration. That is a matter of great interest.

The next question I will ask is, Why does phosphorus cause jaundice? I take it that jaundice from phosphorus poisoning is a real obstructive jaundice, that phosphorus gets into the liver, and you get a swelling of the liver and obliteration of the bile-ducts in that organ, and the bile re-absorbed into the blood. You must remember this in regard to the jaundice of phosphorus as against other kinds of jaundice, that the jaundice of phosphorus poisoning is the last biliary offering of an expiring liver; in a very little time the whole liver cells undergo fatty degeneration, and the bile-forming function of that liver ceases to go on.

Acute Yellow Atrophy.—The next point—also a very important one—is that phosphorus poisoning very closely resembles a rare disease of which you have read, and which, I take it, you are certain to see but seldom, namely, *acute yellow atrophy* of the liver. Clinically the two are indistinguishable, or I may say that some cases

of phosphorus poisoning and some cases of acute yellow atrophy of the liver are indistinguishable. There is the same jaundice, the same insidious course, the same absence of rise of temperature, the same delirium before death, and the same almost inevitably fatal result. It is absolutely certain that many cases of phosphorus poisoning have been reported as cases of acute yellow atrophy of the liver; there can be no doubt about that. A case occurred some years ago at Netley Hospital, and if anywhere in the wide world they understand liver diseases, having patients from the tropics in every part of the world, they understand them at Netley. One of the *employés* about the gardens at Netley Hospital died, it was said of acute yellow atrophy of the liver, and it was not until after the post-mortem examination, and after the case, as far as the pathology was concerned, was considered closed, that they found out that he had taken phosphorus paste. In short, it was a case of phosphorus poisoning, not idiopathic acute yellow atrophy of the liver. A similar case occurred in our hospital here not very many years ago, and a case occurred to Dr Leonard Hill, a former student of this College, who is now Lecturer on Physiology at the London Hospital. The patient was a girl, who died of "acute yellow atrophy," and on making inquiries he found that she had been playing tricks with her friends, and had given some sort of "spiritualistic" entertainment, and had rubbed her face with phosphorus paste to get luminosity of countenance.

Now it is said that in acute yellow atrophy the liver is always small, and that in phosphorus poisoning the liver is always big. That is not true; certainly not. Many cases of so-called acute yellow atrophy have been reported in which the atrophy of the liver has been slight, if present at all; and, on the other hand, there are many cases of phosphorus poisoning where the liver has been reported small. Though I do not wish to dog-

matize on the matter, and although the fact is doubted by some, I am inclined to think that the most probable explanation of that is the time which the patient lives. If the dose has been a big one, and the patient dies in the early days of the jaundice, you may find the liver big, because it has not had time to atrophy; but if the patient continues to live after the blocking of the ducts, and the fatty degeneration of the cells sets in, the liver atrophies rapidly and becomes small.

The next point is this. It is said that in acute yellow atrophy of the liver the urine contains leucin and tyrosin, but in phosphorus poisoning it does not. I have a very interesting tale in connection with that.

In the case of which I am telling you I made the post-mortem examination. I also saw the patient during life; we got some of the urine, and in this urine were a number of fine star-shaped crystals. The urine was very acid, and I looked at it and said to myself, "I wonder if that is tyrosin." I do not think I was to be blamed for saying "I wonder if that is tyrosin," because tyrosin is the rarest of urinary deposits. I remembered the pictures in the books. I went off to a urinary expert, and took the sample with me, and I said, "Look at that urine. What is it?" He said, "That is tyrosin undoubtedly." But it was not. Now that is rather interesting in connection with expert evidence. The deposit was uric acid in the form of stellar crystals, such as occur sometimes in patients who are the subjects of diabetes; and it was an interesting fact about that case of phosphorus poisoning that the urine contained sugar. Although the urine did not contain tyrosin in this case, tyrosin was obtained from the liver in large quantities. To put it shortly, I do not think one can distinguish between "acute yellow atrophy" of the liver and phosphorus poisoning.

Now comes another point. You may say "acute yellow atrophy is a disease which occurs mainly in a

particular class of people; it occurs mainly in women, and it occurs largely in pregnant women." It clearly has occurred, particularly in Vienna, in women of loose moral character. Quite true; those are facts which have been established by statistics, and they mark out acute yellow atrophy of the liver as a disease mainly affecting a peculiar class. The interesting point is that the statistics of phosphorus poisoning show exactly the same thing. The majority of the victims of phosphorus poisoning are women, the majority of them have been pregnant women, and a large number of these have been women of loose moral character. Why should women suffer more from phosphorus poisoning than men? The reason is that phosphorus is a domestic poison, and many housewives troubled with black-beetles have phosphorus in the house and even if they have not phosphorus paste they have matches. And a woman is nothing if not impetuous, and when she makes up her mind to suicide she takes the first poison which comes handy, and does not think much of the consequences. That I believe is the reason for the undoubted fact that phosphorus is more used by women suicides than by men. You will find that men commit suicide by the more deadly poisons, and that a man who is bent on suicide will go and get prussic acid, or take a dose of laudanum, or drown himself, or shoot himself. A woman who commits suicide very seldom uses firearms.

Phosphorus has been largely used in procuring abortion, not so much in this country as on the Continent, and it has some reputation of being an aphrodisiac. In these two facts you will find another explanation of the preponderance in women, and a preponderance among women of a particular class. The identity of the statistics of phosphorus poisoning and acute yellow atrophy of the liver is very interesting. Richter has collected 41 cases (36 females and 5 males) of acute yellow atrophy in syphilitic subjects.

Acute yellow atrophy of the liver was first described

by Rokitansky in Vienna in 1842, and acute yellow atrophy of the liver does not seem to have gained a footing until after the establishment of the lucifer match industry. It is a very interesting fact that we find the first accounts of acute yellow atrophy emanating from the town where the lucifer match industry was first established. I admit that Vienna was and still is one of the great centres of pathology, but still the fact is remarkable.

Another fact is this: In Graves's *Clinical Medicine* mention is made of acute yellow atrophy occurring in three members of the same family. I can double that in phosphorus poisoning. The case upon which my remarks have been largely founded, and which led me to investigate the whole subject, was a case which occurred twenty or thirty miles from London. The patient was a woman who was living under the "protection" of a gentleman in the country, and this gentleman was going to be married, and his *quasi*-connubial arrangement was to come to an end, which caused great trouble to the lady. She accordingly took phosphorus and poisoned herself. This girl came of what I should call queer parentage; I suppose she had come of a family of prostitutes. And a very curious fact is that her own sister, under exactly parallel circumstances, had done precisely the same thing. That came out in the evidence before the coroner; and her mother, who was a woman of the same class, it was whispered but not proved, had also done the same thing. So that it was a tradition in this family. There I leave the matter, and please do not come to the conclusion that I say for a minute that there is no such thing as acute yellow atrophy apart from phosphorus poisoning. Phosphorus is an element which in a state of combination we carry about us in very large quantities, yet so little as a grain or two of pure phosphorus suffices to kill. But again we must remember that this acute fatty degeneration is after all only a symptom, and it is quite possible it may be brought about in more ways than one. I have

said enough to make you careful when you have a case of acute yellow atrophy, to search about, as did Dr Hill, for evidence of phosphorus poisoning, remembering that that evidence is often exceedingly difficult to get. I have told you that phosphorus is taken for unworthy purposes, and people do not admit a fact of that kind without a great deal of cross-examination.

Again there may be such a thing as indirect phosphorus poisoning, *viâ* black-beetles and rats, and through them to the animals we consume for food. That is a point which I think is well worthy of attention, and certainly it is a point which should always be inquired into when you are confronted with these cases.

The next point is how to treat phosphorus poisoning. If you came quickly to the patient you would of course wash out the stomach, so as to try to get the phosphorus out of it, and I think perhaps you would be right in giving a big dose of castor oil afterwards. Phosphorus is soluble in oil, and if the oil is going to course through the alimentary tract and be expelled, very likely that would do good. There is one thing which serves as an antidote for phosphorus, and that is crude turpentine. In the vapour of crude turpentine phosphorus ceases to be luminous, and the only treatment which seems to be of any use is the administration of repeated doses, perhaps as much as thirty drops every half-hour, to the patient who is the subject of phosphorus poisoning. There was a case in the hospital a few years ago under Dr Ringer, and the patient was treated in that way, and went out well. Another interesting fact about that patient who went out well was that she came back into the hospital a few weeks later with Bright's disease; and it is very likely indeed, or at least possible, that that which cured the phosphorus poisoning had irritated the kidneys, and set up a form of Bright's disease. After being in the hospital for some time she recovered.

There is one other point with regard to phosphorus which is of very great interest, and I find that Dr Luff in

his book on *Medical Jurisprudence* quotes a case which was described in the *Lancet* of 1893, in which the liver symptoms were delayed, he says, for nine weeks after swallowing phosphorus. That, of course, is very exceptional, but exceptional cases do arise, and your investigations as to whether the patient has had phosphorus or not must have reference not only to the few days before the accident, but to some time previously.

There is a form of chronic phosphorus poisoning which consists of necrosis of the jaw; it occurs in those match factories where yellow phosphorus is used. You cannot read the papers, especially some of them, without finding allusions to "phossy jaw," as they call it. The papers make the most of a few cases, for it is a very rare trouble; but it seems to be avoidable in several ways: first of all by giving good ventilation to the room; secondly, by great cleanliness in the matter of washing the hands before meals, the methodical use of the tooth-brush, and so forth; and thirdly, by excluding from the factory anybody with carious teeth. Those with carious teeth are more liable to get phosphorus necrosis than are others. In fifty-four cases of phosphorus necrosis which have been collected, twenty-seven were in the lower jaw, twenty-two affected the upper jaw, and five affected both jaws.

With regard to the detection of phosphorus, this may be easy or difficult as the case may be. I would say that in phosphorus poisoning of a few days' duration the whole of the phosphorus is oxidized, and you fail to find crude phosphorus in the body. We have any amount of combined phosphorus in the body normally, and the discovery of that would be of no import whatever. Phosphorus is a luminous body, and in a case of phosphorus poisoning you should take some of the contents of the stomach and put them on a dish in a darkened room, and gently heat them over a flame. In vomit containing phosphorus you will see when it is warmed little points of flame, and you will perceive a characteristic smell of garlic. One of the best

ways of detecting phosphorus was the method used by Mitscherlich of distilling it in the dark. Put the contents of the stomach into a retort with a very long tube and heat gently in the dark, and you will find the delivery tube into your condenser is luminous. There is perhaps another way of detecting phosphorus poisoning, and that is the fact that phosphorus reduces nitrate of silver. If I take a piece of paper and wrap some phosphorus paste in it so as to get the paste safely to the bottom of a test-tube, then make some filter-paper into a cone, and after moistening it with a solution of nitrate of silver put it on the top of the tube and apply heat, the tip of the cone of paper will become darkened, and have a metallic lustre. It should be left for several minutes. In making that experiment you must be careful that you have not got sulphuretted hydrogen present, for if you darkened the nitrate of silver paper in the presence of sulphuretted hydrogen you would get a false result, as I will show you. But that may be rectified by trying another paper moistened with lead acetate; if the silver paper is blackened and the lead acetate paper is not, you may come to the conclusion that phosphorus is present. I have dwelt fully upon the pathology of phosphorus poisoning, and it is a matter of great pathological interest that though we have so much combined phosphorus in our bodies, yet a grain or two of it uncombined will cause almost certain death.

CHAPTER XI

ARSENIC

White Arsenic (Arsenious Oxide)—Uses—Its Properties—Symptoms of Acute Arsenical Poisoning—Chronic Arsenical Poisoning—Arsenical Pigments—Symptoms in Workers in Arsenic—The part played by moulds growing on Wall-papers — Aqua Tofana—Arsenical Pigmentation and Peripheral Neuritis in Chronic Arsenical Poisoning — Trial of Madeline Smith in Edinburgh, 1857—An Account of the Case—The Post-mortem Appearances Found — Appearance of the Exhumed Body—Chemical Analysis of the Viscera—The Defence of Madeline Smith—Christison's Evidence as Expert for the Defence—In Opposition to Orfila, Christison's Opinion *re* Tastelessness of Arsenic — The Maybrick Case — Post-mortem Appearances of the Stomach in Arsenical Poisoning—Gastro-Enteritis—Elimination by Lower Bowel—Damage to Stomach from Incessant Vomiting—Cosmetic Effect of Arsenic—Dr Thomas Oliver's Experiment on a Dog—No Arsenic found in its Liver and Bones—Fatal Dose — Fatal Period — No Absolute Rule Possible—Arsenical Poisoning Simulating Disease—Case of Mary Anne Cotton at the Durham Assizes (1873)—The Lives of the Victims Insured—Arsenic in Dusting Powder leading to Illness and Death—Treatment of Arsenical Poisoning—Tests—Reinsch's Tests—Marsh's Test.

I NOW come to that very important poison *arsenic*. Arsenic is the most important poison with which we have to deal, and it has been used again and again. When the early chemists discovered white arsenic it was soon used by poisoners, and was said to be contained in the aqua tofana which was so largely used in Italy. White arsenic is largely employed in the arts, and it is largely

employed in medicine. It has been used also for dipping sheep, and for steeping wheat in before it is sown. Therefore, arsenic is one of those things which is readily found in agricultural districts, and may be got nearly everywhere. But when sold for economic purposes of that kind it is obliged by law to be mixed with colouring matter, such as soot or indigo. White arsenic has no colour and very little taste, and it can be given without the victim being immediately aware of it either by the tongue, or the nose, or the eye. In consequence of its lack of colour it has been accidentally mixed with flour, and with violet powder, and dusted over babies, to their great detriment. In one notable case at Bradford, the so-called Bradford lozenge case, a confectioner had the intention of only mixing plaster of Paris with the lozenges, but he put into them white arsenic, with the result that over two hundred people who partook of those lozenges were made seriously ill, and seventeen died. That occurred many years ago. The solubility of arsenic is not great, and in pure water and in boiling water not much of it is dissolved. But if to the boiling water you add a little alkali, then the solution of the arsenic takes place quickly. Owing to the difficult solubility of arsenic it has often been given suspended in thick liquids. We shall have to deal with a case presently in which the arsenic was given in cocoa, and in another case arsenic was given in a patent food — Revalenta Arabica. Arsenic has usually been given suspended in that way.

Now when arsenic is taken, the symptoms do not begin at once; there is generally an interval. Of course one need hardly say that the length of that interval depends upon the state of the stomach and the way in which arsenic is given. If it is given on a full stomach, and with a thick stodgy meal, the interval may be considerable; but if it is given on an empty stomach in a state of fine comminution, the interval may be slight. In recorded cases the interval before the commencement of the bad symptoms seems to

have varied from as little as eight minutes to as long as nine hours.

As you are aware, arsenic has been used as a caustic; arsenical paste has been largely used by cancer quacks for destroying growths, and a speck of arsenic is often employed by dentists for destroying the nerve-ending in the tooth before stopping. Arsenic, being a caustic, causes symptoms of irritation in the stomach. There is burning pain and intense thirst. There is vomiting; and the vomit, as with other corrosive irritants, may consist of bloody material, mucus, and coloured material if indigo or soot has been mixed with the arsenic. With the vomiting there is usually purging and collapse, the patient being so feeble that he is almost unable to do anything—that is very characteristic—he can hardly speak or move. In addition there are very often cramps in the legs. I would call your attention to the not infrequent association of gastro-intestinal disturbance with cramps in the legs; it is a reflex phenomenon, and is frequent in poisons which cause gastro-enteritis, and it is frequent also when gastro-enteritis arises from any other cause. It is very common in cholera, and not uncommon in acute dysentery. Towards the end of a case of arsenical poisoning there may be delirium, coma, and convulsions. The patient looks exceedingly ill, and not infrequently, if life is prolonged at all, there is jaundice, though slight in degree. The next point—and it is a very important one—is that in arsenical poisoning as a rule there is no rise of temperature; that has a bearing on the diagnosis. Not only may arsenical poisoning be acute, but it may also be chronic. The latter occurs where arsenic is extensively used, as in the arts. There are many arsenical pigments. Arsenic is also used as an antiseptic by furriers and by so-called taxidermists. Many wall-papers are made with arsenical pigments. Nowadays arsenical pigments are very largely replaced by aniline pigments. There again, in order to produce these colours, arsenic acid—the higher

oxide—has been used as the oxidising agent, and many years ago there was an outcry that people who wore magenta-coloured socks got an eczematous eruption up the legs, and this was put down to the arsenic which had been used for the colours. In the same way some of the other pigments are injurious; although they have not got an arsenical base, arsenic has been used for their development.

Chronic arsenic poisoning is very apt to occur in workers in arsenic. Persons employed in these trades are very apt to get eczematous eruptions on various parts of the body, especially spots where arsenical particles would be likely to stick, such as between the scrotum and the thigh, in the axilla, and very often around the conjunctiva. Conjunctivitis is not uncommon in those who take arsenic by the stomach only. Conjunctivitis has been observed in cases of both acute and chronic arsenical poisoning. Therefore we must infer that conjunctivitis is not solely due to the sticking of arsenical particles on to the conjunctiva, but to the presence of arsenic in the tissues, or in the secretion of the lachrymal glands or conjunctiva.

There is another point which is of interest in connection with chronic arsenical poisoning, namely, how is it brought about. I have mentioned before that cases are due to arsenical wall-papers, arsenical socks, arsenical dresses, and so forth. Now it has lately been shown that certain moulds growing upon damp arsenical wall-papers, such as Penicillium and other common moulds, produce a metabolism in the sub-stratum in which they grow, and eliminate arsenical gas. The arsenic enters into the composition of these moulds, and they give off an arsenical gas. That is a matter of very great interest, and opens up a vista of possibilities. It has been observed that an arsenical liver put away for a time gradually loses its arsenic, which disappears presumably in the form of gas.

Now it is said that animal matters impregnated with

arsenic and allowed to rot sometimes give an arsenical dripping, and it is said that the aqua tofana was prepared by rubbing arsenic into pigs and collecting the fat, which distilled partly perhaps as a result of heat, and partly as a result of putrefaction.

There are two other conditions observed in chronic arsenical poisoning. One is pigmentation of the skin; the skin gets very brown, and we often have in the hospital cases of this kind in people who have taken arsenic for a long time. Keratosis of the palms of the hands has also been described. Another trouble is neuritis. Many metals cause peripheral neuritis, arsenic amongst others. It is very common for arsenical workers to complain first of all of numbness, formication, and queer sensations about the limbs, and subsequently to complain of either paresis of the muscles or definite paralysis of groups of muscles, owing to the inflammation of certain nerve branches. A subject of chronic arsenical poisoning often gets pain behind the eyes, he gets dyspeptic, and looks thin and worn. With regard to arsenical poisoning, I think I am right in saying that in the East arsenic has been taken as an aphrodisiac. In the work on *Indian Medical Jurisprudence* by Chevers, there are allusions to this fact.*

Trial of Madeline Smith.—There is no poison which has caused so much discussion as arsenic. It has been used for criminal purposes again and again, and there have been several cases of arsenic poisoning which have been worked out with very great care by a number of experts. First of all I will put you in possession of a case of acute arsenic poisoning which came before the law courts in Edinburgh in 1857—the noted case of Madeline Smith. I have been through this case, and have selected certain facts; and I think all the facts which I shall bring before you are worthy of your attention as medical jurists, though they may not be strictly medical facts. Madeline Smith was put upon her trial before the High Court of Justiciary

* See Appendix, p. 521.

in Edinburgh, charged with the murder of her quondam lover, one L'Angelier, a Frenchman. The indictment charged her with two attempts at murder: (1) on Thursday or Friday, the 19th or 20th of February, 1857, and (2) on the 22nd or 23rd of February (Sunday or Monday), and with actual murder on the 22nd or 23rd of March (Sunday or Monday), and that all three attempts (two successful and one unsuccessful) were made by the administration of arsenic or other poison in cocoa or coffee, or some other article of food. It was never doubted by either side that L'Angelier met his death by poisoning with arsenic; but, there being several missing links in the chain of evidence, the trial ended in a verdict of "Not proven," and the prisoner was discharged.

We have no verdict of not proven in England, and I take it the difference between not guilty and not proven is that if a jury returns a verdict of not proven, the prisoner may be brought up again on the charge and re-tried when additional evidence is procured. But if a jury brings in a verdict of not guilty, I believe the prisoner cannot be tried again upon that specific indictment. But in England we have a different method of proceeding. Before a case comes into Court it is heard in a preliminary way by the grand jury; the grand jury listens to the facts, and they then either find a true bill or ignore the bill against the prisoner. When the grand jury ignores a bill, that is very similar to the Scotch "Not proven"—that is to say, the prisoner may be again charged upon the same indictment when the evidence is sufficient to convict him.

Madeline became engaged to another man, and the theory of the prosecution was, that in order to be rid of L'Angelier (and having failed to do so or to recover her letters in ordinary ways), she determined to poison him with arsenic. It was proved that Madeline had purchased arsenic on several occasions shortly before L'Angelier's illness and death. A packet of cocoa was found in Madeline's bedroom, which was on the ground

floor, and it was sought to establish the fact that Madeline handed L'Angelier his fatal draught from the window of her bedroom about ten or eleven o'clock on the evening preceding his death. Madeline's father would not countenance the addresses of L'Angelier to his daughter. All their meetings were clandestine, and he was frequently in the habit of tapping at her bedroom window at night-time, and holding conversation with her. You never can neglect in any of these cases the moral circumstances; and though they may not be precisely medical circumstances, they are most important, and give colour to a case. But moral circumstances of that kind, it always seems to me, cut in two directions. They show that there was reason for wishing to get rid of a certain person, and they give importance to facts which otherwise would be of no importance. On the other hand, you must remember that moral circumstances of this kind might give importance to facts which really ought to be neglected. Moral circumstances generally make against the prisoner, and sometimes unjustly so. "Trifles light as air are, to the jealous, confirmation strong as proofs of Holy Writ."

Now there is the evidence at the trial. The lodging-house woman with whom L'Angelier lived gave the following account of his illnesses and death. "One night about the middle of February he wished for a pass-key, as he thought he would be out late. I went to bed, and did not hear him come in. I knocked at his door about eight in the morning and got no answer. I knocked again, and was answered, 'Come in, if you please.' I went in, and he said, 'I have been very unwell; look what I have vomited.' It was a greenish substance; there was a great deal of it. It was thick like gruel. He said that while on the road coming home he was seized with a violent pain in the bowels and stomach, and when he was taking off his clothes he thought he must have died upon the carpet. He was

not able, he said, to ring the bell. He went to business (he was a clerk in a merchant's office) that day. He complained of thirst repeatedly during the day. The illness made a great change in his appearance. He looked yellow and dull. Before that his complexion was fresh. He complained of feeling cold."

"On the 23rd of February he had a similar illness, and the witness was called to him about four in the morning. He was vomiting the same kind of stuff as before. He complained much of cold and also of being very thirsty, and he took a quantity of cooling drinks. There was much purging as well as vomiting on both these occasions. At this time he was unable to attend business for a week. He continued very unwell, and was obliged to go into the country for his health."

"On March 21st he returned from the country in better health. He went out that night about nine, asking for the pass-key before he went as he might be late. It was about half-past two in the morning when I next saw him. He did not use the pass-key in coming in, but rang the bell with great violence. I rose and asked who was there, and Mr L'Angelier answered, 'I am very bad; I am going to have another vomiting of that bile.' He said he thought he would never have got home, he was so bad on the road. The first thing he asked for was a little water. He began to undress, and then to vomit severely. The vomiting was attended with great pain. He was chilly and cold, and wished a jar of hot water to his feet and another to his stomach. About five o'clock he was much worse, and his bowels became bad. A doctor was sent for, but did not come [mark how dangerous it is not to obey a medical call]. At seven o'clock he was worse still. He was dark about the eyes. The doctor was sent for again, and came. I took the doctor into the dining-room and asked what was wrong with him, and he asked whether he was a person who tippled. At

nine he was still worse, and he asked that one of his friends might be sent for. He said that if he could get five minutes' sleep he thought he would be better. These were the last words I heard him use. I came back to the room in about five minutes; he was then quiet, and I thought he was asleep. The doctor shortly returned, and discovered he was dead."

Post-mortem the body presented nothing extraordinary externally, but a "tawny hue of the surface." The stomach being tied at both extremities was removed from the body. Its contents, consisting of about half a pint of dark fluid resembling coffee, were poured into a clean bottle, and the organ itself was opened along its great curvature. The mucous membrane, except for a slight extent at the lesser curvature, was then seen to be deeply injected with blood, presenting an appearance of dark red mottling, its substance being easily torn by scratching with the finger nail. The appearance of the stomach being suspicious, it was reserved for analysis, and the authorities were informed of the suspicious circumstances. The body was buried, but on the 31st March it was exhumed for further examination. It was observed that the features had lost their pinched appearance, and that the surface of the skin was no longer tawny, but had become florid, "and," the report says, "we all agreed that the evidences of putrefaction were much less marked than they usually are at such a date, the ninth day after death, and the fifth day after burial." Portions of the large and small intestine (the portions being previously ligatured to preserve the contents) were removed, together with some of the liver and brain. The mucous membrane of the duodenum and part of ileum were found redder than natural, and this redness was more marked over several patches, portions of which, when carefully examined, were found to be corroded. Several small whitish and somewhat gritty particles were removed from its surface. A few small ulcers about one-sixteenth of an inch in

diameter, and having elevated edges, were observed at the upper part of the duodenum. In the rectum were found two vascular patches about the size of a shilling. The fluid contents of these portions of intestine were poured into a glass vessel, on decanting which there were observed a number of crystals adhering to the sides of the vessel, and at the bottom a whitish sediment.

One of L'Angelier's medical attendants gave evidence, and said "there was an appearance of jaundice. I have heard of that as a symptom of irritant poison. It is in Dr Taylor's work on poison."

Counsel for prisoner: "Show me the passage in Dr Taylor's work" (handing it to witness).

Doctor: "I cannot find the particular passage. It is in the case of Marshall."

Counsel: "What was the poison in the case of Marshall?"

Doctor: "Arsenic."

Counsel: "Well, see if you can find it."

He could not, and you will remember what I said about quoting authorities. The cross-examining counsel was down upon him at once.

Dr Penny, professor of chemistry in the Andersonian University, Glasgow, made an examination of the viscera and their contents, the most important fact in connection with which was he found $82\frac{7}{10}$ grains, or very nearly one-fifth of an ounce, of white arsenic in the man's inside. In concluding his report, he said, "having carefully considered the results of this investigation, I am clearly of opinion (1) that the matters subjected to examination contained arsenic; (2) that the quantity of arsenic found was considerably more than sufficient to destroy life."

In this case of Madeline Smith there was another point which came out at the trial; the arsenic which Madeline Smith was proved to have purchased was mixed (as the Act directs) in one case with soot, and in the other case with indigo (about 5 per cent. in each). The

question arose as to whether an untutored girl could, by manipulating this mixture, get rid of the soot and indigo from the arsenic. Now if Madeline Smith got her verdict of not proven by one circumstance more than another, it was that neither soot nor indigo was found in the intestines, but arsenic was found; and it is possible that by throwing the mixture into a large quantity of water the arsenic would fall to the bottom, and the soot float on the top. The question arose as to whether a girl could do this. The next point was that the defence set up a plea (which has often been set up) that she used arsenic as a cosmetic. I see at the railway stations illustrations of a girl with a marvellous complexion through using somebody's arsenical soap; I mention that to show that arsenic has a great reputation as a cosmetic. It is given largely for skin diseases, and is used by grooms for improving horses' coats. I think there can be no doubt that it does improve horses' coats. It was said that Madeline Smith bought the arsenic to use as a face wash. Be that as it may, a defence of that kind manipulated by a clever counsel is good enough for a jury. Then the question arose as to whether the girl could wash her face in an arsenical solution without getting any harm from the proceeding; whether the arsenic would not get into the eyes, and cause irritation and trouble.

Then the question of the solubility of arsenic came up, and it was shown that this arsenic had been administered in a thick liquid, namely, cocoa or chocolate. It was in this trial that Dr (afterwards Sir R.) Christison, the great toxicologist, the expert for the defence, deposed that the appearances found in the intestines were such as might be expected in cases of arsenical poisoning. He adds, "I think all the symptoms in the case might have occurred from malignant cholera; the ordinary time that elapses between the administration of arsenic and death is from eighteen hours to two and a half days. The shortest time is two or two and a half hours." Then he said a very

ingenious thing. He said, "The dose was probably more than double the amount found in the stomach. In the greater proportion of cases of suicide the dose is generally found to be large. *It is in cases of suicide that double-shotted pistols are used and large doses given.*" The cosmetic theory, the absence of soot or indigo, and the theory of suicide helped to bring about a "not proven" verdict. Dr Christison was recalled and examined as to the use of arsenic as a cosmetic. He thought it would be very unsafe to put arsenic into a basin of water and wash the face in it; it might get into the nostrils, the eyes, and the mouth, and cause inflammation. He contended (with all respect to Orfila, who states the contrary) that arsenic has no taste. There could be no doubt that large quantities of arsenic have been swallowed by persons without their noticing it. Some have said it had an *acrid* taste. This was probably an error, the acrimony being confounded (1) with the roughness of the gritty particles in the mouth; and (2) the burning, etc., slowly developed by the poison afterwards. The word acrid is a professional phrase, but Orfila used the word "âpre," which means rather *rough.*

Counsel: "Yes, in his first volume, page 377, he does use the word, but on page 357 of the same volume you will find he says the taste is *âcre et corrosif.*"

Dr Christison had come to the conclusion that arsenic had no taste from experiments made on himself. Orfila does not say that he made similar experiments. There you get again the danger of quoting authorities. The defending counsel was a man of gigantic ability, and tremendous memory. That is a very instructive case, and it is instructive on account of the many medical questions which first came up at it.

In the case of Maybrick, who died of arsenical poisoning in Liverpool, there are a few points worthy of attention. Among the symptoms from which Maybrick suffered was a persistent cough, and he complained that he had a hair in his throat, and several witnesses bore testimony thereto.

Post-mortem there was found a slight ulcer on the epiglottis, which was caused by a little drop of arsenical solution, or possibly a minute speck of white arsenic lodging on the epiglottis, and causing irritation. Then the state of the stomach was a matter of controversy. It will occur to you that the state of the stomach in a case of arsenical poisoning must be variable. It is not reasonable to suppose that you can take a stomach and say, "That is the stomach of arsenical poisoning." If the arsenic has been given in the form of a powder you very often find on the stomach minute specks of powder, and each speck may be the centre of a little inflammatory area. In arsenical poisoning also petechial ecchymoses have been seen. One of the witnesses for the defence said that in every case of arsenical poisoning you were bound to find the condition of petechial ecchymosis in the stomach. Granted you very often do, but to say you are sure to find such a thing is not reasonable. Every witness for the prosecution and for the defence in that trial admitted that the patient died of gastro-enteritis, and every witness for and against in that trial admitted that the post-mortem signs were those of gastro-enteritis. Now gastro-enteritis is not a thing which comes of itself; it is a condition which is caused by some irritant—it may be an organic irritant, it may be a mineral irritant.

Then there was found evidence of inflammation of the duodenum for a little way down. Then the rest of the intestinal tract was normal, and there was some ulceration of the rectum. I would again insist that the large intestine is probably a very important channel for the elimination of poisons, and that the escape of the great mass of the intestine from injury points to the fact that whereas absorption takes place in the upper part, elimination takes place very largely in the lower part. I shall have to read to you presently a case in which exactly the same state of things was found in poisoning by antimony. You will find the same thing is found in some forms of mercurial poison-

ing. You must remember that if a person vomits incessantly, hæmorrhage very often takes place. I remember once going from Dover to Calais in a very bad sea; I have the good luck to be a good sailor. It was a very bad passage, and I made a sort of clinical tour around the ship. I think I am right in saying that quite 10 per cent. of the people on board brought up a little blood. That is a fact well worth knowing. Some of the passengers brought up large quantities of blood. I take it the hæmorrhage in such cases comes from the squeezing and bruising, and that if a person vomits almost incessantly for a couple of hours, as those unfortunate people did, it is not surprising that a little blood should occur; and if the liver should be a little congested because of the supper the previous night, or something of that kind, I think it is reasonable to suppose there would be a little blood. My point is that you may find evidence of hæmorrhage into, and damage of the stomach from the incessant act of vomiting, quite apart from the action of any irritant upon the mucous membrane.

I have here a case reported by Dr Thomas Oliver, of Newcastle, who gave to a dog a grain of arsenious acid daily for several months. The animal gained considerably in weight, and became sleek and well, and covered with hair, which before was stunted and stubby, but now became silken. All who had seen the dog before were struck by its improved appearance; that is a very interesting fact in reference to the use of arsenic for cosmetic purposes. Before its death the dog suffered from vomiting, diarrhœa, and rapid emaciation, and post-mortem the most careful chemical examination of the liver and bones, repeated on three occasions, failed to reveal arsenic.

We now come to the question of the fatal dose. There seems to have been a case in which death took place with as little as two to three grains, but much bigger doses have been recovered from. As to the fatal period, how can

we speak on that point? Madeline Smith's lover probably got his fatal dose somewhere between midnight and two in the morning, and he died at nine or thereabouts. But he got 82 grains at least, probably a great deal more. Then there is a case recorded by Dr Foster of Huntingdon, in which a child died in two hours after taking arsenic. As I have warned you, you cannot lay down any absolute rule on these matters. Maybrick lived for a week, and he had probably been having poisonous quantities of arsenic from the beginning of April, more or less, until the middle of the second week in May. The meaning of that is that no sudden death and no very prolonged illness would of itself exclude arsenical poisoning. If a person gets a dose of arsenic, and he has a fatty heart, and he vomits and faints, he may die in a minute or two in the first attack of vomiting. On the other hand, we see that he may live for a long time.

I will remind you that arsenical poisoning may simulate disease. And I would recall to your recollections the case of Mary Anne Cotton, who was tried at the Durham Assizes in 1873. Cotton was indicted for the murder of her stepson in July 1872. The body was exhumed, and arsenic was found in it, and was proved to be the sole cause of death. The woman had, at different times, killed by poison her mother, fifteen children, three husbands, and a lodger, making twenty persons in a few years; and the lives of all of them were insured. One of the husbands and four of the children were insured in one office. The death of Cotton's victims was ascribed to "gastric" fever, and wherever this woman moved there seemed to be a mild epidemic of "gastric" fever around her. I may mention another case which is interesting. A number of children at Loughton, in Essex, in 1878, were made ill from the use of violet powder, which was found to contain 38.5 per cent. of arsenious acid. A new-born child was dusted over with this powder twice on the first day, and four times the second day. There was marked redness of the skin,

and this led to a very free use of the powder, which, of course, increased the trouble. Notwithstanding the substitution of starch for the powder, the inflammation continued, and the child died on the tenth day from exhaustion caused by sloughing of the skin. Six and a half grains of arsenious acid were recovered from the body of this child post-mortem by Tidey. That is a very interesting case.

Treatment.—The treatment, of course, is to empty the stomach and wash it out; you may give demulcents, and it is said that the hydrated sesquioxide of iron, freshly made by mixing the liquor ferri perchlor. with solution of ammonia, and collecting the precipitate and giving it suspended in water, is one of the best antidotes. In your efforts to get the stomach empty you must take care not to check the action of the bowels. That is a mistake that is often made. I am not meaning to criticise, but it is obvious that if the diarrhœa is due to arsenic, one of the worst things you can do is to stop it. You will do better to run your risk and let the mineral poison be turned out as quickly as may be.

Tests.—Next, as to the tests for arsenic. I have here some white arsenic, and I will put some into this mortar and pound it up. That white powder might be anything—it might be chalk, starch, or an alkaloid even. In dealing with a white powder, I proceed as usual, and place some on platinum foil and heat it over a spirit lamp. Notice first of all that this powder does not melt; it fumes and volatilises without melting, and it neither inflames nor blackens. It is gone, and the foil remains almost unsoiled. Therefore that white powder is not chalk, nor zinc, nor magnesia, nor tartar emetic, nor acetate of lead, nor an alkaloid. We shall see how tartar emetic behaves shortly. Perhaps, as arsenic and antimony go together very much, I may just take a speck of tartar emetic and volatilise it on a piece of platinum foil. Tartar emetic and arsenic cause symptoms which are very similar, and we shall find that chemically also we have to carefully consider

the diagnosis of the two. You see this tartar emetic flies about, gets red-hot, and blackens, leaving a residue on the foil. Next, to the arsenic we apply some reagent. One of the first reagents I will apply is ammonium sulphide, and you will notice that at first there is very little change, but apparently solution takes place, and you will find after a little time that it will dry up and leave a yellow stain. I will put alongside that a little tartar emetic, and immediately I get what looks like black. The books say it is orange, but it is more like blood-orange gone rotten. Still, if you look at the more diluted points it is perhaps orange. You see the antimony has changed instantly. The patch of arsenic is first of all dissolved in the ammonium sulphide, and it leaves a little orange-yellow rim where it is evaporating. The books say antimony sulphide is orange and arsenic sulphide is yellow. We will now try another test. A solution of potash would dissolve the arsenic and cause no change of colour; and of course with perchloride of mercury you would get a yellow colour, and with the subsalt of mercury you get a blackening on the addition of potash. Putting our arsenic into a tube, you will notice that on adding water and shaking it in the cold the solubility is very slight; and on boiling, the solution is not much increased; but on the addition of an alkali such as potash you get a solution taking place tolerably quickly. You will notice that on boiling, some of the arsenic stops at the bottom, and a good deal of it is floating on the top of the liquid. I put it through a filter-paper and get a clear solution. Here I have a solution of white arsenic in water pure and simple, so that the amount of arsenic is very small. Proceeding in the usual way, I have a liquid without odour or colour; perhaps it gives a slight reddish tinge to the blue litmus paper. I add to this a drop of hydrochloric acid, and get no precipitate. And then adding some sulphuretted hydrogen, I get a yellow precipitate. Adding to that some ammonia, I get it dissolved. Therefore we get a

yellow precipitate in an acid solution, which is dissolved on the addition of ammonia. That shows us that we have to deal with arsenic. Persalts of tin give a yellow precipitate, which is soluble in ammonia.

There are two other special tests for arsenic which are very good. One is ammonio-nitrate of silver, and the other is the ammonio-sulphate of copper. Now a word of caution. You saw that that yellow sulphide of arsenic dissolved readily in ammonia, and taken as a broad fact, you must remember that any excess of alkali in dealing with arsenic will keep it dissolved. So that in making ammonio-nitrate of silver and the ammonio-sulphate of copper you must be very careful that there is no excess of ammonia present, and on that account the ordinary ammonia solution is too strong to make your ammonio-sulphate of copper or ammonio-nitrate of silver. So I take the ammonia and freely dilute it. Then I take two test-tubes, and into one of them I put a little solution of nitrate of silver, and into the other I put a little solution of sulphate of copper; to each of these solutions I add some diluted ammonia cautiously and slowly. By adding this to the silver solution I get a brown precipitate, which is redissolved on adding more ammonia. I treat the copper solution in the same way. You will see that there is a deep blue colour. Now I take my arsenical solution, which is very weak, and put a little into two tubes. The ammonio-sulphate of copper gives a green precipitate, and the ammonio-nitrate of silver gives a pure yellow precipitate. So that I have a clear solution, without odour or colour, leaving no residue on evaporation, not blackening, giving no precipitate with hydrochloric acid, but a yellow precipitate with sulphuretted hydrogen, soluble in ammonia. And in applying my confirmatory tests I get a green precipitate with the ammonio-sulphate of copper, and a yellow precipitate with ammonio-nitrate of silver.

Now, when arsenic is mixed with organic matter,

the separation of the arsenic is not very easily done, and it is not done without a great deal of care. You have seen how volatile arsenious acid is; in a few seconds over a spirit lamp the whole of it volatilised and disappeared. Therefore, the use of strong heat in separating arsenious acid from organic matter is not to be thought of. You may destroy organic matter without the application of much heat by mixing the organic matter with potassium chlorate, and heating it over a water bath with hydrochloric acid, and in that way your arsenic will not be volatilised. That is not a lecture-room experiment, because the amount of chlorine given off would make the room uninhabitable.

Another way of getting arsenic free from organic matter is by making use of its volatility, and obtaining the volatile arsenical chloride by distilling the organic matter mixed with a good deal of hydrochloric acid.

Reinsch's Test.—For qualitative analysis, however, one may proceed in another way, and I am now going to show you a test which is of the greatest importance in medical jurisprudence, and whenever you are confronted with an organic fluid, such as beer or gruel, you must always test that fluid by *Reinsch's test.* I have here some common porter. I will put into a test-tube a drop of solution of arsenious acid, and on to this I will pour some of the porter. We will suppose that is a portion of porter which you have to analyse. Take a piece of clean copper foil and cut it into convenient sized strips, place them in a test-tube, and add your organic solution. Then add hydrochloric acid. I want to warn you that the hydrochloric acid in Reinsch's test is not to be added in drops, but in considerable quantity—a quarter or one-fifth will not hurt, one-sixth, I think, is about the usual quantity mentioned in the text-books. This you must boil, and if you have very little arsenious acid present, you may have to boil for a long time. In a recent case the mistake was made of not trying the urine with

Reinsch's test long enough, and it is evident that in such a case, where only a decimal part of a grain of arsenic was found in the liver, the amount of arsenic in the urine must have been exceedingly small, and the urine ought to have been put aside to boil gently for an hour or more until it was concentrated. Here I have a relatively large amount for the purposes of demonstration, and there will be no difficulty at all. Reinsch's test is peculiarly useful, because it is applicable to organic fluids. When only a small quantity of poison is present, and when it is intimately combined with the organic matter, you do not get the ordinary reactions. There may be mercury, there may be arsenic, there may be antimony in, say, a person's urine, or in the contents of the stomach, but unless there be a great excess you will not get an ordinary reagent such as sulphuretted hydrogen to give you a precipitate. But with Reinsch's test you get evidence in organic fluids, and therefore it is a test of the greatest possible value, not only for arsenic, but for antimony and mercury and other metals, amongst others bismuth. But we are only concerned here with the poisonous metals. If you try Reinsch's test and get no result from it, you may be perfectly sure that neither arsenic, antimony, nor mercury is present, and, of course, that is a great piece of knowledge. If you try Reinsch's test for a long time, and you find no deposit upon your copper, you may be sure none of these metals are present. I have boiled this porter and arsenic, and now I pour the fluid off and shake the pieces of copper on to cartridge paper. Here is the copper coated with a grey film. There is no doubt about it, it is not merely a dirtiness, but a definite grey film. In sulphurous fluids you may get a dirtiness of the copper which you must not mistake for the real deposit in Reinsch's test. Reinsch's test being applicable to three metals with which we are concerned, and as utility in this class must take the place of order, I

will anticipate, and do Reinsch's test with antimony and mercury so that you may see the difference. I will do precisely the same thing with antimony. Here is the porter, and I add hydrochloric acid, and indeed repeat the process. I ask you to look at the deposit now; you are sometimes told that there is a difference in the appearance; perhaps there is, but you cannot tell that difference, unless you have the two together to compare them side by side. Without this comparison all you know is that you have one or the other there.

I will now go a step further. Here is some perchloride of mercury, porter, hydrochloric acid, and copper strips. This test is very important, and often helps you to a definite result. If you look closely at the copper you will see something white and shiny, which tells the tale; if I rub the copper with the mercury upon it with a cloth I get a mirror-like polish, but if I rub the one with arsenic or antimony I do not get that result. This mirror-like polish is conclusive as to mercury.

It is, of course, possible to apply further tests to the films which we have upon the slips of copper; but the quantities of material upon the films is so small that practically you will find it best to have recourse to the original liquid, and, armed with the knowledge which Reinsch's test has given you, to move in a new direction. Whereas the first part of Reinsch's test is very easy, the further testing of the films is not so easy, and is, indeed, rather confusing.

Marsh's Test.—The moral of this is that when you get a positive result with Reinsch's test in toxicological analysis you have every reason to suppose you have either mercury, arsenic, or antimony present, and with mercury the test is conclusive. My advice is that you then immediately proceed with an organic fluid to do Marsh's test. That consists in the generation of arseniuretted hydrogen. I am accustomed to do Marsh's test both with antimony and arsenic, so that you may compare results.

I have here two Wolff's bottles, the corks of which I carefully examine. The bottles contain zinc and water. I will add sulphuric acid to both to generate hydrogen.

In using Marsh's apparatus you must be careful not to get an explosion. I hold a test-tube over the exit of the Wolff's bottle and then hold it to the flame, and I get a small explosion, which tells me that I have air mixed with my hydrogen. I wait a little, and repeat the trial; the explosive noise is replaced by a slight sound, showing that probably pure hydrogen is being driven off. I now light the gas at the exit of the Wolff's bottles. Next we have to test whether the zinc and the sulphuric acid are pure. I put the back of a white plate in front of each of the flames of the Wolff's bottle and there is no stain; therefore our reagents are pure. I will now add a very small quantity of the mixture of arsenic and porter to one Wolff's bottle, and wash it down with a little water; and similarly I add a little of the mixture of antimony and porter to the other Wolff's bottle. When we add our suspected fluid there is a very great increase of action. I now apply the plate again to the flame, and you will see that the antimonial flame deposits black spots upon the plate immediately, and the arsenical flame gives us brown spots where it impinges.

I have here three arsenical spots and three antimonial spots in parallel rows upon the plate. The first reagent I will apply is a little ammonium sulphide to each. Notice that the antimonial stain is dissolved and the arsenical stain is not. The next reagent we will use is a solution of bleaching powder, which I will add to the portion of each on the plate. The greater part of the arsenical stain is immediately dissolved, and the antimonial stain is not. The third reagent is protochloride of tin, and we note that the solubility of the antimonial stain is greater than that of the arsenical stain. The best test is the bleaching-powder solution.

CHAPTER XII

ANTIMONY—MERCURY

Antimony. — Effects of Antimony — Tartar Emetic — Post-mortem Appearances — Fatal Dose — Treatment — The Bravo Case — Professor Redwood's Analysis of the Vomit, etc.—Dr Payne's Post-mortem Examination—Tests for Antimony.

Mercury.—Effects of Mercury—Symptoms of Poisoning by Mercurial Vapours—Mercurial Tremor — The Case of the ship *Triumph* with a Cargo of Quicksilver — Mercurial Dermatitis — Chronic Mercurialism — Corrosive Sublimate — Reading Case (1845) of Death from Calomel Poisoning — Post-mortem Appearances of Corrosive Sublimate Poisoning—Fatal Dose and Period—Treatment and Tests for Mercury.

Antimony.—The next poison I have to deal with is *antimony*. The effects of antimony are very similar to those of arsenic. Antimony, like arsenic, is an irritant; it is more depressing than arsenic; its depressant effect upon the heart is very great indeed. Like arsenic, when applied externally, it produces a pustular rash, and you will bear in mind that bodies which are able to irritate the skin are very able indeed to irritate the stomach; that goes without saying. Antimony is usually given in the form of tartar emetic—the potassio-tartrate. This potassio-tartrate of antimony is easily soluble in water in poisonous quantities. Antimony is a very powerful emetic, and the consequence is that, if a large dose of antimony is given, the whole of it is often expelled by vomiting, and death consequently does not result. So that it is one of those bodies, which I have quoted as an example, which may

sometimes be an exception to the rule, that the danger of a poison is in proportion to the size of the dose. It is said that, like arsenic and like phosphorus, it tends to produce fatty degeneration, and it is an interesting fact that these three bodies—phosphorus, arsenic, and antimony—all combine with hydrogen, forming phosphuretted hydrogen, arseniuretted hydrogen, and antimoniuretted hydrogen, and that they all seem capable of producing fatty degeneration. But of these three, phosphorus has the greatest power in that direction. The post-mortem signs of antimonial poisoning are those of gastro-enteritis. The fatal dose is very difficult to estimate; one-twelfth grain will act as a sudorific, two grains as an emetic, but the fatal or lethal dose is exceedingly difficult to determine. There is not the slightest reason why you should not use the stomach pump in cases of antimonial poisoning, and wash out the stomach. But you must bear in mind that poisons are sometimes given, not singly, but in company with others; antimony may be given with another poison such as opium, which dulls the sensibility of the stomach and possibly lessens the tendency to vomit. Tannin precipitates the salts of antimony, and solutions containing tannin are therefore recommended; boiled tea, boiled oak bark, or any other body containing tannin may be given. In a trial, of which I shall give you the facts, it was alleged that the antimony was given in some burgundy, and expert evidence was given at the trial that a solution of tartar emetic could not be mixed with burgundy without great danger of the consumer having his attention arrested by the fact, because the tannin in the burgundy would cause a precipitation of the antimony. I have, however, mixed some solution of tartar emetic with rough burgundy without causing any cloudiness of the wine.

The only good case of acute antimonial poisoning which has been before the public of late years was that known at the time as the "Balham Mystery" or the "Bravo case." An inquiry was held concerning the death

of Mr Bravo, barrister, aged thirty, who was living in Balham, and was taken ill on Wednesday, April 18th, 1876, and died on April 21st. When first seen by a medical man at 10.30 on the night of the 18th, he was leaning back in an armchair in his bedroom, perfectly unconscious, and the pulse scarcely perceptible, and the doctor's first notion was that he was suffering from narcotic poisoning. The history given was that after going to his bedroom he was heard to cry out with sudden pain, and that he had vomited after mustard, and the judgment ultimately formed was that he was suffering from an irritant poison. He vomited bloody matter and passed bloody urine, and was in the most excruciating pain. He remained unconscious for about five hours. Sir George Johnson (then Dr Johnson), the first consultant to see him, said that his first impression on seeing the patient was that he had had an epileptic fit, but the bloody vomit soon aroused the suspicion of collapse from irritant poison. It was supposed that the antimony had been given in burgundy, and the witnesses all concurred in the statement that the antimony and burgundy would make a muddy, cloudy mixture, owing to the tannin. He died thirty hours after the dose. Bravo had vomited once out of a window and into a leaden gutter. This vomit was kept separate, and this, as well as other vomit, was analysed by Professor Redwood. In both he found antimony, and in the first lead also, owing to its having been scraped from the leaden gutter. Antimony was also found in the urine, in the intestinal contents, and in the liver. The professor said a man might take thirty or forty grains of tartar emetic in a glass of water without tasting it so forcibly as to make him desist. That is true enough. If a man were to sip his wine he might notice a strange taste, but if he took a draught of it that would not be the case. Thirty or forty grains could easily be got into a glass of liquid, because it is so easily soluble. The post-mortem examination was made by Dr Payne, of St Thomas's Hospital. A toxico-

logical post-mortem made by a trained morbid anatomist is of peculiar value, and Dr Payne stated that "there was no appearance of inflammation, congestion, or ulceration of the stomach. The colour of stomach and intestines was yellowish. At the lower part of the small intestines there were some red spots. The large intestine was of a deep red colour, and contained clots of blood, and there were small ulcers in the cæcum, the probable source of the hæmorrhage. The large intestine was filled with a red material, fæces mixed with blood. All the other organs were healthy. The lungs were congested. All cavities of the heart contained blood." The witness, in answer to questions, stated that the antimony had probably been given in a diluted form, owing to the absence of inflammation of the stomach. The condition of the large intestine and rectum quite bears out what I have said before, that the large intestine is a powerful channel of elimination, and it is very interesting that this man who lived *three days* had practically nothing the matter with the upper part of his alimentary tract, while the lower part of his alimentary tract showed intense inflammation and congestion and hæmorrhage; the same thing is noticeable in mercurial poisoning. The result of this Bravo case was that great suspicion fell upon his wife, but it was never discovered where the antimony was bought, or who bought it, or who gave it, and nobody was put upon trial for the supposed murder. Now comes the explanation. It came out, as an undoubted fact, that Mrs Bravo was a dipsomaniac, and it was said that Bravo had some quack powders for the cure of dipsomania which contained antimony. The explanation of the case ultimately given was this: that for some reason or another Bravo first took opium, and then swallowed the antimonial powder as an emetic. The cause of the comatose state in which he was found was probably opium, while the antimony did not really act until later. At the time, all the papers wrote as if the woman murdered her

husband, and, indeed, the facts looked very black. As a matter of fact, there was no vestige of evidence on that head.

Now, with regard to the reactions for antimony. I have shown you a good many already (see Tests for Arsenic, p. 171). I showed you that antimony, that is to say tartar emetic, is easily soluble; we will dissolve some and heat it over a spirit lamp. You see that nearly the whole of it is dissolved in a very short time. Antimony is much more soluble than arsenic. You proceed with this analysis as you would with any other, and the first reagent you add is hydrochloric acid. That produces a white precipitate. I ask you to remember that, because in your books on qualitative analysis you read of silver, lead, and subsalt of mercury coming down with hydrochloric acid. So does antimony. Antimony, however, is soluble in excess of the acid, while the other three metals are not. I mention that most particularly, because when you are pressed for time and making analyses at your examinations, you add a little hydrochloric acid to a solution of tartar emetic, and you rush to the conclusion that you have silver, lead, or a subsalt of mercury. Remember that antimony is soluble in excess of the acid. When you dilute it again, by pouring into it a large quantity of water, you get a re-precipitation of the antimonial salt. That is a very important matter to remember. The next test is sulphuretted hydrogen. I now add some sulphuretted hydrogen to the original solution, and an orange-yellow precipitate is caused. You see it is dissolved in a large quantity of hot hydrochloric acid, and then, on pouring it into the water, we get the antimonial salt re-precipitated. I have shown you Reinsch's test with copper, and also Marsh's test, and I need not repeat them now.

Mercury.—We now go to another poison, *mercury*. That is one of those things which has been given in the metallic state, in large quantities, without causing any toxic symptoms whatever. In former days it was not uncommon

to give as much as one pound of liquid mercury to overcome intestinal obstruction. When mercury was given in that way it may have done mechanical injury, but it did not produce any toxic symptoms. Mercury is not absorbed unless it is given in a state of very fine subdivision, as in blue pill or grey powder. The vapours of mercury, of course, cause constitutional symptoms—salivation, dysenteric diarrhœa, and swelling of the gums. There is also another constitutional symptom from which workers in mercury suffer, and that is mercurial tremor. Mercurial tremor is getting more and more rare in this country, because mercury is less and less used in the arts. Looking-glasses are no longer silvered with an amalgam of mercury, they are coated by some manipulation with the salts of silver itself. But the making of mirrors with mercurial amalgam was at one time a common cause of mercurial tremor, and some of you may have seen an example of it in an old Italian mirror maker who has been under my care periodically for what is known in the trade as "the trembles." His attacks of tremor were quite characteristic. Sometimes they attacked him in the legs so that he could not walk, and sometimes in the upper limbs so that he could not feed himself. These tremors were coarse tremors, and were quite indistinguishable from the tremors of disseminated sclerosis; that is to say, he was fairly quiet until he tried to pick up something, when he began to shake violently. Therefore it was an "intention tremor." The only way in which the mercurial tremor in the patient I am alluding to differed from the disseminated sclerosis, was that he had had repeated attacks and had got well, whereas disseminated sclerosis is one of those things, the diagnosis of which usually means that the patient's days are numbered. There are several other trades in which mercurial poisoning is common, such as mercury miners, furriers, preservers of dead animals (taxidermists, as they call themselves), and hatters. It is a very dangerous thing when mercury is spilled about a

house or about a ship. In 1809 a remarkable instance of the noxious effects of mercurial vapours was observed in the case of the ship *Triumph*, while conveying a cargo of quicksilver off Cadiz in April 1809. By some accident the leathern bags containing the metal burst, and three tons of quicksilver were dispersed through the vessel. The crew soon began to suffer from salivation, partial paralysis, and disorders of the bowels. In three weeks no fewer than two hundred men were salivated. Two men died from excessive salivation ; one lost some of his teeth, and his cheeks were in a gangrenous condition ; the other lost the whole of his teeth, the greater part of his tongue, and at the time of his death the lower lip was in a state of gangrene. The interior of the ship was covered with a black powder, and the copper bolts were mercurialised. The vapour proved fatal to the animals on board, for nearly all the poultry, sheep, pigs, mice, goats, cats, and dogs, and even the canary bird, died from its effects (Paris and Fonblanque). The poison in this case was not merely the vapour of metallic mercury, but probably in part oxide of mercury produced by oxidation, and diffused as fine dust.

Mercury, like other irritants which I have mentioned, such as antimony and arsenic, is an irritant when applied externally. There is a case on record, a very sad one, in which, to cure an eczematous scalp, a strong solution of perchloride of mercury was applied to the head of a child. Sloughing of the scalp resulted, and the child died of mercurial poisoning. I remember an instance at the hospital, of a patient who, being troubled with pediculi pubis, applied perchloride of mercury, 80 grains to the ounce, with the result that he not only destroyed the pediculi but very nearly destroyed their habitat, root and branch. You may remember that I had under my care in the hospital, a year or so ago, a case of mercurial dysentery which had arisen from the application of solution of perchloride of mercury for an extensive skin disease. Therefore, you must be very careful when you use these

mercurial preparations, whether externally or internally. Chronic mercurialism, like other chronic metallic poisoning, causes anæmia; it causes lassitude, salivation, inflammation of the mucous membranes of the mouth and gums, and tremor. There has also been described "mercurial erethism," in which there is some mental excitement, nervousness, sleeplessness, morbid shyness, and an indisposition to go into society, and which is said to pass off entirely when the effects of the mercury have worn off. I need hardly say mercury is especially dangerous when there is chronic disease of the kidneys. In the old days people were salivated much more than they are at present, and it is said that children have been born of mercurialised mothers with tremor and salivation. I give you that for what it is worth; I should not attach very much importance to it. The most common salt and the most dangerous salt is mercuric chloride, corrosive sublimate. Corrosive sublimate is very easily soluble in water, and also in alcohol and all kinds of spirits. It is said there is a certain amount of toleration for corrosive sublimate, and it is said that in some parts of Asia Minor there are sublimate eaters who take it constantly. It is also said that they use it for very much the same purpose as opium is used in other parts of the world. When corrosive sublimate is given in large quantities, you get the symptoms of acute irritant poisoning, symptoms which are indistinguishable from the symptoms which I read to you in connection with arsenic —intense pain, vomiting, retching, collapse, and so forth; and in corrosive sublimate poisoning the urine is often bloody and albuminous. It causes inflammation of the kidneys if given in large quantities, and, in consequence, the urine is sometimes suppressed.

Other symptoms which I will incidentally mention are, if the patient lives, dysentery and tenesmus. Of course, the dose of mercury which may produce salivation differs enormously, and, if there is any disease of the kidneys, a very small dose is sufficient to give it. I have never seen

a man really salivated in the old-fashioned way but once, and I may tell you how that happened. I was at the time in charge of the Great Eastern steamship, and we had been three months at sea cable-laying, and there had been some want of fresh meat and vegetables amongst the crew. Nothing favours salivation more than a taint of scurvy, and I accidentally gave three grains of calomel to a man who had a scorbutic taint upon him. I remember perfectly well the swelling of his gums, and how he lay in his bunk with tongue swollen, gums swollen, and the saliva running from him in enormous quantity.

It is said by some that salivation is one of those things which may cease and recur. That I think is a very doubtful statement. It may recur if the cause recur, but that it does so without a repetition of the cause I very much doubt. At Reading, in 1845, a man labouring under disease of the kidneys had placed himself in the hands of a quack who promised to cure him. Part of the treatment consisted in the administration of small doses of mercury. Profuse salivation came on, and the patient ultimately died. A coroner's inquest was held, in order to determine whether he had not died from improper treatment. It appeared in evidence that some calomel pills were prescribed, and that, had the prescription been followed, the deceased would have taken no more than six grains in the five days that he was under treatment; but, in consequence of some mistake, he took $11\frac{1}{4}$ grains, *i.e.*, $2\frac{1}{4}$ grains daily for five days. On an inspection of the body, the gums were found ulcerated, and the mucous membrane of the tongue, mouth, and throat was in a state of intense inflammation. Both kidneys were enlarged and in a diseased state. After hearing the evidence of several medical witnesses, the jury returned a verdict that the deceased died from natural causes. Mercury and quacks are both things which exist in nature, and I suppose the verdict, if we look at it philosophically, was a correct one.

In poisoning with corrosive sublimate, you find post-

mortem inflammation, softening, and erosion of the stomach; and it is exceedingly common to find a great deal of blackening, probably owing to the fact that the intestines get covered with mercuric sulphide. The large intestine as well as the stomach gets coated with a black deposit; the kidneys are inflamed very often as a result of giving mercury, and there is one case on record of perforation of the stomach from a large dose of corrosive sublimate. Three grains of corrosive sublimate are said to have killed a child, and five or six grains have killed an adult. Recovery, however, has taken place after thirty or forty grains. In these poisons which cause vomiting, the lethal dose is very difficult to fix. The shortest fatal period on record appears to be three and a quarter hours; on the other hand life may be prolonged for some time after a dose of corrosive sublimate has been taken.

Now, the treatment of corrosive sublimate poisoning undoubtedly would be the stomach-pump; and one of the best antidotes you can give is white of egg. I have here some white of egg in water, and to it I will add a little solution of corrosive sublimate. When I do so you will notice there is immediate clotting.

I will now show you the reactions for mercury. You will remember that with Reinsch's test the beer containing mercury gave a mirror-like deposit upon the copper. I now put a solution of perchloride of mercury into this beer, and we will imagine we have done Reinsch's test and got a mirror of mercury. We add some hydrochloric acid, and pour a drop of the solution on to a sovereign, and touch the sovereign through the solution with a piece of metal, such as a key; and in that way you may get the sovereign coated with mercury. That is a very useful test, and a perfectly certain one. If you have not got a sovereign, a penny will do. Of course, by heating the sovereign you can get rid of the mercurial stain.

With regard to the liquid tests for mercury, confirmatory tests only, I begin in the usual way with hydrochloric

acid and get a negative result. Next, with sulphuretted hydrogen, you get precipitation of sulphur, and after a time, if you use enough, you get a yellow precipitate which turns black. I will now go on and use ammonium sulphide when I get a black precipitate. If you want a confirmatory test, one of the best you can use is potassium iodide, which gives you a red precipitate. Therefore, we have no doubt that we have a persalt of mercury. Now take the subsalt of mercury (the mercurous nitrate), add hydrochloric acid, and you get a white precipitate. You want to know what that precipitate is, and you add ammonia. If it is silver it will be dissolved, but being mercury, we see it is blackened. You have to remember that when you have given white of egg to your patient in order to cause coagulation of the albumen, you have got in the stomach an albuminate of mercury, and that that albuminate of mercury may be digested and absorbed, and having given the white of egg it is none the less incumbent upon you to get that white of egg out of the patient's stomach as quickly as possible by washing out the stomach and by giving a purgative.

CHAPTER XIII

ZINC, COPPER, LEAD, ETC.

Zinc.—Zinc Sulphate—Zinc Chloride—Treatment of Zinc Poisoning—Tests.

Copper.—Copper Sulphate—Copper Poisoning—Effects of Copper Coins on the Ostrich — Workers in Copper — Brassfounders' Ague—Tests for Copper.

Lead.—Lead Poisoning—Criminal Poisoning by Sugar of Lead: Case of *Regina* v. *Taylor*—Symptoms—Analysis of the Viscera—Fatal Dose—Chronic Lead Poisoning—François Citois—Colica Pictonum—Huxham—Sir George Baker—The Devonshire Colic—Drinking Waters and Lead—The Old "Bills of Mortality," and "Griping in the Guts"—Symptoms of Chronic Lead Poisoning—Gout—Renal Inadequacy—Lead, Gout, and Beer—Symptoms—Treatment — Precaution — Teetotalism for Lead Workers—Detection of Lead.

Iron, Bismuth, and Silver.—Potassium Bichromate—Precaution in applying Solid Nitrate of Silver to Throat.

Zinc.—The next poison which will receive our attention is *zinc.* The sulphate of zinc is an emetic, and toleration for it is soon established. When sulphate of zinc was given in big doses, as it was at one time for whooping-cough, children soon became able to take very large quantities.

Chloride of zinc is an irritant poison, and it is of importance because it is antiseptic and disinfectant. It is a constituent of Burnett's disinfecting fluid. For salts of zinc the best treatment is the stomach-pump, albuminous fluids, such as milk and the white of an egg. The characteristic test for salts of zinc is that they give a white precipitate with sulphuretted hydrogen and

ammonium sulphide in neutral solutions, and also a white precipitate with ferro-cyanide of potassium.

Copper.—Copper is the next substance. All the salts of copper are poisonous, and the sulphate (or blue vitriol) and the acetate or verdigris may give rise to acute poisoning. Here, again, it is interesting to bear in mind that the poisons we have hitherto been dealing with are all irritants externally. Arsenical paste and tartar emetic ointment are used as irritants, and mercurial preparations are intensely irritant when applied externally. Again, the chloride of zinc paste is a caustic which is sometimes used for external applications.

Now sulphate of copper, or "blue stone," used to be employed very largely externally, and, together with nitrate of silver, was a favourite application for getting rid of what used to be called "proud flesh," that is to say, unwholesome granulations. You who live in the days of asepsis and antisepsis do not know so much about "proud flesh" as the student of some years ago, when nobody used to be without a stick of nitrate of silver. Either nitrate of silver or sulphate of copper used to be in constant requisition, and they were used as antiseptics before they were known to be such.

Sulphate of copper in large doses is an irritant, and it is one of those things which may be used as an emetic. It produces a metallic taste in the mouth, burning, vomiting, purging, tenesmus, and, in large quantities, it causes collapse, convulsions, and so forth. With copper poisoning of this kind the vomit is often green. Is there such a thing as chronic copper poisoning? Well, opinions seem to differ very much. The best evidence we have on the subject is that of Dr Thomas Oliver, of Newcastle-on-Tyne, who says that copper has apparently none of the serious effects upon work-people that lead and arsenic have, but symptoms generally appear if the copper is combined with zinc, as in brass-moulding. Experiments rather point to the harmlessness of copper, but here again

you must remember we have trade interests to deal with. A great many articles of diet have been sent to this country at one time or another which have been tinged with the salts of copper to give them a good colour, to make them more saleable, but the green of copper is not really the green of the natural vegetable, and I think any practised eye can at once tell the difference. In all the best kitchens, copper utensils are used exclusively; a really first-rate cook will use nothing else. They are used because they are easily cleaned, and because they are excellent conductors of heat, and because, I take it, they are very durable. It is therefore obvious that in an ordinary way no harm can come from the process of cooking in copper. But occasionally harm has come, and when things have been put aside in copper vessels, such things as preserves or soup, and allowed to go acid and ferment in copper vessels, then harm appears to have arisen, and those who have partaken of the food have suffered from gastric trouble. But here, again, we come to a little difficulty, because we must necessarily be in doubt, after soup has been allowed to go sour, and probably in a dirty place, whether the poison is in the copper, or is an organic poison, or ptomaine brewed by a micro-organism which has caused an unwholesome fermentation in the food itself. Our knowledge of ptomaines and fermentation has somewhat altered the point of view which we may hitherto have taken with regard to the danger of copper. I should say that copper is not good for human beings, and it does not appear to be good for ostriches. I have here some copper coins, which were given me by the late Professor Garrod, who was the prosector of the Zoological Gardens. They came out of the crop of an ostrich whom the British public fed on coins of the realm. Professor Garrod told me that the animal first exhibited symptoms of partial paralysis, and was, in consequence, constantly stumbling and falling. In two months time it took to the sitting position, and would not get up. Shortly after this it died.

It suffered from great irritation of the skin of the head, and was perpetually scratching itself. Its appetite was reduced, and during the latter part of its life it would not take any food. Fifteen coins were found, post-mortem, in the stomach, and four in the cæcum, together with about a gallon of stones. You may see, as you look at these coins, that on some you can just see the faint outline of the Queen's head. And what is interesting about these coins is that, in their final stage of digestion, they were all reduced to the form of spherical triangles. I have traced an outline of them on the paper I pass round. You will say, "If copper can kill an ostrich it can kill anything." But evidence that the animal really died of copper poisoning is not obtainable; I take it that was not the first ostrich in the Zoological Gardens which had been fed upon copper coins.

To come back to our point, the evidence of the toxic effects of copper is not very strong. Some years ago I was at the Charing Cross Hospital (before I became attached to University College), and close to Charing Cross there was a great factory of copper utensils. A large number of the men used to come to the hospital for various minor ailments, and I have often seen them. I have seen the margin of the gums round the teeth tinged green; I have seen them with the green salts of copper under their nails, and I have seen them looking quite ill; but I never learned, nor did anybody else learn, to recognise any particular set of symptoms connected with their occupation. Professor Oliver mentions that brass-founders, men who work with the combination of metals, get a sort of ague. This "brassfounders' ague" occurs in this way. In making brass, copper, zinc and some quantities of lead and tin are melted together; and it is during the act of pouring these compounds into moulds that it deflagrates, and a dense white cloud fills the atmosphere, and collects on the rafters of the building, where it forms an incrustation. In brassfounders'

ague, which seems to be a recognised disease, the patient is said to be cold, collapsed, and shivering, but the hot sweats and stages of true ague are absent. It is mainly new workers in brass foundries who suffer. That does not implicate copper very strongly.

All the salts of copper are coloured, therefore a colourless solution cannot contain a copper salt. I put solution of copper sulphate into three test-tubes. If you put a bright needle into it the needle will get coated with copper. With ammonium sulphide you get a deepish red, almost black precipitate; the confirmatory liquid test is ferro-cyanide of potassium, which gives you a reddish-brown precipitate. Another confirmatory test, and the best, is ammonia. You see that with small quantities of ammonia you get a bluish-white precipitate, which is quickly redissolved in excess, giving a deep blue liquid.

Lead.—Now we come to a more important poison, from many points of view, namely, *lead.* Lead is very extensively used in the arts and manufactures, and chronic lead poisoning is of very great importance indeed. Acute lead poisoning is very rare, and criminal lead poisoning is exceedingly rare. There is a case recorded of a drummer in the army who, by accident, took a large quantity of what is called "Goulard's extract," that is to say, acetate of lead, and he, in consequence, suffered from acute irritant poisoning. Metallic lead is very doubtfully poisonous. I remember, some years ago, being at the Clinical Society one night, and hearing the late Mr Hulke say that he knew in the country a gamekeeper who was troubled with dyspeptic symptoms, which the poor are very apt to speak of as the "rising of the lights" (*i.e.*, flatulence). It was in the days of muzzle-loading guns, etc., and when the gamekeeper was troubled with this "rising of the lights," he took a charge of shot internally to keep them down. He appeared to have taken charges

of shot medicinally, and never to have come to any harm. That is quite on all fours with the fact that the large doses of mercury are innocuous.

I have only one case of criminal poisoning from lead, and it is a very interesting one, namely, *Regina* v. *Taylor*. Louisa Jane Taylor, aged thirty-six, was convicted at the Central Criminal Court, before Mr Justice Steven, of the murder of Mary Anne Tregillis with sugar of lead. The deceased was eighty-one years of age, and lived with her husband, a naval pensioner, aged eighty-five, at Plumstead, near Woolwich. Early in August 1881, the prisoner came to live with the Tregillises, and slept in the room with the deceased. After this Mrs Tregillis fell ill. She complained of being sick, and that "her throat burnt like a hot coal." She only complained of pain when medicine was given her by the prisoner, and was more sick at night than in the day-time. About a fortnight before deceased died it was noticed, both by her husband and a neighbour, that her teeth had turned black. On October 1st the deceased had an attack of convulsions, and one or two attacks subsequently. She also had tremor of the hands. She lost her speech on October 20th, and died on the 23rd. It was proved that between August and the time of the deceased's death, the prisoner had on three several occasions purchased an ounce of sugar of lead. The deceased, in a "dying declaration," had asserted that the prisoner was in the habit of mixing a white powder with the medicine which the doctor ordered for her, and that it was after taking medicine thus treated that her sufferings increased. The medical evidence went to show that deceased became ill on or about August 23rd with sickness, shiverings, perspiration, and abdominal tenderness. Her skin was sallow, her teeth black, and there developed a characteristic blue line on the gums. *Seventeen* days before deceased died the prisoner *ceased* to attend upon her, and a few days before death the deceased had an ordinary hemiplegic attack, which it was not alleged was

due to lead poisoning. Dr Stevenson, on analysis, found distinct evidence of lead in the liver, spleen, kidneys, stomach, and brain. The drinking water of the house contained no lead. No mention was made in the evidence (as reported in the *Times*) of the coarse lesions (if any) which produced the hemiplegia. The motive alleged for the crime was the desire on the part of the prisoner to succeed the deceased as the wife of Tregillis, and thus enjoy with him (aged eighty-five) the pension of £40 a year, which he was receiving from the Admiralty. The defence was that the lead had been administered by the husband, and not by the prisoner, and the prisoner's possession of the lead was accounted for by the alleged necessity which she had of using a vaginal injection made of lead. The defence was a flimsy one, and there can be no doubt that Taylor attempted to compass the death of old Mrs Tregillis. What was the actual cause of death is not so certain. The deceased was eighty-two, and she had an attack of ordinary hemiplegia shortly before death, and she had not had any poison given to her for seventeen days previous to her decease. The fatal dose in cases of acute poisoning can hardly be said to be known. Some have suffered only slightly after an ounce, and several cases of recovery after this dose are on record. There were no signs of corrosion or irritation post-mortem, and almost the only symptoms of chronic lead poisoning at the time of death was the blue line on the gums. The very marked blackening of the teeth, which was noticed by those in attendance on Mrs Tregillis, may, no doubt, be accounted for on the supposition that she never cleaned her teeth, and that they became coated with lead sulphide; but, nevertheless, it is not among the ordinary symptoms of lead poisoning. The blue line round the edges of dirty teeth is due to the deposition of lead sulphide in the tissues of the gums. Old Mrs Tregillis's death was probably hastened by the administration of the lead, but this is more a probability than a proved fact. The conviction of this

woman for murder was a very interesting thing. The sentence was not carried out.

Much more important than acute lead poisoning is chronic lead poisoning. Chronic lead poisoning has played a very important part in many diseases which for a long time were not suspected to be due to lead. In 1617, François Citois, the physician of Cardinal Richelieu, published an essay on the "Colica Pictonum," or the Colic of the Pictones or dwellers round Poitiers. I mention this because I see it sometimes written colica pictonum, or "painter's colic." There were scattered about the world what were known as endemial colics, and Devonshire suffered from an endemial colic. Among the earliest writings upon it is an article by Huxham in 1739, who wrote an essay called "De morbo colico Damnoniorum." Huxham's pathology is so interesting that I will read it to you. "By long and frequent drinking of liquor of this kind (cider), such a quantity of crude gross tartar is thrown into the blood that it thence becomes very acrid, and not only the blood but from that impure source all the humours thence secreted, so that instead of a very soft lubricating mucus separated by the glands discovered by Dr Havers, we have as it were a sharp coagulated matter, whence arises great pain in the joints and impotence of their motion. Instead of an exceedingly soft lymph to moisten the nerves, a corrosive ichor, and hence epileptical attacks. At length even the very bile, that variously useful balsam of the body, becomes corrupted and quite enervated by the superabundant apple acid, though in its natural state it was designed to correct acidity." That was Huxham's pathology of the Devonshire colic of 1739. In the same way one finds accounts of endemial colics in Spain; and in some regions of central America and the West Indies there was known a disease called the "dry belly-ache" of the West Indies, which was ultimately found to be due to nothing but that the people drank rum which had been brought somehow into contact with

lead in the process of manufacture. These endemial colics were numerous, and the man who first made out that these colics were due to lead, and that they were preventable, is deserving of the highest honour. Sir George Baker read to the College of Physicians on June 29th, 1767, "An Essay concerning the Endemial Colic of Devonshire." Baker went into the whole matter. He showed that in Devonshire colic was common, while in the neighbouring cider counties of Gloucester and Hereford and Somerset colic was rare. He set himself to show why it was common in Devonshire and not in the adjoining counties. After investigation he found that the cause was lead. From eighteen bottles of Devonshire cider in his own cellar he produced some metallic lead and brought it before the College of Physicians. Then he went on to show that the cider presses of Devonshire were clamped together with lead, while the cider presses in the neighbouring counties were of a different pattern, and lead was not used in them. Baker's discovery was soon applied to the elucidation of other endemial colics, and led to their gradual disappearance. But chronic lead poisoning is still fairly common, and we often have patients in the hospital suffering from it. I have one very typical case in my wards at the present time. The cause of lead poisoning is usually to be found in the impregnation with lead salts of articles of diet. The most common thing in which it is found is water, particularly soft waters, rain-waters kept in lead tanks. Publicans who have drunk beer drawn from leaden beer engines, especially when the beer has been lying in contact with the leaden pipes, have been known to suffer from lead poisoning. I need hardly mention that lead poisoning is very common among those who work with lead dust — white lead makers, painters, plumbers, colour grinders, and so forth. It is said that the glazed linings of hats have contained lead, and that hair dyes have contained lead. Certainly one hair dye, which I used to keep here, consisted of flowers

of sulphur and acetate of lead mixed. People have suffered from lead poisoning from taking snuff, the snuff having been adulterated with red lead. Bloater paste has similarly been adulterated with red lead. The glazing of pottery contains lead, and it is said that actors who use cosmetics and face paints in which lead enters, have suffered from lead poisoning. In fact, provided the intaking of lead be constant, there seems to be no quantity too small to produce poisoning.

There are many insidious ways in which lead poisoning may take place. File-makers are said to be liable to lead poisoning from striking incessantly upon lead cushions. Tea may be contaminated by so-called tin-foil, which is mainly lead. I knew an instance of a country practitioner who was confronted in his district with several cases of chronic lead poisoning, and he could not make out for a long time what was the cause. At last he thought he detected the cause in certain packets of tea, and on analysing this tea, or getting it analysed, a very minute quantity of lead was found. This practitioner wrote to the local papers, and he also wrote to the *Lancet*. Whereupon the tea dealers threatened him with an action, and he had to pay handsomely. That must be a warning to you to be sure of your ground before you take any public action of that kind. The proper course would have been, I think, either to have communicated with the sanitary authorities confidentially, or have written confidentially to the tea dealers, stating his suspicions, and asking them to direct attention to the matter. But, when, on the analysis of a packet or two, he wrote condemning the whole of the tea sold by a big company, of course he put himself wrong. It was very public-spirited of him, but you must be very cautious how you take steps of that kind. Now, just a word as to how water becomes contaminated with lead. I think the best thing to say is that our knowledge is incomplete. It is certain that

some waters are but little affected by lead; and it is certain that other waters are very easily affected by lead. Taking the matter broadly, we should say that hard waters, waters which contain a great deal of dissolved matter, especially lime and especially carbonates and sulphates, do not act upon lead, but that soft waters do act upon lead. But there is something more than that. In Glasgow they have a most exquisitely soft water from Loch Katrine. I believe the amount of dissolved matter in the Glasgow water is smaller than in any other town in the three countries; and I fancy I am right in saying that lead poisoning in Glasgow has been exceedingly rare, and that I am also right in saying that they are very careful in Glasgow about their lead fittings. But, of course, in a huge city like that, care is not universal. Still, the Loch Katrine water does not seem to act very potently upon lead. On the other hand, some of the waters obtained by the Yorkshire towns, particularly from off the moors, do act very actively upon lead, and the cause of that is said to be the acid in the water, the acids being found in the peaty soils, which serve as gathering ground for the water. It is now recognised, therefore, that these peaty waters are dangerous to lead. Still, one would imagine that the gathering ground for the water of Loch Katrine must likewise be peaty; and I think the difference must be found in the fact that, somehow or other, in the huge settling reservoir which Loch Katrine is, a change takes place which makes the water safe.

One of the most notable instances of lead poisoning in this country, and one which caused a great deal of excitement, was the poisoning of the French Royal family, who were then staying at Claremont; the water at Claremont in those days was got from sandy soil, and was soft. The whole household suffered from lead poisoning because the water acted upon the lead fittings

It is probable also that impure waters act upon lead. In the old "Bills of Mortality" for London, which were collected by the parish clerks in the sixteenth and seventeenth centuries, the causes of death are very odd, we do not quite know what some of them mean. For instance, a considerable number of people in old London were "planet struck," but they do not say what it means, or what planet it was that struck them. You will notice that a very common cause of death in these records was "griping in the guts," which, in those days, was a sufficient cause of death to put in a death certificate. "Griping in the guts" is common from a variety of causes, but one cannot but suspect that the old water conduits, which were of lead, were answerable to no small extent.

Lead has been used in medicine very largely as an antiseptic, and as a styptic it has been given for internal hæmorrhages, and it has been applied externally in various forms as a lotion. I think there can be no doubt that lead produces a contraction of the muscular coat of the small vessels and arterioles. When a person takes small quantities of lead, one of the first things he suffers from is pallor of countenance, and there is nothing more remarkable in the effects produced than the anæmia. The patients have a muddy, sallow complexion, which is sometimes called saturnine, and this yellowish complexion is especially marked in a patient whom I have now under my care in Ward 8. The next thing from which a patient suffers who is taking lead is constipation, and the constipation is due to the contraction of the muscular coat of the bowels. It is said that that contraction may be so marked in some of these cases as practically to obliterate the lumen of the bowel altogether. When a patient has lead colic, the abdomen is retracted because the bowels are all contracted, and therefore occupy a smaller space than normally is the case, and it is this boat-shaped hollow abdomen that often helps you in the diagnosis of lead

colic or painter's colic, as it is very often called. Thus you get constipation, pallor, and diminution of the red blood corpuscles; later, with the contraction of the arterioles, there is a degeneration in many organs, and workers in lead eventually get, almost to a certainty, some fibrosis of the kidney, which latter is one of the commonest things in lead poisoning, and, of course, checks elimination. Now, with contraction of the arterioles, and with obstinate constipation and contraction of the intestines, and chronic fibrosis setting in in the kidney, it is obvious that one of the reasons why lead poisoning is so excessively insidious, is that the channels of elimination are blocked, and it is just precisely because you take into your system a poison which sets to work to block the channels of elimination, that the effect of the lead is markedly cumulative. A person suffering from lead poisoning has generally a low temperature and a slow pulse, and very commonly he has a blue line on the gums. This blue line is well marked in the patient now under my care, whom I have mentioned. The blue line upon the gums requires a little attention. It is a thin line of blackish blue close to the margin of the gums. It only occurs where the teeth are present; where the teeth are gone there is no blue line, even though the person be saturated with lead. The blue line is said to be caused by a precipitation of lead sulphide in the tissues at the margin of the gum, and the lead sulphide is said to be formed by the hydrogen sulphide, which is brewed by the decomposition of the albuminous food collected round the edges of dirty teeth. I mention this because, supposing you get a person whose teeth are very carefully kept, and in good order—a rare condition—you find there is no blue line. It is very important to recollect that you may have lead poisoning and no blue line.

I mentioned that lead checks elimination, and that leads me to speak of another symptom which is common in lead poisoning. A sufferer from chronic lead poisoning

is very frequently a sufferer from gout, and it was pointed out in our hospital over the way by Sir Alfred Garrod, that if to gouty patients you administer a very small quantity of lead acetate, a gouty paroxysm almost inevitably results, and gout, I take it, is, broadly speaking, due to the fact that a person's dietetic and metabolic accounts do not balance, that is, that the intake is rather greater than the output. If you have a man with good health, good appetite, and healthy gastric juice, good villi to absorb the food, and a healthy liver to deal with it, and if you suddenly check the elimination, that man runs a great risk of a gouty paroxysm. In discussing gout, too much is made of uric acid, which, I believe, is only an accidental circumstance, valuable as showing you what is happening; but you must not pay too much attention to it; I myself believe the amount of notice it receives is most unscientific. The gouty are divisible into two classes: (1) the class who become gouty because they have got very powerful primary digestion, with a perennial appetite and perennial thirst, and (2) the man who becomes gouty not so much because he can absorb this or the other, but because he cannot eliminate. The late Sir Andrew Clark used the expression, and a good practical expression it was, that there was a large number of people who suffered from "renal inadequacy"; that is to say, they were perfectly happy so long as they did not exceed at table either in eating or drinking, but directly they took liberties, and tried to do what others did, they got gouty symptoms, because there was renal inadequacy. And you will find people with no other sign of disease, except that they pass urine of rather low specific gravity, and probably a certain number of these may have granular kidney forming. But the point I wish to emphasise is that the gouty have to be divided into two classes.

Now, the plumbic gouty person, the saturnine gouty person, is generally of the latter class. He becomes gouty because he fails to eliminate, not because he sometimes

absorbs too much. The reason why the administration of acetate of lead brings on a paroxysm in a gouty person, is that it instantly checks elimination. Take a gouty man, who is a stout, rubicund, jolly person, and suddenly check the action of his kidneys, and let his habitually freely-acting bowels become constipated. His perennial smile disappears, the angles of his mouth are drawn down, he feels miserable; perhaps he beats his wife, and then his big toe swells in the middle of the night. You have to remember that the overloading of the organism with the products of nitrogenous metabolism has a very powerful effect upon the nervous system.

I think we can now come back to lead poisoning, a little bit better able to understand some of the troubles. One of the common troubles mentioned in books as occurring in chronic lead poisoning is *arthralgia*—pain in the joints, and these pains in the joints are probably resolvable into gouty pains, and pains due to nerve disturbance, to neuritis, and, possibly, to changes in the central nervous system and in the spinal cord, which not infrequently is the seat of sclerosis. Now, just as you get fibrosis of the kidney, so in chronic lead poisoning you get fibrosis of the other tissues—fibrosis affecting the spinal cord, the liver, and other organs and tissues of the body. One of the other symptoms of lead poisoning is paralysis, and in its typical form this paralysis is known as "wrist-drop." For instance, a painter suffering from lead poisoning cannot use his brush, and it is due mainly to paralysis of the muscles supplied by the posterior interosseous nerve, that is to say, the extensors of the wrist and fingers. As a rule, the supinator longus escapes. In a person who has suffered for some time from wrist-drop, the muscles rapidly degenerate, and give the reactions of degeneration. But I would warn you that a person suffering from chronic lead poisoning may be almost entirely paralysed, that is to say he may be absolutely paretic everywhere, and there may not be a muscle in his body that acts properly. After the

wrists, the most common muscles to be affected are the deltoids. Last year I had a man under my care who had not a sound muscle in his body, and some were very much wasted. He had also a singular lack of expression, not from absolute paralysis of facial muscles, but from a paretic condition, and his voice was very imperfect and toneless, because he had paralysis, or want of adducting power, in his vocal cords. In certain forms of lead poisoning there are head symptoms and insensibility called *encephalopathy*. I do not know whether that word is of much use to you, but coma and convulsions do occur, and the question is whether these coma and convulsions are secondary to a granular contracted kidney, or due to primary intoxication by the lead itself. In some lead factories, especially in the north, and especially with women, the action of the lead-laden atmosphere is what one might call fulminant, and the patients are taken suddenly with convulsions, and very often die rapidly. If pregnant, they usually abort. In this part of the country we are unacquainted with lead poisoning of that kind, but I quote Dr Thomas Oliver, whose services in the investigation of industrial diseases we must all gratefully acknowledge.

Another trouble not very common is *amaurosis;* that is generally due to retinal degeneration and optic neuritis. Now, there is one peculiarity about lead poisoning, and it is this: that true gout is much more common among lead-workers in the south than in the north; and while gout is common amongst plumbers and lead-workers in England, it was said to be practically unknown in Scotland—Edinburgh and Glasgow—and the reason given used to be that whereas the English plumber soaked himself in beer, the Scottish plumber soaked himself in whisky; and it was said the whisky drinker, for some reason or other, escaped the gout. Whatever the explanation may be, that explanation which I have just mentioned is apparently not true, and Dr Thomas Oliver points out that the Newcastle worker and the workers in lead on the Tyneside are by no

means deficient in their attention to the national beverage, beer, but they do not get gout. And I think Oliver is of opinion, an opinion which seems reasonable, that the size of the towns has something to do with it. There is no doubt whatever that whether you get gout or not very much depends upon how you are circumstanced. A man who lives in the fresh air, and who is engaged in active exercises, and can hunt, and so on, runs very much less risk of gout than a person who is cooped up in the centre of a very big city, to get to the outskirts of which involves a journey, the expense of which is, perhaps, too great for an artisan. The occurrence of gout in London, and its comparative non-occurrence in other places, may be due to that fact. However, the fact remains that gout is much more common in the south than in the north. A worker in lead gets granular contracted kidney, and, of course, high arterial tension and hypertrophy of the heart. Now, the point I should like to ask you, or which you would ask me, is, "What quantity of lead is necessary to give a man chronic lead poisoning?" I should answer that question in this way: That if the lead be detectable, in however small a quantity, in anything which the man is taking habitually, such as water, he certainly runs a risk of getting chronic lead poisoning; and if you were to say in any case that the amount is so small that it may be neglected, I feel sure you would be giving wrong advice. However small the quantity of lead detected, you ought not to allow the person to go on taking it.

Next, as to the treatment of lead poisoning. Of course, in acute cases, you give emetics, purgatives, and albuminous fluids. Now, as to chronic lead poisoning. The most important thing, much more important than treatment, is the prevention of lead poisoning, by preventing the person taking any lead into his stomach or into his lungs. In order to prevent lead poisoning, two things are necessary: thorough ventilation of the factory, and absolute cleanliness on the part of the worker. It

was said that lead poisoning was much more common in London than in smaller towns, especially the Scotch towns, and one of the explanations originally offered was that the Scotch artisan, the town in which he worked being comparatively small, went home to his dinner, and ate it in civilised fashion, that is to say, after he had washed his hands, and so forth, while the London artisan, being at a distance from his home, was obliged to take his dinner very often with dirty hands, and, under these circumstances, the dinner is generally eaten in the fingers. One need hardly say that a man engaged in lead ought to be exceedingly careful about personal cleanliness. He ought always to wear a complete suit of washable overalls, and, of course, he ought to wash every part of his body daily, including the head and hair and whiskers. That, I think, is not an unimportant matter. If a man is working in a dusty atmosphere, should he or should he not wear a moustache? Now, a moustache is a natural respirator, and tends to stop the inhalation of lead particles. On the other hand it is likely that particles get caught in the moustache, and if he sucks the end of it, as so many do, he may constantly be taking lead into his system in that way. I should be inclined to say that a lead-worker should be clean-shaved. These points are not by any means trifling, but are of great importance to the artisan. If a man inhabits a dirty suit of clothes until they drop off him, as some do, I think he has nobody but himself to thank if he gets lead poisoning. Another point is that if a man is working in lead (and in this I quite agree with Dr Oliver), he should be a teetotaler; absolute abstention from alcoholic drinks is, for a lead-worker, most desirable. If a man is in the habit of drinking beer, and overtaxing his kidneys, he is very likely to get fibrosis of the kidney, and to suffer from lead poisoning severely. In places where lead salts are manufactured, if you use wet methods of manufacture instead of dry, dusty, and powdery ones, of course the prevention of lead poisoning is thereby favoured. The

theory has been put forward that workers in lead should quench their thirst with acid drink into which sulphuric acid enters. Well, I do not at all agree with that. It is said that sulphate of lead is insoluble; so it is, *in water*, but things which are insoluble in water are perfectly soluble in the alimentary tract; and it is said that lead poisoning has occurred amongst seamstresses from sucking the ends of cotton which has been loaded with lead sulphate, lead sulphate being one of the things with which cotton is adulterated to give it weight. But sulphuric acid is a very constipating substance, and to give people drinks containing it seems to me a risky mode of treatment. But it is not of much use discussing the question, because I am told that where this sulphuric acid lemonade has been provided, the people will not drink it. To treat cases of lead poisoning, we must find out the source of the lead, and cut that off. Lead poisoning has been treated from all time by hot baths, notably at the thermal springs at Bath, and by sulphur baths, especially sulphur baths in high situations, such as in the Pyrenees. This locality has a great reputation for the treatment of cases of lead paralysis. I need not go into the other question of treatment of the muscles by massage, and so forth.

Next, as to the detection of lead. Now, acetate of lead is one of those things which you may have to detect, and you may have it given to you in the form of a white powder, and perhaps mixed with such a thing as flour. I want to give you just one word of caution here as to dealing with bodies which are given you mixed with starchy materials. I have here some wheat flour, and I will add to it some acetate of lead. Probably you know what it is by the smell, as most starchy things have a slight smell. We proceed in the ordinary way by putting some on platinum foil. In the powder which I have here you can see a few little shiny particles. It does not melt, and, of course, it chars, from which fact I simply know that I have some organic matter. Now, I will take some

of the pure acetate of lead, and you see it melts and inflames, and leaves a yellow lead oxide upon the foil. The next point I want to direct your attention to is this. When you have a powder like this to examine, you must be careful, first of all, to extract it with a little *cold* water; do not make the fatal error of boiling it, because, if you do, you cannot filter it, and you are thwarted. I have known men take hold of a powder of this kind and boil it. Acetate of lead is very soluble, and I shall be able to get it out from the starch rapidly. I have now got my clear solution, and the first thing I will add is hydrochloric acid. With that I get a white precipitate; I add more hydrochloric acid, and it does not dissolve, so that this powder, which contains carbon, is not tartar emetic. You will remember how the antimony salt behaved—on the addition of excess of hydrochloric acid we got it dissolved. We will now add some more water, and boil over the spirit lamp; you see the precipitate caused by the hydrochloric acid is redissolved in a large quantity of hot water. Now, I want a confirmatory test, and I therefore put a little into three test-tubes; add sulphuretted hydrogen in liberal quantity, and I get a brown coloration. Ammonium sulphide gives me a black precipitate instantly, and potassium iodide a yellow precipitate.

Iron, Bismuth, and Silver.—There are other metallic salts besides those I have mentioned which are irritant. The salts of *iron* are sometimes irritant when taken in large quantities, especially the sulphate of iron. *Bismuth* is another substance which is sometimes irritant, and it has caused irritant symptoms when taken in large quantities. The irritation is said to be due, as a rule, to the adulteration of it with arsenic or some other metals. *Potassium bichromate* is also a caustic and strong irritant. Another one which must be mentioned is *silver nitrate.* Silver nitrate, as you know, is a caustic and irritant, and the danger of it depends very much on the degree of concentration, as with other irritant poisons. The danger

of dropping a little solid nitrate of silver down a man's pharynx would be very great indeed, and that is an accident which has happened. I would, therefore, caution you to be exceedingly careful when you are applying any caustic to a patient's throat. Nitrate of silver coagulates albumin, and albuminous liquids are probably the best antidotes. We hear sometimes of chronic silver poisoning. I say *hear*, because I have never seen a case. If given for long, silver is said to colour the skin brown, bluish-grey, or black, and in the old days, when nitrate of silver was a favourite remedy for epilepsy, and when epileptics accordingly took small quantities for weeks, months, and even years, I believe there were some few cases in which the body became profoundly tinged.

CHAPTER XIV

VEGETABLE AND ANIMAL IRRITANTS

Euphorbiaceæ.—Croton Oil—Castor Oil—Euphorbium Officinarum—Jatropha Manihot—Euphorbium Lathyris—Mercurialis Perennis.
Coniferæ.—Turpentine—Savin—Case of *Regina* v. *Pascoe*: Savin used as an Abortifacient—Post-mortem Appearances—Yew.
Colchicum.—Symptoms of Colchicum Poisoning—Colchicin—Veratrum.
Ranunculaceæ.—Hellebores—Podophyllin.
Cucurbitaceæ.—Elaterium—Colocynth—Bryonia.
Fungi.—Ergot—Its Physiological Effects—Forms and Symptoms of Ergotism—Mushrooms—Edible and Poisonous Mushrooms—Agaricus Campestris—Boletus—Amanita Muscaria—Muscarine—Poisoning by Fungi in England.
Cantharides—Symptoms of Cantharides Poisoning.

Euphorbiaceæ.—Now, proceeding with the irritant poisons, I shall pass lightly in review some of the common *vegetable irritants.* I shall hope to be able to show you some of the indigenous irritants and other poisons in the course of a few days. It is easy to get the whole of them together, but it is not easy to get on a particular day the plant with which I happen to be dealing. Many of the irritant poisons are used in medicine, and I suppose we must take them in some kind of order. We will begin with the plants belonging to the natural order, *Euphorbiaceæ.* I have upon the screen a picture of a moderately common euphorbium—the euphorbium lathyris. The euphorbiaceous plants have this peculiarity,

that the flowers are unisexual, the male and female flowers grow upon different stems. The euphorbiaceous plants are often milky. The commonest of common weeds in all gardens is the "milk weed," a euphorbiaceous plant, which I do not bring forward as a poison. There are many well-known plants, such as croton oil and castor oil plants, which both belong to the Euphorbiaceæ. Then, there is another euphorbium, the *E. officinarum*, which is a plant used largely in veterinary medicine as an irritant. The dust of that plant is very irritant indeed. The most important vegetable irritant poison is *croton oil.* I need not discuss croton oil; it is one of the most powerful purgatives in the pharmacopœia, and if taken too plentifully may set up an amount of gastro-intestinal irritation, which may cause death. There is a case on record in which a child died in six hours from a dose of croton oil, the dose consisting of less than three minims. On the other hand, there is a case of recovery after half an ounce. A druggist took half an ounce of croton oil in mistake for castor oil. This was followed by vomiting, and he had violent purgation and collapse, but, nevertheless, recovered. Again, it is quite conceivable, even with a thing like croton oil, that a big dose may be expelled more rapidly than a comparatively small dose, and thus be got rid of. A case was tried at Liverpool some years ago, in which the prisoners were charged with having caused the death of a man by placing in food, of which he and others had partaken, two drachms of powdered jalap, and two to six drops of croton oil. Several persons, including the deceased, suffered from vomiting and purging, but they recovered, and the deceased so far recovered as to go about as usual. But he was subsequently attacked with ulceration and inflammation of the bowel, from which he died.

A point of interest with regard to the croton oil seed, is that it has been given entire in the husk, and no ill result has followed. With regard to *castor oil*, it is said

that the husk of the castor oil seed contains an irritant oil, which is scarcely less powerful in its action than croton oil, and serious mishaps have occurred from taking the refuse of castor oil after the proper oil has been expressed from it. Some of these euphorbiaceous plants are not only irritant, but very curious symptoms have followed from handling them. Some of you may know Dr Pereira's work on Materia Medica; it is one of the most strangely interesting books upon an uninteresting topic that I have ever come across. It consists of three big volumes, and the facts which Dr Pereira collected about drugs are often of very great value. He mentions the case of a man engaged in grinding euphorbium officinarum, and who remained longer than was prudent in the room. Suddenly he darted from the mill room, and ran with great velocity down two flights of steps, and on arriving on the ground floor was heard to fall. "Within five minutes," says Pereira, "I saw him. He was lying on his back insensible and convulsed; his face was red and swollen, pulse frequent and full, and his skin very hot. I bled him, and within half an hour he was quite sensible, complained of headache, but he had no recollection of flying downstairs, which seems to have been performed in a fit of delirium." That is very interesting, and may be regarded as true, coming from Pereira. Euphorbium officinarum is an external irritant; it is used as a blistering agent in veterinary medicine, and there is a case on record where a person was punished because he put powdered euphorbium into a maidservant's bed, causing a considerable amount of cutaneous irritation. Among the Euphorbiaceæ there are the various plants belonging to the class Jatropha, one of which furnishes arrowroot. They are West Indian plants, and some of them are very irritating. They sometimes have stinging hairs, not unlike the nettle, and it is said in the West Indies that it is dangerous to sleep beneath some of these

trees. The *Jatropha manihot* is said to produce irritant effects on those who touch it. A jatropha was raised at Kew, and there is a record of a person coming in contact accidentally with some of the hairs. In a few minutes there was swelling of the lips and redness of the face, faintness, great prostration of strength, and such a degree of collapse that for some minutes he was thought to be dead. But he rallied, and recovered. In another case the pain and swelling in the part lasted for some days, and an itching sensation continued for a long time.

With regard to the plant figured on the screen, the *Euphorbium lathyris*, or caper spurge, its fruit when pickled has been used as a substitute for capers. But Sowerby and Johnson mention the case of two children, aged six and fourteen, who were killed by eating that plant.

With regard to British poisonous plants, there is no doubt that some of them are exceedingly poisonous, but I must remind you that it is a very fine line that divides indigestion from poison. If children fill their stomachs with indigestible matter, stalks, stones, fruit, and so forth, they may get irritant symptoms, and sometimes it is difficult to determine whether a plant is merely irritant from being taken raw or bolted by children, or whether it is really poisonous. But with regard to some of them there can be no doubt. Amongst the plants of this natural order there is the *Mercurialis perennis*, sometimes called wild spinach. It is said that this plant has proved fatal when cooked and eaten as spinach. A party of gipsies took some near Worcester, in 1820, all were ill, and two children died.

I would again allude to the fact that the irritants, concerning which I have just been speaking, are many of them irritants when used externally. Of course, we know croton liniment quite well, and we know euphorbium, which is used in veterinary medicine.

Coniferæ.—We may now discuss another class of irritants, namely, Coniferæ, that is to say, the plants which,

broadly, belong to the fir-tree type. These plants all contain turpentine, or an analogous body, and these turpentines are irritant when applied externally. We know that turpentine, if applied persistently, will blister the skin. It may produce pustular eruptions externally, and when given internally it purges and acts as an irritant upon the kidneys, producing albuminuria, hæmaturia, and painful micturition.

Savin.—One of the most important of the Coniferæ is, I need hardly say, savin. Savin is a species of juniper; it does not bear a cone but bears a berry, the juniper berry. So with regard to the yew tree. That, of course, does not bear a cone, but it bears a berry, and the yews have been separated under the name of Taxacaceæ. Savin is very important because it has, from time out of mind, been used for procuring abortion. Again, savin ointment is an irritant which is used externally. The savin bush is very like the juniper. The leaflets, or needles, are exceedingly sharp; it has a characteristic odour, and you can express savin oil from it. The *Juniperus sabina*, or savin, is a very uncertain abortifacient, and it is very doubtful whether it has any specific action upon the uterus. It is maintained by many that savin only acts as an abortifacient when it produces intestinal irritation, and the uterus contracts reflexly. It is said that a woman may be killed by savin, and yet may not abort. It has been used for such a purpose, however, for one does not know how long, and there is the old Scotch ballad of "Mary Hamilton," in which there occur the following lines:—

> "The king hath gone to the abbey garden,
> And pulled the savine tree,
> To scale the babe fra Mary's heart,
> But the thing it wad na be."

This shows that, even in the hands of kings, savin was a very uncertain abortifacient—"the thing it wad na be." It is because of its use as an abortifacient that savin has

been scheduled as a poison. Among the cases in connection with the use of savin is that of *Regina* v. *Pascoe*, in which a medical man was transported for giving fourteen drops of savin oil three times a day to a pregnant woman. The crime of abortion has always been severely dealt with. Post-mortem, when savin has been taken, you find the smell, and you may find in the intestines the sharp green points from the twigs of savin. It is really by finding savin in the intestines that you come to the conclusion that it has been administered. Christison mentions a case of a female who took so much of the powder of savin that she was attacked with vomiting, hiccup, pain in the abdomen, and fever of a fortnight's duration. Nevertheless, she was not delivered until the natural time. A female applied to a pedlar to supply her with the means of getting rid of her pregnancy, and under his direction appears to have taken a large quantity of infusion of savin leaves at night, and again next morning. No medical man witnessed the circumstances, but it was ascertained that she had violent pain in the belly, and distressing strangury. (Savin oil, like turpentine, affects the kidneys.) On Sunday afternoon she miscarried, and on the ensuing Thursday she died.

Yew.—Now, we come to another plant, the *yew*. I need not say anything about it because it is so common. It has occasionally been fatal to human beings. The male yew trees bear the pollen, and the female the berries, which have a sort of preputial shape, and are eaten by children without any harm. I suppose there is hardly anybody here who has not eaten yew berries, although few evergreens can be got to live in London, not even in the Botanical Gardens in Regent's Park. You may have noticed that in none of the parks of London do you see the yew tree, or Coniferæ, because these evergreens get choked by the soot, and die in consequence. Even at Kew the Coniferæ begin to show the effects of London smoke. It

is the leaf of the yew rather than the berry which does harm, and there are cases on record in which people have been killed from eating yew, and one of the cases—indeed more than one, if I remember rightly—occurred in lunatics, and some have occurred in those who have been putting up Christmas decorations in which the yew entered. It is exceedingly common for animals to be killed by yew, and it is very difficult to know what it is that causes the yew to be poisonous. In animals it seems to be tolerably certain that the yew is not uniformly poisonous. It is said that it becomes very much more poisonous after the boughs have been cut off and swept into a heap, an animal being poisoned more readily from eating from such a heap than when browsing direct from the living tree. It has been supposed that either the male or the female yew is the poisonous plant, but there appears to be no difference. Experiments have been made in that direction, and it has been found that both kinds of yew have poisoned, and both kinds of yew have been eaten with impunity. It is common to find a cow or a horse killed by eating yew, and yet in experiments no harm has come from animals browsing upon the yew tree. Therefore I must leave it, and say that the cause of the varied behaviour of the yew is not understood. It has been supposed that the cause is to be found in a difference of soil, but that is not the case. It may be due to the fermentation undergone by the leaves after they have been cut, but, again, that does not seem to be the case. Of course, it may be due to the season of the year. Therefore, here is a field for exploration.

Colchicum.—Another plant is *colchicum*, which grows in the autumn. It is like the crocus, but bearing a purplish flower instead of a yellow one. Colchicum causes irritant symptoms—vomiting, purging, pain, and collapse. I once knew a case in the country, in which a rustic was left rather long in the anteroom of a doctor's surgery, and I suppose he got thirsty, for he went into the surgery,

and apparently went round until he opened a bottle which smelt like sherry. He finished about half a pint of colchicum wine, and died of the symptoms of irritant poisoning and collapse. That is an interesting case, and should show you, especially if you are going to practice in the country, that you should not leave dangerous drugs where they can be got at. The active principle of colchicum is colchicin, and that acts more strongly than the colchicum.

Other plants allied to colchicum, which act as irritants, are those which yield veratria. Of the various plants of this order, Veratrum album, Veratrum viride, and Sabadilla may be mentioned. Veratria also has a distinct action upon the heart, and causes a very slow muscular contraction. But, after all, it is not a poison of much importance.

Amongst other plants of the irritant order there are those belonging to the Ranunculaceæ, among which are the hellebores. The plant from which we derive podophyllin is of the same natural order. Then there are plants which are acrid, belonging to the cucumber class, or Cucurbitaceæ. There is the elaterium and colocynth. We have an indigenous plant of the cucumber order, which is known as *Bryonia dioica*, which grows in the hedges. Its flowers are unisexual. It feels prickly and has rough hairs upon it not unlike cucumber. In the autumn it furnishes a reddish-yellow berry which is said to be poisonous.

Fungi.—More important, perhaps, than these irritant plants is ergot, a fungus which grows upon cereals in wet seasons, especially on rye. Ergot in large quantities is an irritant poison, and may be regarded as having a specific action upon the uterus, and a specific action upon the blood-vessels. It causes contraction of the blood-vessels, and hence is largely used as a hæmostatic. We give it internally and hypodermically in cases of hæmorrhage from internal organs. Ergot is a complex body, and in places where rye is largely used as

an article of food, epidemics of ergot poisoning do occasionally arise, though they were formerly much more common than they are now. The physiological effects caused by ergot are gastro-intestinal irritation, and, it is said, a great contraction and diminution in volume of the heart, contraction of arteries, and *lowering of blood pressure.* That is said to be its peculiarity, although you get contraction of the heart and arteries, there is relaxation of the veins. In former days chronic ergot poisoning affected whole provinces, and it is a curious fact that chronic ergot poisoning has taken two different forms, it has taken a spasmodic form and a gangrenous form. When the ergotised grain produces spasms it does not produce gangrene, and when it produces gangrene it does not produce spasms; moreover, in widespread epidemics of ergot poisoning, the two classes of symptoms very seldom complicate each other. I suppose from that we must assume that there are differences in the fungus which grows upon the corn. It occurs in wet seasons, and in some parts of Russia they have had, quite in recent years, epidemics of ergotism. In Russia the form of ergotism which has been common is the gangrenous form. When an epidemic of ergotism is widespread you may get every degree of gangrene; there may be mere whitlows and necrotic points upon the fingers, and between that and the complete loss of all four limbs you may get any degree. Complete loss of all four limbs from ergotism has been described; it is probably a very rare thing, but I mention the fact to show you the extremes which occur. It is said that in both the gangrenous and the spasmodic forms the troubles generally begin with gastric irritation. There is in both forms alteration of sensation, formication about the limbs, a ravenous hunger, discomfort and weariness. When the disease takes the spasmodic form, the spasms are said to be clonic spasms of the hands and fore-arms chiefly, accompanied by great coldness of surface, and gradually advancing cardiac paralysis and

death. In former days the spasmodic form was common in Germany, and the gangrenous form was common in France.

Going from ergot, which causes symptoms of a nervous character, we pass on to the other fungi, and I will shortly allude to them. It is, of course, very well known that all mushrooms are very apt to be poisonous, and they are poisonous from causes which are not very well understood. I remember, some years ago, calling accidentally, and without premeditation, on a friend of mine in the Temple. When I got to his rooms I found that they resembled a Channel packet boat more than anything else; ladies and gentlemen were laid out in all directions, vomiting into anything they could get hold of. They were all exceedingly bad, except the host, a sufficiently suspicious circumstance. On inquiry I found that these people had been to a neighbouring restaurant, and that they had eaten "*vol au vent à la Financière*," a mysterious dish, into the composition of which there entered button mushrooms, and it was these button mushrooms apparently which had caused the trouble. It is a matter of common knowledge that mushrooms will occasionally cause such symptoms. Now why do they cause such symptoms? Mushrooms are common articles of diet, they are eaten largely, and much appreciated. First, I would say that button mushrooms are hard and indigestible. The next thing I would say is that mushrooms are sometimes artificially grown for the market in very unwholesome places—in underground cellars, and other damp holes. That *may* have something to do with it. At any rate, I think we shall all agree that the mushroom is very differently flavoured, according as it is grown under conditions of that kind, or on open downs or parks in the autumn. Perhaps the most important thing is that mushrooms collected for the London market, and not quickly sold, lie about in bulk, very likely under conditions which favour fer-

mentation, and that really mushroom poisoning is a kind of ptomaine poisoning caused by micro-organisms which have grown on the fermenting mass. Whatever it may be, we have to recognise the fact that the mushroom, that is to say, *Agaricus campestris*, is sometimes not wholesome, and has been known to cause a great deal of trouble.

Now, fungi may be divided into the edible and the poisonous. Those which come into the markets as articles of food are of two kinds mainly, the *Agaricus campestris* and a few Boleti. In the *Agaricus* the spores are arranged in rays, while the Boleti have a structure not unlike sponges, that is to say honeycombed. In this country Boleti are practically never eaten. I do not remember seeing a Boletus exposed in Covent Garden, or in any market I have walked through. But you may go through markets abroad and see nothing but Boleti exposed for sale, and never a mushroom. I believe I am right in saying that in Italy they will not eat the *Agaricus campestris*. Probably there may be some condition in the soil which leads to their being unwholesome. With regard to the main facts, which enable you to determine whether a fungus is likely to be wholesome or the reverse, the following points are taken from Bentley. That the edible fungi grow solitary and in dry places. That is true in a sense. Of course, we know that if we go into a park where horses have been browsing, we find mushrooms, and you very often find two or three pretty close together. It is the droppings of the horses which forms the nidus for the mycelium to grow upon. Those who grow mushrooms will tell you that, if you want to cultivate them successfully, you must get the dung of an entire horse. The reason for that is quite plain. The testicles have nothing to do with it, but the entire horse is well fed, he gets a lot of nitrogenous food, and it is because he is highly fed, and because his food is nitrogenous, that

you get the mushroom to grow upon his dung. Edible fungi grow solitary, and the poisonous fungi grow in clusters very often, and in dark, damp places. If you walk through the woods in the autumn you can see the poisonous fungi growing up from the damp roots of trees. Edible fungi, as a rule, are white or brownish. The mushroom begins as a white ball, and when it is quite ripe the rays get black, and before it is ripe they go through a graduation of tints. Many of the poisonous fungi, on the other hand, are bright coloured, and, as a rule, the bright coloured fungi should be avoided. One of the most poisonous fungi is the *Amanita muscaria*, or fly fungus, which has a bright red top with specks upon it. This is the fungus which produces muscarine, and is most dangerously poisonous. The flesh of a wholesome fungus is brittle, not tough or watery, and the flesh of the real mushroom undergoes no change of colour on exposure. But if you take some of the fungi, which are shaped like mushrooms, and break them, you will very often see that they turn instantly to a blue colour, just as an apple grows brown after it is cut. Remember, then, that those which undergo a change of colour after being opened are said to be dangerous. The juice of a healthy fungus, if there be any juice at all, is watery, not milky. Then, the odour of an edible mushroom is agreeable. Of course, some fungi stink to a degree which is almost indescribable, and I should think nobody could be got to eat them. Edible fungi taste pleasantly, whereas poisonous ones taste unpleasantly, and are of an astringent character.

The *Agaricus campestris*, in the early stage, is entirely covered with a velum, which is attached to the stalk. You will find when the fungus has spread that the velum gets broken, and the remains of it are to be found as a ragged fringe encircling the stalk.

Fatal poisoning by fungi is in this country rare, and it seems to be sufficiently rare everywhere. There is one

of these fungi which is very strongly poisonous, and to which allusion has been made, and that is the *Amanita muscaria*, or fly fungus, which gives us the alkaloid which you hear of in your physiological lectures—muscarine. The fly fungus is almost precisely like a mushroom, except that it is red. Muscarine has an action very like that of pilocarpine, the active alkaloid of Jaborandi. It depresses the heart and contracts the pupil, and causes salivation, and the mode of death from it is usually heart failure. This body muscarine is said to be consumed as a luxury in some parts of Eastern Asia. The craze for muscarine is said to be so great that, in order to enjoy it, the poor are content to drink the urine of the rich. A case of poisoning by it occurred in 1859 at Corte, in the island of Corsica, when five French officers were killed from eating fly fungus. They suffered from gastro-intestinal symptoms, and a foolish delirium in which the victims simply did silly things. Then stupor came on, and then convulsions, followed by death from cardiac failure.

Cantharides. — Passing from vegetable irritants we come to the animal irritants, one of the chief of which is *cantharides*, or the Spanish fly, *Cantharis vesicatoria*. It is used as a counter-irritant, and has also the reputation of being an aphrodisiac, but whether it is or not I should say is more than doubtful. The only direct evidence we have is that if cantharides be given in sufficiently large quantities it causes intense irritation of the genito-urinary tract, including strangury and painful priapism, which is a very different thing from aphrodisia. There is no doubt that cantharides may cause intense irritation of the kidney, and, if it is given in large quantities, may produce hæmaturia, with swelling of the kidney, suppression of the urine, and a condition not very distinguishable from acute Bright's disease. There is also no doubt that when large blisters have been negligently applied to persons suffering from kidney disease that the kidney troubles

have been intensified. The detection of cantharides in the body depends upon finding in the intestines some of the bright shining particles; one may make an ethereal extract of the contents of the intestine, and try the blistering effect upon the skin.

CHAPTER XV

FOOD POISONING

The German Sausage—Symptoms of Sausage Poisoning—Dr Ballard—The Welbeck and other Food Poisoning Occurrences—Gelatine as a Cultivating Medium—Construction of Larders—Tinned Foods — Ptomaines — Leukomaines — Growth of Fungi and Bacteria in Food — Pellagra — Shell-Fish — Disappearance of Arsenic from Bottle Specimens of Tissues — Chemists and "Stinks"—Idiosyncrasy—Treatment of Food Poisoning—The Middlesborough Epidemic of Pneumonia investigated by Dr Ballard.

WE now come to a question of very much greater importance, namely, *irritant food*, and food poisoning generally. There are many forms of food poisoning apart from purely irritant poisoning. The first form of food poisoning which seriously occupied medical attention was the so-called *sausage poisoning* in Germany. I make no reference to trichinosis, or the occurrence of trichina in uncooked pork or sausages; that is a matter which is quite outside my course of lectures. What I have to deal with is a poisoning from food occurring under certain conditions. Sausage poisoning has occurred in Germany in the form of limited epidemics. Sometimes whole households and families have succumbed, and occasionally whole villages have gone down with it, and the trouble has been traced to the consumption of sausages. The Germans have made the sausage a specialty in the way of food. Whereas the inhabitants of the British Isles generally are in the

habit of providing for the winter by making bacon or hams, or salting pork or fish, the Germans, from time immemorial, have gone, perhaps, ahead of us, and have made sausages, and these sausages are made in a peculiar way. Ordinarily, the sausage is made of chopped pig meat, which is mixed with certain antiseptic herbs, and the German sausage is not cooked, but is dried. In Wurtemberg and Baden the custom has been to dry such sausages in the chimney to smoke them. If the sausage be made primarily of good materials, if it be made not too moist, if it be made not too big, that is to say, if the diameter is not too great, if it be put in a chimney where the fire is continuously alight, where it is exposed to pyroligneous acid and other antiseptics of the smoke, it remains perfectly wholesome. But if these processes are carelessly carried out, and if putrefactive changes are set up in the sausages, you may get dangerous results. The causes of sausage poisoning are said to be, first of all, putting unwholesome material into the sausages—meat which is already bad, and which is the product of diseased animals. Secondly, sausage poisoning has occurred particularly where the ingredients have been too fluid, where there has been an excess of brains or blood, and you get a semi-fluid mass in the skin instead of a proper sausage. A third cause of trouble is having the sausage too big, for, when that is the case, the drying process is not thorough, and the centre of the sausage is apt to undergo putrefaction, or allied changes, on account of its moist state. Sometimes the sausages have been put in the chimney of a cottage, and the fire allowed to go out, so that the sausages get frozen and then thawed again, and thus putrefactive changes are favoured. Now, sausage poisoning is not merely an attack of gastro-intestinal irritation, a mere stomach-ache from eating bad food; far from it. Sometimes the symptoms of gastro-intestinal irritation have not been at all pronounced, though sometimes they have been pronounced. The symptoms

which have been occasionally most prominent have been the nervous symptoms—dilatation of the pupil, formication, and tingling, double vision, paralytic symptoms, convulsions, stupor, and so forth, very often accompanied by violent diarrhœa. It is only recently that we have really learnt to comprehend food poisoning. It is a well-known fact that in all organic matter, under certain conditions, bacteria will grow, and it is well known that these bacteria in the process of growth cause a brewing of toxins. There is no doubt that sausage poisoning, and food poisoning, to which I am going to allude presently, are due to the formation of toxins in the food. This knowledge is due to Dr Ballard, who was one of the inspectors of the Local Government Board, and a former student at this college, and one of the most distinguished students that this college has ever turned out. Dr Ballard was the first to work out the whole question of milk epidemics. I need not go into that, or what it means, but we owe to Dr Ballard the knowledge of how milk epidemics of typhoid, scarlatina, and diphtheria were caused. Dr Ballard, in a paper which he published not very long before his death, collected a large number of cases of food poisoning in this country, all since 1880. In 1880 he investigated a case in which there was a sale at Welbeck on the Duke of Portland's estates, and, as a preliminary to the sale, there was a great luncheon, including cold hams; and a very large number of people who partook of those Welbeck hams were made ill, partly with nervous symptoms and partly with symptoms of gastro-intestinal irritation. Some of these cases died. Then cases occurred at Nottingham from eating cold baked pork. Then cases occurred from eating cold sausages. Cases have also occurred from eating cold pig's tongue, also from eating cold mutton pies. It has been found in one case that, with some article of food which was served from a cook shop —I think it was cold pork—there were served lumps of "cold gravy," and that cold gravy proved fatal to a certain

number of people, and made a large number ill. There was another case, a notable one, where a party in the north assembled for a wedding breakfast. It was a smart affair; there were glazed tongues and glazed hams, and things of that kind. A large number of the people who partook of these articles of food were made seriously ill, and some of them died. It is, of course, a well-known fact that occasionally pies, especially cold meat pies, have caused death, and the explanation of that has been a riddle. It used to be said that cooks made a hole in the pie "to let the devil out," a superstition based upon the fact that pies have sometimes caused trouble as articles of diet. It has been universally acknowledged that there are certain articles of food which are liable to be unwholesome; one of these is pork, and the other is veal. We have often heard of people being made ill by pork and veal. Now, if we take the pork pie, the veal pie, cold ham, cold tongue, etc., what is there in common? Ballard pointed out that there was one thing common to all these, and that was jelly, and he also pointed out that gelatine is universally employed by the bacteriologist for the cultivation of bacteria of all kinds. The next thing which Ballard pointed out was that these food poisonings almost always occurred with cold articles of food, and mainly in cold gelatinous articles of food, which had become the cultivating media for noxious bacteria. Thus the whole thing is quite comprehensible. Two or three years ago, in the country, a country doctor, who was also medical officer of health, called upon me, and told me of an incident which had been causing some local excitement. A clerk in the city, who had a cottage in the country, brought home with him on Saturday a leg of pork from the stores. This leg of pork was cooked, and part of it eaten for the Sunday dinner, and nobody who partook of that pork for the Sunday dinner took any harm. Some of it was eaten on the Tuesday, and it caused a certain amount of gastric irrita-

tion, and accordingly the remains were given away, and of those to whom it was given three who ate of it died. All the local tradesmen, of course, pointed the finger, and said, "That comes of buying things from the stores." But it was not that, and I remember the medical officer of health asking me about it, and I said, "You will find it was not the hot pork but the cold pork which caused the trouble. Go and find out where the cold pork was stored." He found it had been stored in a place which went by the name of a larder, under the stairs, communicating by a ventilator, on the one hand, with a dog kennel, which had never been cleaned out, and, on the other hand, with a trapped gully, which was as foul as trapped gulleys usually are. This cold pork, therefore, was put between two fires, if we may say so, of microbes, and the result was that the people who ate of it died. It is usually cold food which causes most mischief, but not exclusively. You must remember that if meat, especially the young, gelatinous meat of the calf and the young pig, has been kept before cooking in an unwholesome place, it may become a nidus for the growth of bacteria, toxins are produced, and these toxins may not be destroyed in the pot, and may produce acute poisoning. Food poisoning is of two classes, that in which the toxin ready-made is swallowed, in which instance you get no incubative period, or only a very short one; and the other, in which you swallow the bacteria, which are ready to brew toxins in the incubating chamber which every man carries about with him, that is to say, the abdominal viscera. In that case, if the bacteria are swallowed, there is an incubative period before the toxins are brewed and absorbed, and the toxic symptoms produced. The whole matter is so simple that we are very apt not to give sufficient credit to the man who first pointed out what the cause of this food poisoning is.

There are those who maintain that these food poisonings are usually due to definite infective disease occurring in the animal which supplied the food, and that the food

after cooking serves as a nidus for the growth of the original disease organisms which have time to multiply during the process of cooling. This is probably very often the case, and instances investigated by Durham leave little doubt. Nevertheless, the accidental contamination of food by being kept in unwholesome places is not to be lost sight of. Durham, for instance, mentions a man who was poisoned by eating a piece of cake, taken from a refuse heap which also contained diseased meat.

These food poisonings sometimes occur with preserved provisions, the sale of which is increasing enormously. There is a chance that the tinned food may not have been scientifically and thoroughly sterilised in the process of tinning, and that toxins may be brewed by the growth of micro-organisms in the tinned food. One thing is very important: never eat the contents of a tin of food which is bulged. When foods are tinned, and are subjected to sterilising heat, the tops are soldered on while the thing is still hot, and, then, as the cooling takes place, the top of the tin collapses. Every satisfactory tin of provisions ought to be collapsed at the ends. If, however, in filling, sterilisation has not been complete, then putrefactive changes may occur and the tin gets bulged.* I warn you that these dangerous articles of food are not always nauseous. The liquefaction of the gelatine is a sign of danger, unless we are satisfied that such liquefaction has been caused by heat and not by microbes.

Now, a great deal has been written on this subject, and the name of "ptomaines" was given to bacterial products when the subject was first investigated. It is derived from the Greek πτῶμα, "a corpse." The poisons were supposed to be those which are brewed in the dead body, and in dead materials generally. The subject of ptomaines excited very great interest, because many of

* There is reason to believe that "blown tins" may, by dexterous manipulation, be made to resume an appearance of collapse.

the ptomaines gave reactions very similar to, and hardly, if at all, distinguishable from the reactions given by alkaloids. And the question was whether the chemist, in searching for alkaloids in the dead body might not be hopelessly put off the scent, or come to wrong conclusions, because of the ptomaines in the body. Then ptomaines were also spoken of as leukomaines, because many of them were grown in albuminous matter, notably white of egg. Then, a great variety of names were given to poisons brewed on different bodies. I think it is better to use the general word toxin, and then the whole thing falls into line with the diseases which are caused by bacterial toxins, such as enteric fever and diphtheria.

The growth of fungi and bacteria on food has often caused widespread trouble. Yesterday I gave instances of epidemic troubles from the growth of fungi on rye and other cereals, and, in the same way, the eating of mouldy maize causes, in the North of Italy, some parts of France, and elsewhere, a disease known as pellagra, characterised by chronic changes of the skin, and degenerative changes in the nervous system. We know shell-fish are particularly liable to cause limited epidemics. I do not allude to enteric fever, which is sometimes dished up with oysters and mussels caught at the mouths of our rivers; nor do I refer to cholera, which is sometimes dished up in the same way. Very extensive mussel poisonings have taken place, and it is said that they only occur when the mussels have fattened in an unwholesome spot; that, if you take the mussels from the open sea, they are safe; but if you take them from places where the water stagnates, such as the enclosures of harbours and docks, they are liable to be unwholesome. Any of you who have made an ocean voyage, and have seen the fæces, and other forms of refuse of every kind, which an ocean steamer leaves behind it, will readily believe what the water of a dock will come to, and it is

no wonder that the mussel is unwholesome when grown under such circumstances. Then, in regard to this question of ptomaines, there is an interesting thing recorded by Professor Victor Vaughan, to which I have alluded previously, and to which I will allude again. It was found by him that tissues impregnated with arsenic, if allowed to decompose, gave off a garlicky odour, and the arsenic disappeared. Victor Vaughan says he kept chopped liver containing arsenic in a bottle, and it was noticed that whenever the bottle was opened a large amount of gas escaped, and that, at the end of six months, he could get no evidence of arsenic from that liver, showing that, owing to the growth of organisms of some kind, arsenic had entered into combination with the gases of the air, and had escaped. One other point is referred to by Dr Dixon Mann, and has been pointed out by others, that some of these ptomaines which are brewed by decomposition are volatile, and Dixon Mann noticed that after he had been working at this subject he was very drowsy. It was clear that he had absorbed some volatile product which was noxious to him. Surely that need not surprise us. We know that micro-organisms during their growth, especially when there has been very much water and there is putrefaction, may brew carbonic acid, sulphuretted hydrogen, and marsh gas, to speak of no others, and under these circumstances we must regard these gases as volatile toxins. That forces the reflection upon us that the chemist knows absolutely nothing about the great majority of stinks. He can tell us that there is carbonic acid there, and that there is sulphuretted hydrogen there, but we know a great many smells are not pure carbonic acid, and they are not pure sulphuretted hydrogen; they are something of the composition of which we are profoundly ignorant. Some of you may remember that, a few years ago, there was a tropical plant of the arum order growing at Kew Gardens, and those who were knowing in such matters were aware that this arum, which has male and

female organs ranged one above the other, needs for its fertilisation the assistance of a beetle. And those who knew were aware that when the physiological moment came, when it was ripe for fertilisation, it would brew a stink strong enough to bring a beetle from a distance. As predicted, so it came off. The smell of this thing only lasted for a short time, and, just at the physiological period, when fertilisation could be accomplished and was necessary, the stink was so strong that nobody could possibly go into the house where the plant was growing. They took a young and stalwart gardener, and got him to try to take the temperature of the flower at the time, and they put clips on his nose, and sent him into this place, but he could scarcely do it; the odour was so powerfully depressing. Chemists know nothing about these odours, and the gaseous things which are brewed not only by microbes but by flowering plants are something to excite our wonder. There is a good deal we have to accept. How did this plant brew this odour all of a sudden? Then, again, there are odours which, if we stopped with them sufficiently long, are potent enough to make us vomit. How do they do it? Again, there are odours given off by organic bodies which are perceptible after twenty-four hours in the fæces of the person who has been immersed in them, as in post-mortem examinations, or what not. That, I take it, is an experience which all pathologists have recognised, and no pathologist I have talked to has failed to say that occasionally during the act of defæcation he has become aware of the peculiar smell of the post-mortem examination which he made, perhaps, twenty-four hours previously. What is that? Did he swallow it, or did he inspire it? You may be sure that that odour, whatever it was, had become incorporated with the body, and was eliminated again, just as arsenic, or mercury, or anything else may be. I mention these things to show there are many things in heaven and earth that we cannot

explain, even in phenomena of every-day life. To speak of gaseous toxins is perfectly correct, though we may not be able to analyse them.

It is perfectly true that "What's one man's meat is another man's poison," and we now get back to the question of idiosyncrasy. Some people are very fond of putrid food. The true epicure will eat what I should call filth, for it almost amounts to that. A haunch of venison, which some people call ripe, and which I call rotten, is something too awful, but that is a matter of opinion.

Now comes the question of the treatment of these cases of food poisoning. Generally elimination takes place spontaneously, and the first thing you have to remember is not to check it. Secondly, you have to support the patient, and in these cases usually large amounts of stimulants may be given with advantage.

Before leaving the question, I will allude to one other fact with regard to food poisoning because I think it is important. In the year 1888 there was at Middlesbrough an epidemic of pneumonia, and this epidemic was investigated by Dr Ballard. He found that the idea was generally prevalent throughout Middlesbrough that the pneumonia was largely amongst those who had eaten a particular form of bacon. That was quite a new departure, and Ballard, with his open mind, investigated the matter seriously. He found there was a great deal of truth in this, and when he had collected all his cases of pneumonia, he found a large proportion of them had partaken of a particular brand of bacon. He found that the working men and artisans of Middlesbrough had the idea, which is probably common, and I should not be surprised if it is tolerably true, that if you want to get the most good out of meat it must not be over-cooked, it must be underdone. He found the Middlesbrough artisans had been in the habit of eating this bacon very underdone indeed—almost raw, just warmed before the fire. He found that the bacon was made from American pork rapidly cured by a

process of injection, or something of that sort. These rapid methods have given us food, but not such as an epicure would regard as bacon. Ballard found that this pork was being prepared in an unwholesome place, in a factory in which there was a sewer grating. He scraped the fat off the grating, and sent up some of the fat and some of the pork to London to Dr Klein, who found not the ordinary diplococcus of pneumonia, but another one which was capable of giving pneumonia, and which produced an epidemic amongst rabbits and guinea-pigs, and killed a great number of them. The point is, was the pneumonia caused by eating pork? There is some doubt about the matter, and I notice in recent writings this particular instance has been dropped; and it has been dropped, I take it, because the idea is rather general that this pneumonia in 1889 at Middlesbrough was really the first occurrence in this country of the infectious pneumonia with which we have become particularly conversant while the epidemic of influenza has been about. Since then we have all got to recognise that pneumonia is very infectious. Nevertheless, I think Ballard's figures are incontrovertible, that pneumonia did occur in excessive proportion amongst the pork eaters, and a dangerous bacillus was found on this pork, especially in the fat which was scraped off the sewer grating. Ballard was an observer for whom I have such a profound respect that anything he put forward, I would not say was *certainly* correct, but a statement to be treated with great respect. And I am inclined to think that amongst the forms of food poisoning, after Ballard's researches into this matter, we must include a form of pneumonia.

CHAPTER XVI

NARCOTIC POISONS

Morphia—Opium—Symptoms of Morphia Poisoning—Morphia an Anæsthetic—Stertor, Palatal and Laryngeal—Morphia Rash—Relapses in Morphia Poisoning Cases—Diagnosis of Acute Opium Poisoning — Post-mortem Signs — Fatal Dose—The Morphia Habit — Treatment — Atropine as an Antagonist to Morphia—Chronic Opium Poisoning—De Quincey, the English Opium Eater—Tests for Morphia.

Morphia.—I now proceed to consider narcotic poisons. The first and most important of these is morphia, and when I say morphia of course I include everything which contains morphia—opium and the various preparations of opium. I need not give you a list of all the preparations in the pharmacopœia which contain opium, I must assume that you are familiar with them. As you are aware, opium contains a large number of alkaloids, and some of these alkaloids are more narcotic than others. If you look at a tabular statement of the various alkaloids contained in opium, you will find that while some of them produce narcotic symptoms, others produce convulsive symptoms and so forth, and if you look at the lists given by various authors you will see that they do not agree with each other. In short, while we agree about the chief alkaloid of opium, our knowledge is not so certain with regard to the others which are less commonly used. Now when the alkaloid morphia is given, the symptoms produced are tolerably uniform, but,

when opium is given you have to remember that the quality of opium differs very much, that some preparations contain a greater quantity of morphia than others. When opium is given the first symptom is one of very transient mental excitement, but in a very short time the patient sinks into what is apparently an ordinary sleep. If the dose of morphia or opium be large enough, the sleep deepens until it becomes exceedingly heavy. A person fully under the influence of morphia is deeply asleep; there is probably stertorous breathing, the pupils are contracted to pin-points, the skin is cold and clammy and very likely bedewed with sweat, the pulse varies somewhat, but is usually rather slow and laboured, and the respiration tends to get slower and slower. What I want particularly to insist upon is that morphia seems to kill by poisoning the respiratory centre, and that is an important fact. The urine is generally suppressed, and of course there is no action of the bowels. A patient fully under the influence of morphia is absolutely insensible; any pinch or painful impressions may be made upon him without his taking any notice. The muscular relaxation in cases of deep narcotism is singularly great. I mention that because I have heard it questioned as to whether morphia is an anæsthetic. Of course the question would not be asked by anybody who knew anything about it. A patient fully under morphia cannot be roused by anything. I have said that the breathing is stertorous. What do we mean by that? We mean the snoring noise which sometimes accompanies every inspiration and sometimes every expiration. And I should say in speaking of stertor that you have to distinguish between two kinds of stertor, palatal stertor and laryngeal stertor. Palatal stertor is due to complete relaxation of the palate, the palate hangs like a relaxed vibratile curtain, and the air going past it, generally on both sides of it, through the nose and through the mouth, causes the typical loud snoring. And we know very well that people are apt

to get that loud vibratile stertor when they are in a deep sleep with their mouth open. Why do we get palatal stertor in cases of narcosis? The only explanation one can offer is that the muscles of the palate are completely relaxed, and therefore it lends itself to vibration very readily. In cases of deep apoplexy, uræmic coma, and coma from morphia, we get this palatal stertor. Laryngeal stertor is a different thing altogether. It is the noise we get in whooping cough and in laryngismus stridulus, and in cases of paralysis of the abductors of the vocal cords. There are some occasional symptoms in morphia poisoning, and one of these is itching of the skin. Occasionally also we get exanthemata. Exanthemata are common in many conditions, and are apt to occur when anything strange or indigestible is put into the alimentary tract. These exanthemata are common after enemata. They are very common after eating pork or crab, or things of that kind, and they generally mean that there has been an indigestible meal. So after morphia we get sometimes an exanthem and itching of the skin. Then occasionally in children there have been convulsions. Occasionally in males there has been priapism, occasionally vomiting, and sometimes slight albuminuria. Now, you may be called to a case of morphia poisoning, and the patient may recover consciousness and speak and so forth. I want to warn you, with regard to those cases of deep narcosis where recovery takes place, not to go away and leave the patient, nor to tell the friends that the patient is safe now, because that is not always the case. In these cases of deep narcosis from morphia, and sometimes from various forms of suffocation, from inhaling carbon monoxide for instance, the patient is liable to relapse, and it is very important to note that. You may think the patient is all right, and then a relapse may take place followed by death. One notable case occurred some years ago which excited a great deal of attention,

because the lady was living in fashionable circles. She accidentally took a large dose of morphia, and she recovered sufficiently to talk to her daughters, and then when the doctor left her she had a relapse and ultimately died. Of course morphia may be given not only by the mouth but hypodermically, and whenever you find a person narcotised, and you can get no history of his or her having taken anything in the way of food or drink, you should carefully examine the body for hypodermic punctures. I think that is a very important matter.

Now, as to diagnosis. Opium poisoning resembles two things. It resembles a case of pontine hæmorrhage. If hæmorrhage occurs in the pons you may get general muscular relaxation, and you may get pin-point pupils. But in a case of pontine hæmorrhage you would generally get some evidence of definite paralysis, very likely some paralysis of one side of the face. Again, you may get the smell of opium if the poison has been taken in the form of opium. Symptoms resembling those of opium poisoning occasionally supervene in people who are the victims of disease of the lower urinary tract. In some of these cases where there has been an old stricture and suppuration extending up the ureter and the pelvis of the kidney, you may get the patient asleep with pin-point pupils, and your first impression is that opium has been administered. I remember seeing such a case a year or so ago in which the patient's condition was almost precisely like that of a person dying from morphia poisoning, but there was no evidence whatever of morphia poisoning, and there was evidence that he had had a stricture for a very long time and that he had passed pus in his urine. It was found post-mortem to be one of those cases of narcotism subsequent to disease of the lower urinary tract spreading upwards and involving the kidney; in fact it was a form of uræmia.

Now, as to the post-mortem signs of morphia poison-

ing. We get intense congestion of the venous system, because the respiration is exceedingly slow and the patients die asphyxiated. In these cases the bladder is generally distended with urine, and you should draw off the urine with a catheter, if you are in doubt, and have it submitted to an expert chemist to see whether morphia can be detected in it.

What is the dose of opium which is fatal? Well, that is exceedingly difficult to say. It depends so very much first of all upon the age of the patient. And I would remind you that little children are exceedingly sensitive to the action of opium, and that it is not safe to give them opium in any form, in doses however small. One or two drops of the tincture of opium seem to have been sufficient to definitely kill children. On the other hand, an opium eater seems immune to the effects of opium. And the man who habituates himself to the use of the hypodermic syringe is practically immune; the amount of opium such persons take seems to be only limited by the amount of money they happen to have in their pocket to buy it with. One very curious thing about the person who is a victim of the opium craze, is that the effects seem to be very generally reversed. The victim of the craze cannot do his work until he has had his dose. I have heard it said to me very often that a clerk cannot add up a row of figures, that is to say, he has not the use of his faculties, until he has had his dose; it is the old tale, they cannot get on without the morning dram. That is a form of homœopathy which is as old as the hills—the hair of the dog that bit you.

Next as to treatment. The treatment of opium poisoning, if the drug is taken into the stomach, is to empty the stomach instantly, and in addition to wash it out. A great addition to our means of counteracting the effects of opium seems to be found in permanganate of potash. By putting that into the stomach the alkaloid seems to be oxydised or changed, and seems to lose a

good part of its lethal properties. There is no doubt that is a method of treatment which may be followed. Then it is a good plan to keep the patient awake, and to do that you may douche him, walk him about, flip him with towels, and so forth. But let me give you one word of caution: take care that in treating a patient who is the victim of opium poisoning, not to practise what, if he were in a sensitive condition, would be termed cruelties. *In your own interests* it is not advisable to leave marks. You might get accused of brutality through this awkward circumstance, notwithstanding that it may have been done with the very best intentions and with the idea of saving your patient from the brutality of death. You must be cautious and sensible. Tea and coffee are important, they are stimulants; the administration of a large quantity of coffee is undoubtedly a very valuable thing. The next point is with regard to atropine. Atropine and morphia are said to be antagonistic to each other, and they are so, but only to a certain extent. The evidence as to the curability of opium poisoning by atropine is not of the best. A large number of cases of morphia poisoning do recover, and you are always confronted with the *post hoc* fallacy, which confronts us whenever we try to come to conclusions about therapeutic measures. I would, however, warn you not to give lethal doses of atropine. The ordinary dose of atropine is 1-100 grain, and you will do well to give the drug in only strictly therapeutic doses; of course you may repeat the doses at intervals, but do not give a big quantity at once. Because a person has taken poison, that is no reason why you should give him a lethal dose of something else, for by so doing you might put yourself in a false and very uncomfortable position. What is the antagonism of morphia and atropine? Of course the antagonism on the pupil is marked, that is to say, whereas opium contracts the pupil, atropine dilates it. But here is a difference, opium or morphia applied locally to the eye does not contract the pupil, whereas atropine

applied locally to the eye dilates the pupil. Whereas atropine appears to act upon the muscular fibres of the iris, opium does not apparently act in that way, but acts upon the central end of some of the fibres of the third nerve. Again, atropine causes a dry skin, whereas morphia causes a damp, clammy skin. Atropine causes a very rapid action of the heart, an uncontrolled action of the heart; the action of opium on the heart is less uniform, but very often gives a slow, laboured pulse. Most observers seem agreed that if given in large doses both atropine and morphia may weaken the action of the heart, and you must remember that, as a rule, the heart that hurries is feeble.

Now a word or two as to chronic poisoning by opium. I do not think I need detain you very long with that. There are many narcotics which are cerebral excitants in the early stages of their administration. That is, cerebral excitation is one of their first symptoms. And so it is with opium. Opium causes a condition which is *sui generis*, and I rather fancy that the opium state of mind is different from the state which is produced by some other narcotics. We shall have to consider eventually the action of alcohol on the brain, and I think it is worth while to draw your attention to the action of morphia on the brain. Now, we have an account of morphia-taking by De Quincey. De Quincey got into the opium habit, and it is said that he took as much as 333 grains of opium a day. He describes his condition. I would remind you that people differ immensely in their power of taking morphia. Some people get nothing but good out of it, nothing but satisfaction, relief from pain, and so forth (of course I am speaking of medicinal doses). Others it does not affect in the same way. Personally I confess I would rather endure any reasonable amount of pain than take any morphia. My personal experiences of taking small doses for a cold have been exceedingly disagreeable. You must excuse my giving personal experience, because when

one speaks of the effects of things on the brain one has only one's own brain to go upon. So small a dose as is said to be got in a Manilla cigar may cause nightmare of the most disagreeable kind. It is certain that many do not get a true sleep from opium. We have always to consider whether the condition of narcosis is the same thing as refreshing sleep. I may say personally, and other people have told me the same thing, that after they have had a dose of morphia at night they feel "all to bits" in the morning, and not refreshed. Now, the dreamy state produced by morphia is very curious, and has always something of what one may call the supernatural; the nightmares and dreams produced in this way are, so to say, the inventions of an uncontrolled cerebral cortex. De Quincey, who was a very good judge of both, asserts that the mental state caused by opium is different from that caused by alcohol; it is more stable, more chronic, it stimulates the imagination, gives equipoise to the mind, breeds contempt for misfortune and the world. An opium eater in the early stage is never maudlin, never aggressive; he is an active nuisance to no one but himself. That is a very important and curious thing. The drunkard is a nuisance to everybody, including himself. If you read De Quincey's account of the opium state, you will recognise that the delirium caused by opium is quite different from that caused by alcohol. Again, Samuel Taylor Coleridge's poem of Kubla Khan was said to be composed while under the effects of opium. It seems that under its influence supernatural, weird sort of fancies come up. *In vino veritas* is a trite saying, but you cannot say *in morphina veritas*, for the dreamy state of a morphia eater seems to transcend all ordinary experiences.

Alkaloids.—Now the alkaloids are so-called because of their basic qualities; they all have the power of combining with acids and forming salts, and I need not remind you that the salts of morphia are numerous—the sulphate, hydrochlorate, and so forth. Now, of all the alkaloids with

which we are concerned, morphia is one of the most difficult to detect; the detection of small quantities of morphia in organic liquids is a very difficult problem indeed. But at the University of London they recognise that fact, and they do not give the ordinary student morphia in organic liquids. I have here pure morphia. You will notice that it is a crystalline body, white in colour, without odour of any kind. When you get a white powder like that, you should, as we have so often done, put it upon platinum foil and heat it over a lamp. You see it melts into a dark oily liquid, then inflames and burns with an exceedingly sooty flame, leaving the platinum foil coated with carbon. That residue of course tells me at once that I have an organic body to deal with and not a mineral salt. Its behaviour would raise a strong suspicion in my mind that it was an alkaloid. I will now put some of this alkaloid into a test-tube, and, after adding a little distilled water to it, I will boil it. Solution is by no means rapid; the pure alkaloid is not readily soluble in water, but this and many others of the alkaloids are readily soluble in dilute acid. I add a little hydrochloric acid, and you see that solution takes place instantly. When you get alkaloids dissolved in that way you may often get them reprecipitated on the addition of caustic potash. One great difficulty in dealing with morphia is that, having added your caustic potash to reprecipitate your alkaloid, directly you add an excess of caustic potash the alkaloid is redissolved. Morphia is readily soluble both in acids and in alkalies, which fact makes its detection so exceedingly difficult, especially in organic mixtures. But I will now show you a test for it —a colour test. Take the alkaloid and add to it a drop of nitric acid; that gives a red coloration. In the same way perchloride of iron gives a green coloration. It is the red produced by nitric acid and the green produced by perchloride of iron, which tells you that you are dealing with morphia. Now, I will put some morphia into the test-tube and add a little hydrochloric acid, and heat it

over the lamp. I have here a pure watery solution without smell. I evaporate a drop of it to dryness on platinum foil. You see that it dries up, and inflames when it is dry, leaving a carbonaceous residue ; so I know I have organic matter there. We now go right through with the ordinary reagents *— hydrochloric acid, sulphuretted hydrogen, ammonium sulphide, carbonate of ammonia, and so forth, and we get no precipitate. Then the question arises, what have we got? There are certain tests for alkaloids. I put a little of the solution into the three test tubes. I have here Mayer's solution, which consists of 6 grains perchloride of mercury, 22 grains iodide of potassium, and one ounce of water. Now I take Mayer's solution and I get a white gelatinous precipitate. That shows me that I have an alkaloid to deal with. The question then arises, which alkaloid? A very good fluid test for morphia is to mix some solution of iodic acid with chloroform, equal parts, and add morphia to them. You see I immediately get a change of colour, a very ruddy yellow ; iodine is liberated by the morphia, and it is redissolved gradually by the chloroform, which sinks to the bottom, giving you a pink globule. That is a very delicate test for any substance containing morphia. You may get it with opium or any organic liquid. You may use iodic acid with bisulphide of carbon, and that is rather a better thing to use than chloroform, but it is not so pleasant, as it smells badly. Then you may apply to your solution a colour test again. Here, the solution being very dilute, I do not get the intense coloration with nitric acid, but a diluted yellow one. I heat a little in a white evaporating dish over a lamp, and by condensing it I get the orange coloration.

* See p. 500.

CHAPTER XVII

PRUSSIC ACID

Symptoms of Prussic Acid Poisoning—Fatal Dose—Fatal Period—Post-mortem Appearances — Treatment — Potassium Cyanide Poisoning — A Case in Point — Treatment — Power of Volition after taking Prussic Acid—Tests—The Defence in the Slough Case—Poisoning from Oil of Bitter Almonds—Case of Sir Theodosius Boughton: *The King* v. *Donellan* (1780); John Hunter as a Witness — Poisoning by Nitro-benzole — Aniline Poisoning—Test for Aniline.

We now proceed to another poison, namely, prussic acid. Prussic acid is, as you are all aware, a very deadly poison indeed. It is said that prussic acid in its strongest form, which is only a chemical curiosity, is able to kill a man instantly if he just smells the bottle. It is said that Scheele, the Swedish chemist, met his death in some such way, by preparing chemically pure hydrocyanic acid, and the vapour of it was sufficient to kill him. There is no doubt that when a sufficient dose of strong pure prussic acid is taken, death may be almost instantaneous, and may represent either an attack of epilepsy or apoplexy. But, as a rule, the poisonous effects are not quite so rapid as that. One of the first results of swallowing prussic acid is insensibility, which comes on very rapidly. Another result of swallowing it is that the respirations become exceedingly slow; indeed, the main effect of prussic acid appears to be to slow the respirations. There are often very long pauses between the respirations, and

when the respiratory acts occur they are very irregular. The patient is pale and cyanotic, and the eyeballs are said to be glistening. Occasionally there have been convulsions, it is said, of a tetanic kind, but certainly convulsions of some kind are not at all uncommon in the final phase of prussic acid poisoning. Now, the strength of prussic acid varies immensely, and you know very well that when it is freshly made it has a most powerful odour, which gives many people an almost instantaneous headache; but when the acid has been made for some time the odour is very much less pungent. It is one of those bodies which easily lose their strength, partly by evaporation of the acid, and partly by a change which ensues under the effect of light; therefore prussic acid is generally kept in dark places and in cool places, so that it may keep fairly good. Seeing that the strength of prussic acid varies almost from day to day, and that no two samples can be expected to be of exactly the same strength, unless they have been made at the same time and kept in the same way, it becomes almost idle to talk of the fatal dose of prussic acid. It is said that 20 drops of Scheele's acid has killed; further, it is said that recovery has taken place after the taking of a drachm of the acid. But after what I have said about the variation in the strength such discussions are almost useless. Next, as to the fatal period. Death from prussic acid may be almost instantaneous, and the shortest fatal period is given as two minutes. Next as to post-mortem appearances. After what I have said about the effect of prussic acid upon the respiration, you will expect to find venous engorgement everywhere. But really I think the only characteristic post-mortem evidence of prussic acid is the smell. The smell is very pungent, and it would be present in a person poisoned with prussic acid.

With regard to the treatment: as prussic acid affects the respiratory act, the treatment is best directed to stimulating the respiration. I need hardly say that if

prussic acid has been taken, the stomach should be emptied, and the salts of iron may be given with advantage. Also cold affusion and artificial respiration must be persistently employed. Now, not only does prussic acid kill in this way, but cyanides kill in the same way; and a very important poison at the present time is potassium cyanide, which is used so largely in photography. I will read you a very good case of poisoning with potassium cyanide. It is taken from the *Lancet*, December 18th, 1886. I may say that potassium cyanide, having to be dissolved, does not act so quickly as the pure acid, but the action is quite similar. Sophia P., aged 30, with intent to commit suicide, took a piece of potassium cyanide as big as a lump of sugar at 3.45 P.M., on October 4th, 1886. In a few seconds she felt giddy, became insensible, fell on her face without uttering a sound, and did not begin to recover consciousness for two hours. She was taken immediately to St Thomas's Hospital, where she arrived about 4 P.M. She was then completely insensible, giving an occasional gasping respiration. Face flushed and livid; pulseless; limbs flaccid, jaws tightly clenched; pupils dilated; eyes closed; had passed urine, but not fæces; smelt strongly of bitter almonds, and was thought to be dead. Artificial respiration was commenced, and had to be continued more or less continuously for two hours. Cold affusion and flagellation of the chest with a wet towel was employed. The mouth was opened with difficulty by a gag, and the contents of the stomach were removed by the stomach-pump, and about 15 ounces of a solution of ferrous sulphate (gr xx ad ℥j) were pumped in. An injection of 40 minims of ether was given. Even at the end of two hours the respirations were very shallow, and another injection of ether was given. She complained all the evening of great drowsiness and pain behind the sternum. She vomited repeatedly during the evening, and all next day she continued drowsy and her breath smelt of bitter almonds. She was dis-

charged well at the end of four days. The artificial respiration and injection of ether were supposed to have been mainly operative in her recovery.

That is a case which is uncommon. When people commit suicide they generally do it so that they cannot be discharged afterwards, and the consequence is that we have not very frequent opportunities of really watching these cases. That is one of the great difficulties of medical jurisprudence, that unless you happen to be on the spot at the time of these cases of poisoning, you do not get an opportunity of making a careful clinical record.

Now you will find in your books on medical jurisprudence that the question is discussed as to what is the power of volition after taking a dose of prussic acid. That, of course, must depend upon the strength of the acid, and there is no doubt that if the acid is not too strong, there is considerable power of volition after taking the dose. That is to say, sufficient power of volition remains to enable the patient to put a cork back into the bottle and perhaps throw the bottle away. And this question of the power of volition has arisen in connection with cases of murder; and the point has been whether the cork could have been put into the bottle again by the suicide, or whether it had been replaced by a murderer. The matter has been fought with acrimony in courts of law, and hence it gets into all books on medical jurisprudence. It is evident that if the acid is not very strong the volition is considerable. There are reports of a case where a medical student killed himself with prussic acid and walked up or down a flight of stairs before he was seized with his fatal symptoms. Another point which has been investigated is whether there is a cry when prussic acid is taken. I mentioned to you that sometimes the symptoms of prussic acid poisoning are very much like epilepsy; occasionally an epileptic goes off into his fit with a cry, and in prussic acid the same phenomenon has been observed. But that does not appear to be a necessary symptom at all.

I would remind you that prussic acid occurs in nature, that it is found in the bitter almond, and is found in the laurel, the so-called *Prunus laurocerasus*, or cherry laurel. The laurel which I have here smells of prussic acid. As you know, it is used in cooking very largely for flavouring custards and so forth. Next as to the detection of prussic acid. Remember that it is volatile, and that the odour is very penetrating. If you do not get the odour given off in the cold solution, you may get it off in a warm one. I will put some prussic acid into a test-tube, and of course I shall get the odour; but you may have a pure cyanide without the odour of prussic acid, though it usually has a slight smell. There is no doubt about the acid reaction, and I have as vivid a red with the test-paper as with the mineral acids. If I evaporated to dryness it would show that there are no alkalies, such as potash, combined with hydrocyanic acid. The best test is nitrate of silver, and I get with that a very dense white precipitate falling at once. I will add to it some solution of ammonia. The silver cyanide dissolves just as the silver chloride did. I will now add some nitric acid, and I want to point out to you that nitric acid in the cold does not dissolve the precipitate, and that it is soluble only in strong boiling nitric acid. Now, so far, the distinction between the chloride and the cyanide is not very marked.

Now I will heat some of the precipitate on platinum foil. First of all, of course, the water has to be driven off. You will notice that it does not begin to rocket like the oxalate did, and it has not yet melted and run together like the chloride did. I ask you to watch for the cyanogen gas being driven off, when you will see it inflame. That is the point of the matter: that whereas the chloride dries up into a horny sectile mass and lies very tranquil, the oxalate is driven about in rockety forms, while the cyanide dries up and melts, and gives off a gas which burns with a red flame. Prussic acid, being volatile, may be tested so as to show its volatility. I have here some watch-glasses,

and into them I will pour some prussic acid. I now take a microscope slide and put on it some solution of nitrate of silver, and invert it over a watch-glass. I will now put a drop of ammonium sulphide on a slip and invert that over another watch-glass. On the third slide I will put some solution of caustic potash, and invert that over a third watch-glass. The first slide becomes milky from precipitation of silver cyanide. I take the second slide and dry it gently over the lamp, and then with a glass rod I moisten it with perchloride of iron, when I get the sulphocyanide of iron formed with a red colour. To the third slide I add a drop of solution of ferrous sulphate, and then a drop of dilute hydrochloric acid, with the result that prussian blue is developed. If you suspect that the contents of the stomach contain prussic acid, you can put them into a moderately narrow-mouthed jar, stand the jar in warm water, and invert above the top of the jar a plate of glass with some of these test solutions upon it.

Now prussic acid not only occurs in the laurel, but it also occurs in many rosaceous plants, and in the kernels of a great many fruits, as you are aware. The apple, the apricot, the peach, and so forth contain it.

When rich people commit murders the defences are often exceedingly ingenious. In the early forties a noted murder took place at Slough, in Bucks, and it was done with prussic acid. It was perpetrated by a man named Tawell, who had a great reputation in the city of London for piety, but, not only was that so, but he had a great reputation for profligacy in Slough, and he murdered his mistress, who lived in a house at Slough, with prussic acid. In this case the defence set up was that the prussic acid found in the stomach came from the pips in an apple tart which deceased had eaten for her dinner. Tawell's murder of his mistress was noteworthy from another point of view, namely, that it was the first time that the electric telegraph was used for the capture of a criminal. Tawell got into the train at Slough, and the officers there wired

to the police authorities at Paddington, who met him on the platform and took him into custody. Of course it caused a great deal of excitement, and the case was a very noteworthy one.

Bitter Almonds.—Not only may you have lethal results from prussic acid and from cyanides, but also you may get them from oil of bitter almonds. Oil of bitter almonds is obtained from the bitter almond, and the symptoms are precisely similar to the symptoms of prussic acid poisoning. A very notable case of poisoning with oil of bitter almonds was one which occurred at the close of the last century, namely, *The King* v. *Donellan.* The case is interesting because John Hunter, who divides with Harvey the honour of being the greatest man the medical profession has ever known, was a witness. The case was as follows: In 1780 Captain Donellan was put upon his trial for the murder of his brother-in-law, Sir Theodosius Boughton. Captain Donellan and Sir Theodosius Boughton lived in the same house, and the former would benefit pecuniarily by the death of the latter. Sir Theodosius Boughton was a young baronet suffering from slight venereal disorder, for which the apothecary had ordered a draught. At 7 A.M. on the 29th of August 1780, his mother came into his bedroom, and by the desire of Sir Theodosius Boughton administered to him the "purging draught" which had been ordered. The draught was noticed by his mother to "smell of bitter almonds." Sir Theodosius Boughton died, half an hour after taking it, in convulsions. While Sir Theodosius Boughton was dying, Captain Donellan came into the room and emptied and rinsed out the bottle into the washing basin. Captain Donellan had a chemical "still" in his room, which he had given to one of the servants to clean a few days previously, it having been recently used. The medicine furnished by the apothecary had contained no oil of bitter almonds. Sir Theodosius Boughton was exhumed, and signs of venous congestion were found,

John Hunter was called as a witness in the case, and he attested: (1) that the post-mortem signs were all due to putrefaction; (2) that death might have been due to apoplexy, and the head not having been opened it was impossible to say whether this were so or not. Being asked in cross-examination whether the fact of a man in perfect health dying convulsed immediately after swallowing a draught did not point to poison, he replied, "If I knew the draught were poison I should say most probably that the symptoms arose from that; but when I do not know that the draught was poison, when I consider that a number of other things might occasion his death, I cannot answer positively to it." Hunter admitted that it was not very probable that Sir Theodosius Boughton died of apoplexy. The final question put was: *Court:* Give me your opinion in the best way you can, one way or the other, whether, upon the whole of the symptoms described, the death proceeded from that medicine, or any other cause? — I do not mean to equivocate, but when I tell the sentiments of my own mind, what I feel at the time, I can give nothing decisive. The judge (Hon. Francis Buller) made the following comments on the testimony of Mr Hunter: "For the prisoner you have had one gentleman called, he is likewise of the faculty, and a very able man. I can hardly say what his opinion is, for he does not seem to have formed any opinion at all of the matter. He, at first, said he could not form an opinion whether the death was or was not occasioned by the poison, because he could conceive that it might be ascribed to other causes. I wished very much to have got a direct answer from Mr Hunter, if I could, what upon the whole was the result of his attention and application to the subject, and what was his present opinion, but he says he could say nothing decisive. So that, upon this point, if you are to determine upon the evidence of the gentlemen who are skilled in the faculty only, you have the *very positive* opinion of four or five gentlemen of the faculty

that the deceased died of poison. On the other side, you have what I really cannot myself call more than the *doubt* of another; for it is agreed by Mr Hunter that the laurel water would produce the symptoms which are described. He says an epilepsy or an apoplexy would produce the same symptoms; but as to an apoplexy, it is not likely to attack so young and so thin a man as Sir Theodosius was; and as to an epilepsy, the other witnesses tell you they do not think the symptoms which have been spoken of do show that Sir Theodosius had any epilepsy at the time." The jury retired for about an hour, and then brought in a verdict of guilty, and Captain Donellan was executed a few days thereafter. A remarkable circumstance which came to light afterwards was that a still that had been recently used was discovered on the premises. Donellan was so bad a chemist that on being asked for what purpose he had procured this machine, he replied "that he used it to make lime-water to kill the flies"; not knowing that lime-water could only be made by saturating water with lime, and that a still never was and never can be applied to such a purpose. But in his laboratory there happened to be a single number of the *Philosophical Transactions*, and of this single number the leaves had been cut only in one place, and this place happened to contain an account of the mode of making laurel-water by distillation. That circumstance would have been particularly damning if it had been brought out at the trial. I read you that case because it is of interest not merely from the toxicological point of view, but from its being the only instance on record, I believe, in which John Hunter was in the witness-box. And he made, as every scientific man must make, a thoroughly bad witness. The lawyer likes a witness who makes up his mind and gives only one side of the question. But it is quite impossible not to agree with all the doubts that Hunter gave; and it points to the fact that a man with a scientific mind makes what

the lawyers call a bad witness, because it is the custom to call witnesses on one side or on the other.

Nitro-benzole.—Not at all unlike bitter almonds, and not at all unlike prussic acid, is nitro-benzole, which is one of the tar products used for giving the odour of prussic acid to sweets. This makes paper feel greasy, and if I burn it, it burns with a sooty flame, as you see. It is a thick oily liquid. It produces symptoms somewhat similar to those of prussic acid — insensibility, narcotism, and slow respiration, and sometimes great cyanosis of the face. The action is very much slower than that of prussic acid. It acts very much more slowly, and is very much more difficult to get rid of, than prussic acid. You know you have got nitro-benzole because you get a negative result with the tests for prussic acid. The only positive test for nitro-benzole is to reduce it to aniline, and you can only do that by distilling in the presence of nascent hydrogen. That is not a lecture-room experiment. But you may reduce it to aniline and apply the tests for aniline.

Aniline.—If taken in large quantities, is a poison and has an irritant effect. But the fatal cases are very few and far between. Aniline is a coal tar product, and it is the parent of an enormous number of bodies which are used in medicine. Some of the pharmaceutic preparations, such as antifebrin and others scarcely less important, possess the quality of giving a coloration to the skin, and sometimes aniline acts very powerfully in that way. I remember some years ago it was suggested that aniline might be used as an inhalation in cases of phthisis; I got the apparatus, and it was used in my wards. One of the resident students coming round and finding this new inhalation, going forward, quite properly examined it; he took the cork out and smelt it, and he got two or three drops of the fluid to be inhaled upon his lips. As a result of that, when he went down to luncheon in the students' room, he was unconscious of anything the matter with himself,

but his friends began to make personal remarks because of the blueness of his lips. Clearly he was cyanotic at the tips of the ears and the lips as well. The condition lasted for more than a day. It had been noted that where aniline had been taken there was cyanosis. I remember being asked to see a case in Dr Ringer's ward last year of a woman who had been in the habit of taking, I think it was a preparation known as antifebrin for headaches, and she had this cyanotic tint exceedingly well marked in the tips of the fingers and the tips of the ears and the lips. The question is, what is this cyanotic tint? It is said that many of these bodies act as antipyretics by depressing the oxidising action of the hæmoglobin, and that they interfere with the natural oxidation which goes on in the healthy body and in the diseased body, and in that way by stifling the fire they act as antipyretics. But it is very certain that when these aniline bodies have been taken, the cyanotic tint and the evidence of dyspnœa bear no proper relation to each other; that very often a person may be intensely cyanotic, while there is very little shortness of breath or discomfort. Now, aniline has a characteristic odour, and when pure it is white. Aniline is the parent of modern colours. We are all familiar with aniline dyes, and by treating the parent aniline in various ways and getting different degrees of oxidation and different chemical combinations we have got an enormous variety of colours. It is a characteristic of aniline that as it oxidises it changes colour and gets dark red. One of the characteristics of aniline is its smell, and it is hardly soluble in water at all. The oily globule which I put into this water has sunk to the bottom of the tube. One of the best tests for aniline is a solution of bleaching powder. I have here some solution of bleaching powder, and to it I will add some exceedingly weak aniline, when you see I get a very deep purple colour.

CHAPTER XVIII

ALCOHOL—ANÆSTHETICS—PHENOL

Alcohol.—Effects and Symptoms of Alcoholic Poisoning—Acute Poisoning by Alcohol: Illustrative Case—Criminal Poisoning by Alcohol: Case of *Regina* v. *Paine*—The Post-mortem Appearances—Tests.

Anæsthetics.—Alcohol as an Anæsthetic—Æther and Chloroform—Symptoms of Chloroform Narcosis—Dangers—The Glottis in Laryngeal Stertor—Correlation between Descent of Diaphragm and Opening of Glottis—Hiccup—Whooping-Cough—Abductor Paralysis of Vocal Cords—Laryngismus Stridulus—Marshall Hall's Experiment—Death by Chloroform—Preparation of the Patient—Treatment—Detection of Chloroform—Ether.

Chloral Hydrate.—Properties—Tests.

Carbolic Acid.—Properties—Poisoning by Carbolic Acid—Symptoms—Post-mortem Appearances—Poisoning by External Application—Treatment—Tests.

Alcohol.—The next poison is alcohol, and it is too common a one to need any detailed description. But what is the effect of alcohol? Alcohol taken in small quantities undoubtedly affects the brain first of all, and it is a question whether alcohol ever does any good to the brain. It is a very nice question, and I am not going to answer it categorically. It is certain that the Psalmist spoke of "wine which maketh glad the heart of man"; and there is no doubt whatever that alcohol in very small quantities does, I will not say stimulate the imagination, but it relieves probably the controlling centres and allows the imagination to come into play. It is very true, I

think, that a large number of those persons who have given us the brilliant products of their imaginations have not been teetotalers; they have made a rational use of alcohol. Nobody could condemn drunkenness or excess in alcohol more than I; I believe it is productive of nothing but harm, but a dietetic use is another thing. To say that the dietetic use of it has been productive of harm is to make a grave, bold statement, and it is a remarkable fact that those races which have made abstention from all alcoholic drinks of every kind a tenet of their religious creed, have become singularly unproductive both of literature and inventions. When a man gets drunk, the main point is that he loses control. It is an old saying, "*In vino veritas*," and when a man gets too much alcohol it is said you see the true man. We all wear masks more or less, and in society we are obliged to control our emotions, and it is one of the great characteristics of civilised people that they do control their emotions and conceal their feelings. But man under the influence of alcohol does not control his emotions, and you can get a glimpse of the true man; a quarrelsome man becomes more quarrelsome; a morose man becomes more morose; a silly man becomes more silly; a melancholy man becomes more gloomy, and so forth.

With a bigger dose there is loss of muscular control, and then you get the very characteristic titubation, or staggering, which is an effect of intoxication; whether it is cerebral or spinal cord staggering it is difficult to say. I should be inclined to say it was cerebral. You get want of muscular co-ordination, you notice it in the slipshod utterance and in the double vision which are common in alcoholism. Then these symptoms increase so that the man can neither stand nor speak; and then you get the centres of respiration and circulation interfered with. A man in extreme alcoholic intoxication is cyanotic and breathing very slowly and stertorously, not at all unlike a person who is under the effects of opium, except that

pupils are usually dilated. Death from acute alcoholic poisoning is exceedingly rare, and it has never fallen to my lot to see a case; but I believe that at the London Hospital, which is near the London docks, cases have not been uncommon. And the cases of alcoholic poisoning which have been admitted there have been due to "sucking the monkey"—getting a straw through the bunghole of a spirit cask and sucking at it. The patient gets a tremendous dose of spirits into him, and sometimes dies on account of it. When I was resident medical officer at University College Hospital, I was once called to a young man, who, in a fit of bravado, at the end of what people call "a night's pleasure," drank the best part of a tumbler of pure whisky. I was called to his lodgings, and went as hard as I could with the stomach-pump. He was lying on the floor, livid, cyanotic, breathing very slowly indeed. As I got into the room he vomited, and with the vomiting he recovered. He was as nearly dead from alcohol as I remember having seen anybody.

In hospital practice, it is especially important not to mistake apoplexy for alcoholism. Do not be misled by the smell of the breath. Brandy is often poured down the throat of a man in a fit, and, of course, a drunken man is more likely to suffer from cerebral hæmorrhage than a sober one. Keep the patient under observation until your diagnosis is certain.

In connection with alcohol I will read to you a case where a man was put on trial for murder, the poison being alcohol. I read this case not so much because of its strict medico-legal importance, but because the circumstances detailed are of the kind which you are apt to be brought into contact with, and you should know the legal bearings of them.

Regina v. *Paine.* Central Criminal Court. February 1880. Before Mr Justice Hawkins. Lewis T. Paine was indicted for the wilful murder of Annie Maclean, aged thirty-three, with whom he had been living in pretended

wedlock. Maclean was a lady of good social position, and became possessed on the death of her mother of property amounting to nearly £3000. She was of intemperate habits before she became acquainted with Paine, and was deformed with a curvature of the spine. Paine, who was a commercial traveller, became acquainted with Miss Maclean before her mother's death, and the acquaintanceship was disapproved of by her relatives. On the death of the mother, Paine (who was a married man) lived with Miss Maclean as her husband, and they were generally thought to be man and wife. While living together in the autumn of 1879, in a cottage at B—, Worcestershire, there was evidence that they both indulged in alcoholic stimulants to an extreme degree, and it was also evident that Paine's influence over Miss Maclean was very great, so great, in fact, that she seemed to have no will of her own. In September 1879, Maclean made her will in Paine's favour, and he also tried, unsuccessfully, to insure her life. From September to November, Miss Maclean continued to drink too much, and there was evidence to show that she drank in obedience to Paine's "persuasion," and that she drank less when he was away from her than when he was at home. On November 3rd Maclean was moved in a state of intoxication from B— to a coffee-house in Marylebone. At this time she was "very weak," "bloated," and "swollen." Medical aid was called in, and the advice was given that her stimulants should be diminished, but, in spite of this, Paine continued to ply her with neat spirits, and on November 17th she died. Post-mortem there was found an enlarged liver, and commencing fatty change in the heart; there were no corrosions or inflammatory changes in the mouth or stomach, and the kidneys were said to be healthy. Paine was always kind to Maclean, and she always spoke affectionately of him, and there is no evidence that he ever used physical force in the administration of the spirits which accelerated her death. He

was convicted of man-slaughter, and sentenced to penal servitude for life. Now the judge summed up very strongly and adversely to the prisoner; there can be no doubt about that. I think you will gather from his remarks that it was really a case of murder. He laid down the law that in order to be guilty of murder it is not necessary that you should go and knock down a healthy man, or give him poison, or kill him straight away; but if you, by your wilful act, accelerate the death even of a chronic invalid by a single day, let us say (there is no reason why we should not say a second) by administering that which is likely to do harm, you are guilty of murder. The case is one of very great interest, because I think it is unique in the fact that alcoholic drinks constituted the murderous weapon, and it is also unique in that the murdered woman and the murderer both "drank fair." The evidence went to show that Miss Maclean was in bed, with Paine sitting by the bedside, with the table between them, upon which was a bottle of spirits. He was very nearly convicted of murder. I am not prepared to say it is not a perfectly proper interpretation of the law. Moral circumstances have always to be taken into consideration, and I suppose this man was as big a scoundrel as one could well meet.

We now come to the tests for alcohol. It really is not a very practical matter, because if alcohol is present in any quantity there can be no need for any particular tests of alcoholic fluids, and alcohol in an infinitesimal quantity may be expected to be found in the viscera or liver or any other part of anybody who is not a teetotaler. One of the best tests for alcohol is the formation of iodoform. Here is some alcohol, a drop or two, which I will dilute with water and add some iodine, and warm it. To the warm liquid I now add some caustic potash. The fluid gets clear, and then I have iodoform precipitated in a yellow cloud. The smell of it is unmistakable.

Anæsthetics.—Next we have to speak of anæsthetics.

Of course, all narcotics are anæsthetics. I remember talking to an out-patient one day. He had been a sailor and was in the Black Sea during the Crimean war, and he had to have his thigh off. That was in the days before chloroform was in common use. I remember asking this man about his operation, because those things are almost inconceivable to us who have been brought up in these days of anæsthetics. His reply was, "They gave me the best part of a bottle of rum, and I did not feel much." That was necessary, and in the days before anæsthetics, properly so-called, there is no doubt that alcohol was very largely used as an anæsthetic. Many a man who was operated upon was really half-drunk. Probably the shock without the alcohol would depress a man's heart more than the alcohol, which made him to some extent careless of pain.

Ether and Chloroform.—Next, a few words with regard to ether and chloroform. With regard to the administration of anæsthetics, you have to remember that when a person takes anæsthetics he is not only "under anæsthetics," as it is said, but he is "under surgery"; and I want you to look at this question not from the point of view of the mere physiologist, but from the point of view of the practical man. There has been a great deal of discussion of late years as to how chloroform kills, whether it kills *viâ* the respiration, or whether it kills *viâ* the circulation; that is to say, whether it stops the lungs first or whether it stops the heart first. Now, when a patient is put under chloroform, the first thing you very often notice, if you are giving the chloroform pure, is a little irritation; that is to say, the patients very often swallow and wink the eyes, and the vapour of the chloroform is evidently a little unpleasant. Sometimes in the early moments of giving chloroform there are efforts at swallowing, and that you may take as evidence that the chloroform is irritating. Then the patient becomes noisy, and very often he begins to talk

in a rambling and absurd fashion, very much like a drunken man. With the passing off of the noisy period there very often supervenes a third period, which is one of very great importance, and with which you ought all to be familiar, during which respiration stops, and there is a strong muscular contraction of a tetanic kind. The patient will get rigid, and I will not say "hold the breath," because that would imply a voluntary act; but the breath is held and the respiration stops. It is very important to distinguish between the mere noisy, obstreperous condition, and the condition in which the respiration stops and the person becomes almost the subject of tetanic spasm. When that condition occurs you must remember that respiration has stopped, and you must cease the administration of chloroform for a time until the spasm has passed off. The patient then falls into a deep, calm slumber, with the pupils contracted. The slumber gradually deepens, until all reflex movements cease; you may pinch the skin without the patient taking any notice, and you may touch the conjunctiva without there being any response. The patient being "well off," continues in a state which is hardly distinguishable from ordinary sleep. As the narcosis or anæsthesia deepens you get a deep stertorous breathing, showing that the tone of the palate is lessened. In an ordinary normal case, your next stage is one in which the laryngeal muscles lose their tone and cease to act, and you get what is called laryngeal stertor. The condition of laryngeal stertor is always a sign of danger in the administration of chloroform, and is one which requires the serious attention of the anæsthetist. It shows that the air is being drawn through an imperfectly opened glottis. When laryngeal stertor occurs, if you do not take suitable measures, the next thing which will happen will be death. Laryngeal stertor is often removed by simply pulling up the chin; why, I do not know, but it is a fact. If that does not succeed, you must take hold of the tongue

and give it a sharp tug forward. It has been debated whether or not the tongue itself, by getting to the back of the pharynx and rolling back on the glottis, obstructs the respiratory tract. It probably does in some cases; that is all I would say; but, as a rule, that is not a danger. The danger is in the non-opening of the glottis. By pulling forward the tongue the abductors of the vocal cords are made to act vigorously. Very often laryngeal stertor is spoken of as laryngeal spasm. I dissent from that conclusion altogether; I do not think we have any evidence that it is laryngeal spasm. It does not seem reasonable, when all the voluntary muscles have struck work, that the laryngeal muscles should take on an opposite line of action. It is really a state of paralysis. If you watch a patient with the laryngoscope you will see that every time the diaphragm descends the glottis opens, and with every inspiration you see the vocal cords separate. There is a due relation between the force with which the diaphragm descends and the degree to which the glottis opens, and if that due relation is maintained the respiration is normal and not accompanied by stertor. But directly the relationship is altered you get the stertor. Laryngeal stertor occurs in cases of hiccup, because hiccup is a forcible descent of the diaphragm, irrespective of any respiratory need; it is a reflex spasm of the diaphragm often due to irritation of the stomach. The diaphragm goes down, but the vocal cords do not separate. Again, you get laryngeal stertor in whooping-cough. Why? You watch a child with whooping-cough, and you will often see it seize hold of something. Very often it will continue to cough—entirely expiratory efforts—until it has got the lungs as empty of air as it can, and then, when the little thing is blue in the face, with protruding eyes, and you think it will be stifled, the diaphragm goes down with tremendous force, and the indraught of air is so great that the opening in the glottis bears no proper proportion to it, and you get the loud

inspiratory whoop of whooping-cough. That is not laryngeal spasm; there is no evidence of that at all; it is an insufficient opening of the glottis in proportion to the very forcible descent of the diaphragm causing a tremendous inblast of air. Again, there is a disease known as abductor paralysis of the vocal cords. In abductor paralysis you find the voice is normal; the patient can speak perfectly well, but he cannot run upstairs, and when such patients try to run upstairs they say "their breath shuts on them"; that is, with the forcible descent of the diaphragm caused by the rapid movement, the vocal cords are not able to separate sufficiently, and you get the laryngeal spasm.

Again, take laryngismus stridulus. That, I feel sure, is not a spasm. It is a condition which occurs in a flabby, rickety child, and the real cause of laryngismus stridulus is that the glottis does not open. The child wakes out of its sleep and suddenly finds that the vocal cords do not separate. I suppose none of us have ever gone through that little experience; but nothing can be more alarming than to suddenly wake up and find you cannot get your breath, and that the harder you try the more the glottis is pulled together. In laryngismus stridulus sometimes the child gets nearly asphyxiated, and has convulsions, which are called "carpopedal contractions." Because there are those contractions of the hands, the result of asphyxia, people have rushed to the conclusion that laryngismus stridulus is a spasm. I do not believe it at all. It may not be a paralysis; but it is a flabbiness of the larynx, so that it does not open properly. If you take a dead larynx, as Marshall Hall did, and tie a suction-bellows into the lower end of the trachea, and then work the piston gently, the air comes in through the glottis; but directly you give a tug at the piston, and thus imitate a forcible descent of the diaphragm, the soft parts about the upper part of the larynx draw together, and inspiration is impossible. We are always

finding that happen with our aspirating machines. If you get too forcible a vacuum and too flabby a tube, you get the sides of the tube sucked together, and consequently fail to aspirate. I believe it is exactly the same with laryngismus stridulus. If you want to get a child with laryngismus stridulus to breathe, you stimulate it by a cold douche and by letting in air, and so forth. Laryngeal spasm is one of those things which nobody ever saw. Of course, when you get a noise, it is all very well to call it a spasm ; but the fact that there is a noise is no evidence of spasm—a strong involuntary muscular spasm I do not think one can say takes place. So that I am inclined to think that in chloroform narcosis the last thing is the failure of the vocal cords to be drawn asunder by the posterior crico-arytænoids, and other abductor muscles. In the great majority of cases death under chloroform supervenes *viâ* the lungs, and the best safeguard to the patient is knowledge on the part of the anæsthetist as to how these troubles come about, and what are the signs of danger. There is, however, no possibility of doubt that a great many patients die on the operating table from syncope ; whether that syncope be due to the chloroform or to the surgery does not matter at all ; but as practical men you have to recognise the fact that patients do die from syncope. It was my duty at one time, when I was resident medical officer, to give anæsthetics very often, and I have seen several patients faint, and have been able to stop the operation. The patient suddenly turns pale and beads with perspiration, and, if the anæsthetist is not looking after his patient carefully, he will get fatal syncope. I take it that before the days of anæsthetics there were deaths upon the operating table, and probably they were deaths from syncope, induced by the frightful shock of the operation. I remember one case when I was resident medical officer, but I was fortunate enough not to be giving the anæsthetic. It occurred in the out-patient room. A little boy had come from the country

to be operated upon for squint. He was put upon the table, and the anæsthetic was still only half administered when he died. That undoubtedly was a case of syncope. When we came to investigate the matter we found that, in the first place, this boy was under the apprehension that he was to undergo an operation, and that he was to have his eye cut. A human being gets into a state of nervous excitement, which very often interferes with the appetite and digestion and so forth. He was brought up in the early morning, and was told he was not to have any dinner. That was all right; but we found this child had been practically without anything to eat, although it was a cold day, and the anæsthetic was given at three o'clock in the afternoon, and he had got into a very depressed condition before the operation. I think sometimes that is the cause of the trouble. You have always to be careful to see that the patient has not been starved, but that he has had some liquid easily-digestible food two or three hours before the operation begins.

The treatment of chloroform narcosis is by stimulants. You give the tongue a sharp tug forward, which produces a reflex contraction of the posterior crico-arytænoids and consequent abduction of the vocal cords, and then the next step is to employ artificial respiration.

With regard to the detection of chloroform, that is not a lecture-room experiment. In ordinary cases of death from chloroform there is usually very little doubt as to the cause. There is only one case which I know of in which a man died from an internal administration of chloroform. If doubts exist as to whether a man has chloroform in his body, the only way of testing is to take the contents of the stomach and other viscera and distil, when you may get chloroform driven off by distillation; and then you must decompose the chloroform by passing it through a red-hot tube; the chlorine thus formed gives you a precipitate with nitrate of silver. I cannot show you that. The liquid test for chloroform, again, is not a

lecture-room experiment. It consists in adding to the chloroform fluid a little aniline and some alcoholic solution of potash, and gently heating, when an odorous body, isonitril, is given off, which would soon drive us from the room. I did it yesterday morning in my room downstairs, and the odour has not left the place yet, although the windows have been open almost continuously.

Ether.—Ether is generally considered the safer anæsthetic, but it certainly has its dangers. Owing to the irritating nature of the agent, catarrh of the respiratory passages is readily excited, and may induce severe cyanosis and other signs of impaired respiratory function. The pharynx should be frequently sponged free of mucus, the head turned to either side, and the lower jaw pushed gently forward by pressure of the finger on the ramus in a forward direction; if this fails, then the tongue should be withdrawn with tongue forceps: should cyanosis persist it may be necessary to give oxygen inhalation, or even to change to chloroform, a procedure which is generally quite safe. Failure of pulse is not common in ether narcosis, unless the operation is very severe or prolonged; a little less ether and more air, or the use of oxygen, will often remedy this; or it may be necessary to give strychnine hypodermically, or warm saline solution and brandy per rectum, or hypodermically. The pupil is of little service either as a means of estimating the depth of narcosis, or as a danger signal. In some cases, however, especially where there is much shock, and the narcosis for the purposes of special operation is deep, the pupil will dilate to an extreme degree; if the ether is not reduced, the breathing may become extremely shallow and at last fail, though as a rule only temporarily; such an occurrence is, however, undesirable, and is disconcerting to an operator who is accustomed to the rather deep noisy respiration of ether narcosis.

Ether should not be administered to children, to the aged, or to those who are the subject of grave respiratory

or cardiac disorders. Narcosis has occurred from personal administration of the drug for relief of pain, etc., but the cause is soon discovered from the noisy stertorous breathing, the appearance of the face flushed and often covered with perspiration, the smell of ether in the breath, and by the subsequent, rather rapid, return to consciousness, often accompanied by sickness.

The complicated gas and ether apparatus is very liable to become a source of danger to patients, causing septic bronchitis or pneumonia; this is remedied in all modern patterns by arranging the apparatus so that it can be taken to pieces and each part rendered aseptic.

Chloral Hydrate.—Allied to chloroform is *chloral hydrate*, which is a familiar drug. You know the little irregular crystalline particles of which it is composed; and you know the familiar smell of melons. I will put some on platinum foil and heat it over a lamp. It melts, and leaves a little white residue. Neither chloroform nor chloral are combustible: therefore chloroform is often a much more convenient anæsthetic than ether. I will make a weak solution of chloral hydrate and divide it into two parts. To one part I will add a little ammonium sulphide. There is no immediate change. I will put it aside. You will see it first becomes milky and yellow, then it turns to fine pink, and then salmon colour. To the other I will add some caustic potash, and I get the smell of chloroform.

Carbolic Acid.—Carbolic acid, or phenol, is a poison of great practical importance. It is largely used as a disinfectant; it is a common household necessity, and has caused death very many times. The cases have usually been accidental. When strong it is an oily-looking fluid, slightly coloured, and has been given by the mouth and administered as an enema in mistake for castor oil.

Phenol is one of the now innumerable bodies which we get from coal tar. Its formula is given as C_6H_5OH. Although called an acid, and capable of feeble and

doubtful combinations with bases, it is neutral to test paper, and has more affinity with alcohols than with acids.

It is very important to remember this. It is called an acid, and it has irritant and corrosive properties, and the student is apt to jump to the conclusion that, as a poison, it must be classed with corrosives. This is an error, because its narcotic power, which it shares in common with many other alcohols, quickly makes the patient unconscious of irritation or corrosion.

The following cases are fairly characteristic.

Poisoning by Carbolic Acid.—(Ferrier, *British Medical Journal,* February 15, 1873.)—John W., æt. 7, a boy in Central London District School, Hanwell, was found at four in the morning of January 30th lying unconscious on the floor and breathing stertorously. There was complete muscular relaxation and anæsthesia. Pulse feeble, rapid, 160, temperature "greatly lowered." Pupils strongly contracted, saliva flowed from the month. All efforts to rouse him failed, and he died at 10.45, about seven hours after the first symptoms.

P.-M. (twenty-four hours after death).—Great congestion of the brain. General venous congestion in thorax and abdomen, the blood being very dark and fluid. Lungs congested, the seat of both vesicular and intercellular emphysema. The mucous membrane of mouth, throat, stomach, and œsophagus was white, sodden, and corrugated, but not detached; some injection at cardiac end of stomach, but no capillary hæmorrhage. Liver, spleen, and kidneys hyperæmic. Urine of slight olive greenish tint and peculiar mixed odour; contained no albumen. The tissues generally, but especially the upper part of the alimentary canal, smelt of carbolic acid.

Bromine water (Landolt's test) added to the urine gave a copious yellowish precipitate of tribromophenol.

Here is another case. On February 13, 1873, a woman aged forty-four, suffering from emphysema and bronchitis, was given, by a mistake of the nurse (at a

hospital), nearly a fluid ounce of impure commercial carbolic acid.

When seen by the house-physician she was sitting up in bed labouring under great dyspnœa, and apparently suffering great pain, the situation of which she indicated by pressing on the sternum. She was very restless, and groaned repeatedly. Breath smelt of carbolic acid, interior of mouth and lips was charred white, and there was a brown scar on the chin. Pulse 140, feeble; she swallowed an emetic of sulphate of zinc and oil with great difficulty, and soon lost the power of swallowing entirely. The stomach-pump was used, and the stomach washed out with warm water; the breathing became slow and stertorous, the pulse very feeble. She became comatose, and died in fifty minutes after taking the poison.

P.-M.—Brown stain on chin. The mucous membrane of mouth, œsophagus, and stomach converted into a white soft material, giving the organ very much the appearance of being covered with a thin layer of white lead, which easily peeled off, exposing a bright red surface beneath. There were a few congested patches in duodenum. The stomach was strongly corrugated, and contained about two ounces of brown fluid, smelling powerfully of carbolic acid. No smell of carbolic acid anywhere else. Left lung congested, right emphysematous, bronchial mucous membrane of both injected. Larynx and trachea natural. The ventricles of brain contained about an ounce of clear fluid.

The following case is equally characteristic (*British Medical Journal*, April 23, 1881).—A man, aged thirty-nine, took a wineglassful of strong carbolic acid at 11.30 A.M. on January 4, 1881. He was brought to King's College Hospital at twelve. Comatose; stertorous breathing, 36 per minute. Lips shrivelled and white; breath smelt of carbolic acid; one or two scars round angle of mouth. Eyeballs prominent; pupils contracted, insensible to light; complete anæsthesia. Pulse full, soft, intermittent, 120.

Temperature 95° F. No convulsions, no vomiting; urine and fæces retained. Stomach-pump was used, and sinapisms were applied. Death occurred at 1.35 P.M., preceded by profuse perspiration about head and neck.

P.-M. (twenty-six hours after death).—Post-mortem staining and rigor mortis well marked. Blood fluid, and filling all the cavities of the heart, of a mulberry colour, and with a faint odour of carbolic acid. Mucous membrane of stomach almost entirely eroded, "and lay in lines along the posterior surface, looking and feeling like whipcord." The mucous membrane of œsophagus "gathered into folds and looking like cigarette paper." Organs generally congested.

In these cases you will notice there was unconsciousness, contracted pupils, stertorous breathing, quick pulse, and low temperature. The skin is clammy and moist, and but for the history and the well-known smell of the poison, such cases might readily be mistaken for opium poisoning. Although the acid is very irritating, it does not cause perforation of the stomach because of its great coagulating effects on albuminous tissues. Again, it differs from the common irritant poisons, inasmuch as vomiting is the exception and not the rule. The bowels are inactive, and the urine tends to develop a brown colour after it has been passed some time.

The congestion of the organs post-mortem is due to the mode of death, the respirations slow down and the heart's action continues, and hence we get the post-mortem signs of asphyxia.

External Application.—Absorption by the skin has led to equally fatal and no less rapid results than internal administration.

Three very remarkable cases of this kind have been detailed by Machin (*British Medical Journal*, February 1868). Three women afflicted with scabies had their skin rubbed with carbolic acid in mistake for sulphur lotion. All three rapidly became unconscious, and two of them

died. Hoppe-Seyler (*Pflüger's Archiv für Physiologie*, v., 1872) also relates two similar cases. Two apprentices, suffering from scabies, while rubbing each other on the hand and back with a mixture of carbolic acid, water, and alcohol, of which carbolic acid formed about one-eighth, were, during the process, suddenly seized with giddiness and intoxication, and both fell into a state of stupor. One of them died in this state, while the other ultimately recovered, and remembered nothing, except the feeling of tension in the head and giddiness which he experienced at the first. (*London Medical Record*, February 26, 1873.)

When called to these cases it is very important to use the stomach-pump and wash the stomach out. In consequence of the deeply comatose condition emetics often fail to act. If you have it at hand you may give an injection hypodermically of 10 minims of the Injectio Apomorphinæ Hypodermica. The best treatment is to administer sodium sulphate tolerably freely. Albuminous fluids, such as white of egg and milk, may be given with advantage.

The best test for carbolic acid is the smell, which is powerful, persistent, and very characteristic. Ferric chloride strikes a violet colour in dilute solutions ; but this is not a very delicate test, and when the quantity is so small as not to be detectable by the nose, the ferric chloride test will often fail.

By far the most delicate test is bromine water, which gives a white flocculent precipitate, with very minute quantities of phenol. From an organic mixture you may get the carbolic acid by distillation.

I here have some thick arrowroot, which I will ask you to imagine has been taken from a stomach. I add thereto a drop of phenol, and place it in a big test-tube. The test-tube is closed by a cork, perforated and fitted with a long glass tube, bent to an angle rather less than a right angle. I allow the end of this tube to dip into some bromine water contained in a second test-tube, and then I apply heat by means of a spirit lamp to the first tube con-

taining the arrowroot. We are soon rewarded by seeing a clear drop slowly sliding down the long glass tube towards the bromine water, and so soon as it touches it a whitish flocculent precipitate is produced. It is advised that the contents of a stomach before being subjected to distillation should be made acid by the addition of sulphuric acid. The object of this is to free the carbolic acid from any feeble combinations into which it may have entered.

N.B.—I am indebted to Dr Batty Shaw for the paragraphs relating to Ether on pp. 267-268.

CHAPTER XIX

HEMLOCK—NICOTINE—ATROPINE

Hemlock.—Symptoms of Hemlock Poisoning—The Death of Socrates—Death by Hemlock Poisoning—Hemlock and Curara Compared.

Nicotine.—Symptoms induced by Nicotine—Tobacco Poisoning.

Atropine.—Symptoms of Atropine Poisoning—The Delirium caused by Atropine—Case of Dr Sharpey—Tests.

AMONG indigenous poisons is *Conium maculatum*, or *spotted hemlock*,* belonging to the natural order Umbelliferæ. This causes a widespread peripheral paralysis. There are usually some sensory symptoms, but the want of power is perhaps the most important fact. I always like to give leading cases, and the leading case of conium poisoning is *The State* v. *Socrates*. The record, as given by Plato, of the death of Socrates is, I believe, as good an account of conium poisoning as you could have. It has been doubted whether the conium which killed Socrates was the same plant that we know. Whether that be so or not it had the same physiological properties. At all events I do not think it is right that anybody who has attended a class on medical jurisprudence should be ignorant of such an important case of poisoning as this.

* There are other plants of this order, such as œnanthe crocata or wild celery, and cicuta virosa or fool's parsley, which are often called "hemlock," and which, especially the former, are violent narcotico-irritant poisons.

Socrates was condemned to death by poison at Athens in the year 399 B.C., having been judged guilty (1) of disbelieving in the gods received by the State, and (2) of teaching the Athenian youth not to believe. Plato, in his discourse called "Phædo," recounts how Socrates spent the last day of his life in discussing with his friends the question of the immortality of the soul, which he settled in the affirmative. Socrates concludes his discourse with these words, "that man ought to be confident about his soul who, during his life, has disregarded all the pleasures and adornments of the body as foreign from his nature; and who, having thought that they do more harm than good, has zealously applied himself to the acquirement of knowledge; and who, having adorned his soul not with a foreign, but with its own proper ornament, temperance, justice, fortitude, freedom, and truth, thus waits for his passage to Hades as one who is ready to depart whenever destiny shall summon him. You, then, my friends, will each of you depart at some future time; but now destiny summons me, and it is nearly time for me to betake myself to the bath; for it appears to me to be better to drink the poison after I have bathed myself, and not to trouble the women with washing my dead body." After exhorting his friends to live in the doctrines which he had inculcated, and after insisting that when dead he (Socrates) would no longer be inhabiting the body which they saw, and that as for that body they might bury it in such a manner as was pleasing to them and "most agreeable to the laws," he betook himself to his bath. (I may say in parenthesis that that always seems to me one of the wisest things that Socrates ever did, namely, to direct that they were to deal with his dead body in a manner "that was pleasing to them and most agreeable to the laws.") Having bathed, he saw his two children and the women of his household, and having given them such injunctions as he wished, he directed the women and children to go away, and then returned to his friends. When he came from bathing it was near sunset,

and then the officer of the eleven came in, and, standing near him, said :

"Socrates, I shall not have to find that fault with you that I do with others, that they are angry with me, and curse me when, by order of the Archons, I bid them drink the poison. I have ever found you the most noble, meek, and excellent man that ever came into this place. You will bear what is inevitable as easily as possible, for I come to announce to you farewell." And, at the same time bursting into tears, he turned away and withdrew, and Socrates, looking after him, said, "And thou, too, farewell, we will do as you direct" ; and, turning to his friends, he said, "How courteous the man is ; but come, let us obey him, and let some one bring the poison, if it be ready pounded ; but, if not, let the man pound it." One of his friends urged upon him that the sun had not yet set, and that he might still delay for a time, but Socrates replied, "I think I shall gain nothing by drinking a little later, except to become ridiculous to myself, in being so fond of life, and sparing of it when none any longer remains. Go, then, obey, and do not resist."

After a time the man who was to administer the poison entered, bearing it ready pounded in a cup, and Socrates, seeing the man, said, "Well, my friend, as you are skilled in these matters, what must I do?"

"Nothing else," he replied, handing the cup to Socrates, "than when you have drunk it walk about until there is a heaviness in your legs, then lie down, and thus it will do its purpose."

And Socrates, having received it very cheerfully, neither trembling nor changing at all in colour or countenance, but, as he was wont, looking steadfastly at the man said, "Is it lawful or not with this potion to make a libation to any one?" and the man replied, "We only pound so much as we think sufficient to drink." "I understand," said Socrates ; "but it is certainly both lawful and right to pray the gods that my departure hence thither be happy ; which,

therefore, I pray—and so may it be." As he said this he drank off the poison readily and calmly.

When his friends saw him drink they could bear up no longer. Phædo's tears came in a full torrent; Crito had risen up unable to restrain himself; and Apollodorus, uttering a piercing cry, gave way to a paroxysm of grief, which touched the heart of every one but Socrates himself, who said, "What are you doing, my admirable friends? It was mainly for this reason that I sent away the women, that they might not commit any folly of this kind. For I have heard that it is right to die with good omens. Be quiet, therefore, and bear up."

And Socrates, having walked about when he said that, and his legs having grown weary, lay down on his back, as the man had directed him. And after a short interval the gaoler, taking hold of him, examined his feet and legs, and, pressing his foot hard, asked if he felt it. "No," said Socrates. The gaoler then pressed the thighs, and thus, going higher, showed the friends that Socrates was growing cold and stiff. Then Socrates touched himself, and said, "When the poison reaches my heart I shall depart." The parts around his belly were now almost cold, when, uncovering himself, Socrates said (and these were his last words): "Crito, we owe a cock to Æsculapius; pay it, therefore, and do not neglect it." "It shall be done," said Crito; "but consider whether you have anything else to say." To this question he gave no reply; but shortly after he gave a convulsive movement, and the man covered him, and his eyes were fixed, and Crito, perceiving it, closed his mouth and eyes.

"This," says Plato, "was the end of our friend, a man, as we may say, the best of all of his time that we have known; and, moreover, the most wise and just."

Dr Bennett met with a case which is very like the case of Socrates. A man ate a large quantity of hemlock plant in mistake for parsley, and in fifteen to twenty minutes he had loss of power in the lower extremities, and in walking

he staggered, and later his limbs refused to support him, and he fell. Hemlock kills very much in the same way as curara, and its physiological action is very similar to curara. Hemlock, at all events, causes sensory paralysis as well as motor; and, with regard to curara, that is a point which is undecided. Conium owes its potency to the alkaloid coniin, and this alkaloid is fluid and has the pungent odour of mice.

This smell is strongly developed when the spotted hemlock is pounded in a mortar with liquor potassie.

Nicotine.—Nicotine is a poison which has, I think, only been used once criminally. It was so used in Belgium by a Count Bocarmé. Now, nicotine in its pure form is a very powerful poison indeed; and it appears to be a cardiac poison, and kills the individual almost instantaneously. When tobacco is given, either by the mouth, or, as has been done, as an enema, it produces dizziness, syncope, nausea, and general muscular relaxation. Tobacco, however, is one of those poisons to which the world has habituated itself, and poisoning from tobacco is exceedingly rare. There are very few cases on record of death from tobacco smoking or from tobacco chewing. One case, however, I remember very well. After the Crimean War, in a country district with which I am acquainted, a "peace celebration" was organised, and this celebration was accompanied by games, such as climbing greasy poles, jumping in sacks, etc. Amongst the games was a "dry pipe" competition. A prize of 30s. was given to the man who could smoke the greatest amount of tobacco in the shortest time without either drinking or expectorating. I remember perfectly well seeing these fellows as they sat round a washing tub filled with coarse tobacco. There was an army of fillers, and they sat with long clay pipes. I remember one man with six long clay pipes in his mouth at once, drawing in the tobacco as hard as he could. The fun, if one may call it so, was to see the competitors sick one after the other,

and retire from the contest with what grace they might. I remember that the man who won that contest was the biggest ruffian in the district, locally known as Dick Turpin, and that he died next day. Whether he had any heart disease or not I do not know; but his death caused a tremendous disturbance, and those who had left the games before this competition overwhelmed those who had remained with epithets bred of love and sour sanctimony. The tobacco plant is a solanaceous plant, and there are other plants of this order which contain poisonous alkaloids, of which the best known is *atropine*. One hears also of solanine, daturine, and several others, but they all act very similarly.

Atropine.—Now, the effects of the *atropa*, belladonna, or its alkaloid atropine, are very interesting. The first thing that happens after a poisonous or a lethal dose of atropine is dilatation of the pupil, and that is followed by great dryness of the throat, and the patient is always trying to swallow because of the dryness. The next symptom is delirium, and the delirium from atropine is a very curious one. I think it is very different from the mental condition of opium, and from the mental condition of alcohol. The delirium has been an "everyday delirium," in which the patient imagines he is about his ordinary business, or wants to go about his ordinary business. There is a case on record in which a number of monks in a monastery took the leaves of the belladonna plant and cooked them by mistake. And they did what has been recorded in other cases; they went about their duties in a silly way at the wrong time. They got up in the middle of the night and chanted morning service and rang the bell. Another point is that not only is the pupil dilated, but the muscles of accommodation are more or less paralysed and out of gear, and therefore visual hallucinations are common, in fact the patient with belladonna poisoning often sees things and tries to catch at things which are not present. With the dryness of the throat there is great dryness of the skin,

and there is a very rapid pulse, sometimes as much as 120 to 130; and even 160 has been known. There is also giddiness. Occasionally there has been noticed a scarlet rash upon the skin, but this occurs with many poisons, and is not peculiar to any one. Bloodshot eyes have also been noticed. Poisoning has arisen from eating the plant; and children have taken glycerine and belladonna in mistake for syrup because of its sweet taste. There is often irritation of the bladder. The post-mortem signs are of no value. I can give you no better illustration of atropine poisoning than by telling you of Dr Sharpey, the Professor of Physiology in this College, and for many years Secretary of the Royal Society.

In the year 1873, Dr Sharpey was operated upon for cataract. Later in the year (on September 18th) he journeyed from Scotland to London. On the 21st he took 60 to 80 drops of solution of atropia in mistake for quinine. This was "in the forenoon." Believing the solution to be weak, and that no ill-effects would follow, he continued looking over his papers. About one o'clock he went into his bedroom for a glass of water (feeling *thirsty*), and fell heavily upon the floor *insensible*. He remembered nothing which occurred between 1 P.M. on the 21st and 9.30 A.M. on the 22nd (20½ hours). He was attended by Professor Thane and his father and Professor Ringer.

When first seen, at 1 P.M. on the 21st, he was unconscious, incoherent, skin hot and pungent, face flushed, veins of forehead turgid, pupils doubtful, owing to cataract operation. Pulse 110, irregular, generally full, but varying much. Heart's action irregular, teeth and lips dry and covered with sordes. Very restless and very difficult to keep in bed. He became gradually more restless and delirious, and he had a constant desire to pass water. The speech was thick and indistinct.

At 5 P.M. he was delirious and drowsy. Did not recognise Dr Ringer. His attention could be attracted

by speaking loudly. Was constantly trying to dress and saying he should lose his train. Had apparently lost some control over arms and legs. He was neither quarrelsome nor ill-tempered, but attempted to reason. No paralysis nor twitching nor involuntary movement, 9.30 P.M., still delirious, refusing to stop in bed, and saying, "I shall lose my train." Voice natural. Very thirsty. From this time he gradually recovered, and was well at 9.30 on the 22nd. No rash, or pain in the head throughout. Dr Sharpey has himself described his sensations. "The first thing I can recollect is that I was struggling with people in the room. I suppose I must have been very fractious in my delirium. I imagined that I had to go off by train, which started at ten in the morning, and that the hour was approaching, whilst I had nothing ready for the journey; and I believe that I wished to dress and pack my things, but was thwarted and prevented by the people about me. At length I was persuaded that it was too late to catch the train, and agreed to wait till the evening. (I may here explain that I had come from Scotland by rail on the previous Thursday.) I then became sensible that I was lifted into bed and ordered on no account to rise, which I thought a most unreasonable restraint, especially as I was tormented with irritation in the bladder and almost incessant desire to pass urine, which was in very small quantity. In this way I passed a very restless night, but slept fairly in the morning. Meanwhile, my head began to clear, I remembered having taken atropia, and then was able to attend to my condition with some degree of intelligence. I had an intense feeling of dryness in throat, which I knew to be an effect of the poison; this abated towards morning, and then, although I could move my body and limbs, it was only by great effort; and when I raised my arms, they felt as if made of lead. This I ascribed to partial paralysis of the motor nerves, and I watched with some interest the return of power

as the night advanced. As to my sensations, they were not blunted, but I misinterpreted them. Thus, I felt a wet cloth on my head, but supposed I had been out in the rain without my hat; and a dose of bromide of potassium given to me I recognised as a saline solution, but imagined it was mineral water from the Airthry Spring, which I had tasted on the spot some ten days before" (*Lancet*, September 27, 1873).*

With regard to testing for atropine, there is no chemical test for it which is of much value. You can make sure that you have an alkaloid present, you can make sure that it is not morphia, and not strychnia, and so forth. Having found that you have an alkaloid, the next point is the physiological test. Put some of the extract into the eye of an animal, and if you get dilatation of the pupil that is more reliable than anything.

* In treatment, see Appendix, p. 493.

CHAPTER XX

STRYCHNINE

The Rugeley Case—Trial of William Palmer—Symptoms of Strychnine Poisoning—Treatment—Tests.

Strychnia is one of the most deadly poisons known. It was discovered by the French chemist Pelletier in 1818, who extracted it from the seed of the strychnos nux vomica. It is largely used in medicine, and it enters into the composition of so-called "vermin-killers." In the quinquennium 1863-67 there were 41 deaths from strychnia and 20 from vermin-killer. In 1890 I find there were 19 deaths from strychnia and 10 from vermin-killer. Of these 29 deaths 4 were accidental, 24 were cases of suicide, and 1 (a child) was a case of murder. Quite recently (a few months ago) a man was convicted of murdering a woman at St Neots with strychnia.

It is not improbable that strychnia was used by the murderer in the early years of this century more often than is suspected. In 1835 a certain Wainewright probably murdered with strychnia a Miss Abercromby, whose life he had heavily insured, and who had made a will in his favour. Miss Abercromby died suddenly with all the symptoms of tetanus. The circumstances were so peculiar that the insurance offices refused to honour the policies, and Wainewright left the country. This is not the only time that strychnia has been connected with insurance frauds. The most notable trial in

that connection was that of Palmer, a surgeon at Rugeley, in Staffordshire; and I think that it may not be uninteresting or unprofitable if I put you in possession of the whole of the moral circumstances connected with the crime of this unworthy member of our profession.

Trial of William Palmer.—The trial of William Palmer, aged 31, surgeon, of Rugeley, Staffordshire, for the murder of John Parsons Cook, commenced on May 14, 1856.

Palmer was in debt owing to speculations on the turf. On September 29, 1854, his wife died. Her life was insured for £13,000, and with the money he paid some of his debts.

At the time of the Shrewsbury races, in November 1855, bills bearing the forged acceptance of his mother were due against him to the amount of £11,500.

During the year 1854 he had insured his brother's life for £13,000. His brother died in August 1855. The office refused payment. In May 1855, Cook backed one of Palmer's bills for £200.

In August 1855, Cook backed another of Palmer's bills for £500, two of Cook's racehorses, "Polestar" and "Sirius," being assigned as security. The money was ostensibly for Cook, but Palmer forged Cook's endorsement on the cheques, which were made payable to Cook's order, and Cook never saw the money.

In September 1855 he attempted to insure the life of one Bates for £25,000, but failed.

At the beginning of November 1855, Palmer was in great danger of being arrested for debt or of having his mother arrested, because of his having forged her name, and of having his forgeries discovered. On November 13th, Cook's horse "Polestar" won a race at Shrewsbury, and Cook became entitled to £2050. Within a week of this time Cook died.

Cook was twenty-eight years old, not very strong, and had been under treatment for sore throat, etc., a few months before his death.

Palmer and Cook occupied the same sitting-room at the "Raven" at Shrewsbury. On the evening of November 14th, Fisher, Cook's racing agent, went into Palmer and Cook's room. They were drinking. Cook said to Palmer, "You will have some more?" "No," said Palmer, "not unless you finish your glass." Thereupon Cook, taking up his tumbler and draining it at a gulp, exclaimed, "Good God! there is something in it that burns my throat." Palmer took up the glass and drank what remained, saying, "There is nothing in it." Shortly after this Cook was noticeably ill, and vomited violently and frequently. Cook was better the next day, and in the evening he and Palmer went to Rugeley, Cook lodging at the "Talbot," just opposite Palmer's house.

On the night of the 14th Palmer had been seen in his room at the "Raven" looking at a glass of liquid, which he was holding to the light. On the evening of the 16th Cook went to bed pretty well. On the morning of the 17th Palmer saw him early. He ordered him some coffee, which was brought up by the chambermaid and given into the hands of Palmer. Cook drank the coffee and the same symptoms that he had had at Shrewsbury recurred. Throughout the whole of the 17th and 18th Palmer administered everything to Cook. Palmer sent Cook some broth, but Cook could not take it—he vomited so much. The broth looked so nice that the chambermaid took a couple of spoonfuls, and she was shortly afterwards seized with vomiting.

Palmer called Cook's illness "bilious diarrhœa." A local practitioner was called in on the 17th. He found a quiet pulse and a clean tongue, notwithstanding the vomiting. To quiet the stomach, he ordered two pills, containing morphia gr. $\frac{1}{2}$, calomel gr. $\frac{1}{2}$, and pulv. rhei gr. 4 in each pill.

Throughout the 18th the symptoms continued the same. On the 19th Palmer went to town, and Cook was much better throughout the day. The object of Palmer's

visit to town was to get hold of Cook's turf winnings and pay his own debts with them.

On his return to Rugeley on the evening of the 19th, he got three grains of strychnia from a surgeon's assistant there. Palmer was in and out of Cook's room all the evening.

Cook took two pills about eleven, and at twelve he was seized with violent convulsions of a tetanic kind.

On the 20th Palmer bought more strychnine at a druggist's. Cook vomited frequently during the day, and a second medical man was called in. Two pills were given at bedtime, and after taking them Cook was seized with tetanic convulsions, and died.

During both his attacks of convulsions the jaws were not much affected, and he was able to swallow.

On Cook's death his father-in-law came to Rugeley. In consequence of Palmer's officiousness about the burial, the unsatisfactory condition of Cook's money matters, the loss of his betting-book, and the appearance of the corpse, a post-mortem was determined on. At the post-mortem Palmer pushed against the surgeon who was placing the stomach in a jar, and upset the contents. He also tried to make away with the jar and its contents, two slits being found in the parchment covering of the jar; and he also tried to bribe a fly-driver to upset the fly in which the jar was to be conveyed to the railway.

Strychnia was not detected in Cook's body, a fact partly due to the mixing of the contents of the stomach and intestines by the upset above mentioned, and partly also to the fact that the methods of analysis were less perfectly understood then than now.

It is supposed that Palmer prepared his victim by the administration of tartar emetic, and, finding possibly that this was a less sure poison than he had anticipated, he finally had recourse to strychnia. The circumstantial evidence was so strong that, notwithstanding the weakness of the chemical evidence, he was convicted and hanged.

The symptoms of strychnia poisoning very closely resemble those of tetanus. The alkaloid readily dissolves in the stomach, and soon after it has been swallowed (two to ten minutes) the patient is troubled with jerking of the muscles, and soon has a general tetanic spasm, beginning in the limbs and extending to the back, giving rise to so-called opisthotonos. Consciousness is retained during the convulsions; and in this respect strychnia convulsions (being purely spinal) differ from epileptiform convulsions, in which loss of consciousness is always a marked feature.

The convulsions remit, and there is a quiet interval before the next attack. The jaw and the face are implicated in the tetanic spasm, but not so early as is the case in true tetanus. Peripheral impressions—such as a touch, a sound, a flash of light—will plunge the patient into a fit. Death is caused either by exhaustion or by asphyxia, owing to the tetanic fixations of the thorax. A fatal case of strychnine poisoning is an affair of a few hours at most. The symptoms of tetanus may go on for days.

Treatment must be prompt. If possible, the best thing to do is to administer chloroform and wash out the stomach with a warm solution of potassium bromide, which appears to be one of the best antagonists, and also, according to Stevenson, renders the alkaloid insoluble. Failing these, the stock emetics must be given, and the spasm be counteracted by chloral hydrate or by the continued administration of chloroform.

The tests for strychnine are very striking. The pure alkaloid is crystalline (if it be non-powdered). It is feebly soluble in water, but readily dissolves when a few drops of hydrochloric acid are added. You see that I have here a clear solution, without odour or colour, and with an intensely bitter taste.

A drop of this solution, evaporated on platinum foil, leaves a white residue, which, in its turn, melts and inflames, leaving a black stain. The solution, therefore,

contains organic matter, and is slightly acid in reaction.

With the ordinary routine tests I get negative results, with the exception that I get a precipitate on the addition of platinic chloride. There is a dense precipitate on the addition of Mayer's solution.

The special test for strychnine and its salts is the play of colours, which is obtained by acidifying with sulphuric acid and then adding an oxidising body, such as potassium bichromate, manganese peroxide, etc. Taking a drop of the solution, and a drop of sulphuric acid, and a crystal of potassium bichromate on a porcelain dish, I gradually bring all three in contact by means of a glass rod. Immediately I get a dark-blue coloration, which quickly becomes purple, and the red element increases until the stain, from being blue, has become a rich orange-red. It is the series of colours, and not any one colour, which constitutes the test.

This play of colours may be obtained by electrolysis, the colours being developed at the positive (oxidising) pole.

CHAPTER XXI

ACONITINE

Aconitism—Action of Aconite—Aconitine—Aconitine Poisoning—The Lamson Case—Symptoms—Post-mortem Appearances—Analysis of Viscera.

Aconite. — Aconitum napellus, otherwise known as monkshood or nunshood, is a common, highly-decorative plant, very popular in cottage gardens, and which, when once established, is difficult to eradicate.

Monkshood is very poisonous, and all parts of the plant—flower, leaf, root—when chewed give a peculiar tingling on the tongue and lips which may be called aconitism, just as we speak of the buzzing in the ears after taking big doses of quinine as "cinchonism."

The pharmaceutical preparations of aconite are known to depress the heart—and in cases of death from aconite or its preparations, the heart is said to come to a stand-still in diastole, having, in this respect, an effect the opposite to digitalis. The root of the plant has been eaten in mistake for horse-radish, although the roots are not very similar, and ought not to be mistaken. The aconite root is smaller, darker, and distinctly tapering, while the root of horse-radish is "stick"-like. The mistake has probably arisen from the fact that horse-radish, when once established, is more ineradicable even than the monkshood, so that the two plants are very likely, in old gardens, to grow in a confused mass in one untidy bed,

and thus the roots may be dug up together. The alkaloid "aconitine," to which aconite owes its virulence, gives the general reactions for alkaloids (see p. 242); but there is no chemical test sufficiently trustworthy to enable aconitine to be distinguished with certainty from other alkaloids by purely chemical methods. The physiological test, however, is of great value, and appears to be as reliable as is the dilatation of the pupil as a test for atropine.

Aconitine has not been often used by the murderer. One notable instance, however, in which the criminal was a member of our profession, has occurred, and no better summary of aconitine poisoning can be given than the case of the notorious Dr Lamson.

It seems probable that Palmer in 1856, and Lamson, in 1882, selected their poisons because they fondly hoped that detection would prove impossible. In Palmer's case the able handling of the facts by Sir Alexander Cockburn —who was then Attorney-General—brought the criminal to his doom in spite of the imperfect chemical evidence. The conviction of Lamson, on the other hand, was mainly brought about by the ability of the toxicological experts employed.

Regina v. *Lamson.*—On Wednesday, March 8, 1882, at the Central Criminal Court, before Mr Justice Hawkins, George Henry Lamson, aged twenty-nine, surgeon, was indicted for the wilful murder, on December 3, 1881, of his brother-in-law, Percy Malcolm John, aged nineteen.

Percy Malcolm John, who was a cripple with curvature of the spine and paraplegia, had property to the extent of £3000, half of which at his death would revert to the prisoner's wife. John had, for the three years prior to his death, been at a school at Wimbledon, kept by Mr B. On December 3, 1881, John was, with the exception of his paralysis, in good general health, and on that day had taken his meals, breakfast, dinner, and tea, in company with Mr B., among others. On Saturday, December 3, Lamson called on John at 6.55 P.M., and

their interview took place in the dining-room in Mr B.'s presence. Mr B. offered Lamson some wine, which he accepted, and Lamson then asked for some sugar, as the wine (sherry) was rather strong, and he said "sugar would destroy the alcoholic effects." A basin of white sugar was brought, and Lamson put some of it into his sherry. Lamson then produced a Dundee cake and some sweets, of which all three partook. At 7.15 P.M. Lamson produced a box of gelatine capsules from his pocket, and said, "Oh, by the way, Mr B., when I was in America I thought of you and your boys. I thought what excellent things these capsules would be for your boys to take nauseous medicines in." Lamson then gave a capsule to Mr B., and filling another with sugar, handed it to John, and said, "Here, Percy, you are a swell pill-taker; take this, and show Mr B. how easily it may be swallowed." John swallowed the capsule; the prisoner soon said, "I must be going," and at 7.21 P.M. left the house. A little after 8 P.M. John complained of heartburn, and soon after said, "I feel as I felt after my brother-in-law had given me a quinine pill at Shanklin." He was carried up to his bedroom, and about 9 P.M. was found in great pain and vomiting. He complained that "his throat appeared to be closing, and the skin of his face felt drawn up." At 11.30 P.M. he died. John was treated by linseed poultices to the abdomen, white of egg beaten up with water, and two hypodermic injections of morphia of one-sixth of a grain and a quarter of a grain respectively.

The post-mortem examination of John's body was made on December 6, 1881, by Dr Little and Mr Berry of Wimbledon, and Mr Bond of the Westminster Hospital. The spinal disease was found to be old and inactive. There were some old adhesions of the lung. The lips and tongue were pale. The cerebral meninges, liver, kidneys, spleen, and the mucous membrane of the stomach were much congested. The mouth and lips were pale. On the under-surface of the large end of the stomach

were six or eight yellowish-grey patches, a little raised, about the size of a small bean, and towards the smaller end were two or three similar ones. The heart was almost empty, but healthy. The lungs were congested, the posterior parts very much so.

The analyses of the viscera, vomit, and the articles of which John might have partaken were conducted by Dr Stevenson of Guy's Hospital, in conjunction with Dr Dupré of the Westminster Hospital, and the results obtained by the one were verified by the other.

The results were briefly as follows :—

1. Portions of the liver, spleen, and kidneys, treated by Stas's process, gave evidence of slight traces of morphia, and the alkaloid extract, when placed upon the tongue, produced the numb tingling sensation which is characteristic of aconite, and which, for the sake of brevity, we will call aconitism.

2. The contents of the stomach, similarly treated, produced aconitism.

3. The stomach itself, similarly treated, showed the presence of an alkaloid, but the extract failed to produce aconitism.

4. The urine gave evidence of morphia and aconitine, and the extract obtained from an ounce of the urine killed a mouse in thirty minutes when injected under its skin, the symptoms being exactly similar to those produced by injecting a minute quantity of a solution of Morson's aconitine.

5. A mixture of the extracts from 1, 2, and 3, when injected under the skin of a mouse, killed it with similar symptoms in twenty-two minutes.

6. The vomit was found to contain muscle, starch, onion, vegetable pulp (probably apple), raisins, candied peel, and pine-apple essence. It contained neither morphia nor quinine; but very marked aconitism was produced by a minute quantity of the extract, which lasted for over six hours, and when injected under the

skin of a mouse it produced powerful symptoms in two and a half minutes, and killed it in a quarter of an hour.

Dr Stevenson considered that the vomit contained as much as a quarter of a grain of aconitine.

In the beginning of 1881 Mr B. received a letter from Lamson, who was then in America, and a box containing a dozen pills. The letter requested B. to give the pills to John, as Lamson had heard of cases in America similar to that of John being benefited by the pills in question. The deceased had taken one of the pills, and the next morning complained of being very unwell, and said he should take no more of the pills. On August 28, Lamson bought three grains of sulphate of atropine and one grain of aconitine of a druggist at Ventnor. On August 29, Percy John, who was staying in the house of a Mrs J., at Ventnor, was taken ill with diarrhœa and prostration, and a feeling "as if he were paralysed all over."

Lamson was living with his father in Ventnor between August 6 and October 23, 1881, and was in the habit of going to the house where Percy John was living, and had actually called upon him on the 29th. On October 13 he bought twelve quinine powders (containing a grain and a half each) of a druggist in Ventnor. John, at the time of his death, was taking quinine powders which had been supplied to him by Lamson. On November 11, Lamson bought half an ounce of a mixed solution of morphia and atropia, containing forty grains of morphia and one grain of atropia; and on November 16 he bought the same amount of a similar solution. On November 16 he also asked for five grains of digitaline, which were not given to him because the sample in stock was not thought to be good; and on November 20 he asked for one grain of aconitine, with which the assistant in the shop refused to serve him. On November 24 he purchased two grains of aconitine.

Among the effects of the deceased were found twenty

quinine powders, numbered from 1 to 20. Nos. 1, 2, 3, 4, 5, and 6 were in larger papers than the rest, and the powders were nearly uniform in weight, containing about one grain and a half of quinine each. Nos. 7 to 20 inclusive were wrapped in smaller papers, and varied in weight from 6-10ths of a grain to 8-10ths of a grain. Nos. 16, 17, and 19 differed in appearance from the rest, having an admixture of a pale fawn-coloured substance. They all contained aconitine. No. 16 contained 0.83 grain of aconitine and 0.96 grain of quinine. One-fiftieth of a grain of the aconitine contained in this powder killed a mouse in six minutes and a half. One of the pills which had been sent by Lamson from America was found to contain nearly half a grain of aconitine. Some of it injected into the back of a mouse killed the animal in less than five minutes, and the aconitism produced by a small quantity on the tongues and throats of the experimenters lasted for over seven hours. Witnesses were called to prove that Lamson would benefit pecuniarily by the death of the deceased, and that at the time of John's death he was a bankrupt, without a penny in the world.

No witnesses were called for the defence. The counsel for the defence was unable to bring forward any solid arguments in refutation of the evidence and the opinions of the experts; and the jury, after deliberating thirty-five minutes, returned a verdict of guilty. Sentence of death was passed in the usual form.

There are many more poisons than those which I have passed in review. They are, however, of more interest to the pharmacologist and the physiologist than to the medical jurist. I have limited myself to the common poisons, such as are a frequent source of danger, and to those whose effects have been discussed in courts of law. For an account of the others I must refer you to treatises on Pharmacology and Materia Medica.

CHAPTER XXII

IDENTITY

Age and Sex—Development and Points of Ossification—Dentition, Puberty, Manhood, Decay.

Identity of Remains.—Exhumation of Charles I.—Anne Boleyn—Evidence of Pregnancy—Bones—The Hand and Face—The Teeth—Stature—Incinerated Bones.

Identity of the Living.—Age and Sex—Family Likeness—Scars—Marks of the Cat o' Nine Tails—Tattoo Marks—The Photograph—The Bertillon System—Finger-prints—Colour of the Hair—Footprints—The Tichborne Case.

To establish the identity of an individual is often most important from the legal point of view. We may have to establish the identity of the dead or the living.

In order to establish identity we must be able to testify to the age and sex. The question of age may be raised in relation to fœtal remains, or the bodies of young infants in cases of abortion and infanticide; in cases of sexual crimes, and in relation to school attendance, the Factory Acts, recruiting, life assurance, etc. The age of a fœtus will be best determined by those who have an accurate knowledge of embryology and development. The dates at which ossific points appear in the various bones is important; and from the commencing ossification of the clavicle at the sixth week of intra-uterine life to the final union of the pelvic epiphyses at the commencement of adult life at about 25 years of age, the established facts of ossification are of great service in determining

age. Philosophers and poets have talked of the seven ages of man, and perhaps we may usefully remember the number 7. Dentition in infancy begins about the seventh month, and the second dentition begins at or about the seventh year. At twice seven, 14, puberty commences, and at three times seven, or 21, manhood commences. Seven times seven, or 49, completes our maturity, and ten times seven is spoken of as the "allotted span." These figures will do no harm, if you remember that there is no precision in them, and that in relation to development or decay individuals may manifest either precocity or backwardness.

Identity of Remains.—A very frequent duty of the medical jurist is the identification of remains. You must remember that remains are never too decayed for identification to be possible. Some years ago, as I mentioned earlier, the coffin of Charles I. was opened, and it was quite possible to identify that monarch by the shape of the beard, which corresponded with the contemporary pictures of him, and by the fact that the fourth cervical vertebra had been cleanly severed by a sharp instrument. Again, in the Chapel of St Peter Vincula at the Tower, exhumations of a similar kind were made more recently; and among the bodies found was that of a woman whose fourth cervical vertebra also had been severed by a sharp instrument. They were the remains of Anne Boleyn. You may not be able to identify the individual with absolute certainty, but a partial identification or partial facts are of very great importance. For instance, the body of a woman who had been missing for a long time, as is recorded by Casper, was found in a privy, and the body was in a very filthy condition, far advanced in putrefaction. It was supposed that she was pregnant by her paramour, who had murdered her and made away with the body in the privy. When the body was exhumed it was quite past identification as far as the features went, but the uterus had not decomposed so far but that it enabled it to be

stated that it was a virgin uterus, and contained no fœtus. There was no evidence whatever that the deceased woman had been pregnant. Thus the whole theory of the prosecution immediately broke down. Now I think it is quite impossible to tell the age of bones. Bones are very permanent things, and even when they are buried superficially in the earth they last a considerable number of years, and when buried more deeply they last indefinitely. When the new Hôtel Dieu was built in Paris, the workmen, when digging the foundation, came across the remains of an old cemetery and a large number of clean bones. Certainly that ground had never been used for burial (it was in the centre of Paris, and the history was well known) for at least 600 or 700 years. In these bones, which I saw, the markings were all sharp. The soil had been quite dry, and such as would be likely to preserve bones. In going through the catacombs at Naples some years ago—a perfectly dry place in sandstone rock—I found an ulna. It had all the markings upon it, although in all probability the interment dated from the second century of the Christian era. The place is quite dry, and decomposition would not be likely to take place.

When remains are found, a very important thing is to find the hands and face, for by means of these you can often establish identification. The hand, of course, will show you perhaps better than anything else whether it is that of a man or a woman, and it will give you some clue to the occupation. Some of the French writers have gone rather elaborately into the evidence of occupation to be derived from an inspection of the hand, but I do not think it will pay us to go into it equally elaborately, because times have changed, and the use of machinery for almost everything tends to make the marks on the hands less reliable. Then, upon the hands you often get such things as marks of rings; and if there is an impression upon the third finger of the left hand of a female, you would be right in assuming that probably it was the hand of

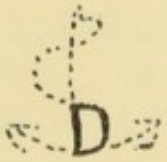
a married woman. I need hardly allude to the fact that the face is of great importance. In the head, of course, the teeth are very important, and you may often get very valuable information from the teeth. When a person is found, you may see that he or she has artificial teeth. Then perhaps the dentist who looked after the teeth has a cast of the mouth, and by this means the identity may be established. Some years ago a person disappeared in America, and he was traced to the laboratory of a chemist but no further, and they assumed that he had been burnt in a furnace in the chemical laboratory. In raking the ashes beneath the furnace they found the remains of bones, and also a lump of gold. It was known that the victim wore artificial teeth, with a gold plate and gold settings; and the assay of this gold showed it to be of identical quality with that which had been used by a dentist for supplying gold settings in the teeth in question. Then you have to judge of stature, and the best way of judging of the stature is to put the remains together and make allowance for the missing part, and thus form a conclusion as best you can. You will find in books on medical jurisprudence, elaborate tables given as to the relative proportions which various parts of the body bear to each other. I daresay that, taking the average of the human race, you will find that a man with an ulna of a certain length will have a femur bearing some definite proportion to it; but, unfortunately we are not all Apollos, and there are great irregularities in feature and figure, and this average proportion very often does not exist. For instance, the standing height and sitting height of individuals varies immensely. A man with very long legs may sit comparatively low. A very important matter is to look over the remains and see whether they are healthy. For instance, some remains which were found several years ago packed away in a coal cellar in the New Road, when carefully examined, showed that the possessor of them had had caries of the spine. That led to their

identification with a hump-backed girl, who was missing. It is also very important to be sure whether the curvature of the spine is due to disease or to force. There was another case where the dead body of a girl was forced into a tea-chest, and with so much violence that the dorso-cervical spine was ruptured; in such cases you will have to determine whether the position was due to fracture or to disease. Another important matter in identification of remains is to see, when a large number of people have been destroyed at one time, whether the parts tally. Many years ago there was a very bad railway accident at Abergele, in North Wales, the Irish Express having run into a petroleum train. The Irish express caught fire, and a large number of people were burnt to death, and some were almost reduced to cinders. But by dint of a very great deal of trouble, it was made out that there were the parts of 33 individuals. Of course the putting of these parts together was a very important matter. In that particular accident it was shown that there were 33 people missing. Many of the people were identified easily, but with others it was a matter of very great difficulty.

Now, with regard to the identity of the living, there are several things which are of importance. To establish the identity of the living you establish their age and sex. The family likeness is admitted, and rightly admitted, as a test of identity. Scars are of very great importance; for scars, if they involve the whole thickness of the skin, when once made are indelible. Of course they get less obvious as they get older, but you have only to look for them and you will find them. In old people in the hospital you often find venesection marks in the arm which were made when they were children fifty or sixty years ago, and these are quite indelible; and probably most of us have some marks about us, the result of cuts or accidents in childhood or since. Again, there may be the marks of the cat o' nine tails; and when flogging was common in

the services, the marks of the "cat" were of great importance. I have seen "cat" marks but very rarely in the hospital out-patient room. "Cat" marks are generally oblique. A "cat" laid on first of all from one side, and then from the other, is apt to lap round the body, and come under the arms, and into the axillary region. Of course, a man who has had small-pox or acne very badly is apt to be marked, but the point to remember is that "cat" marks are often oblique.

Among other marks which are important are tattoo marks, and a tattoo mark, if it is made into the true skin, and if it is made with carbon, is indelible, unless it is removed bodily either by a knife or by caustic. But you must remember that very little boys at school will sometimes tattoo themselves simply in the epithelium, merely making the epithelium dirty with gunpowder or charcoal. That rubs off when fresh epithelium grows. You must remember that tattoo marks may be altered or doctored. In former years it was the custom to tattoo deserters in the army with the letter "D" in the left axilla, and in my wards the other day I had one of these men. In former years one frequently came across them in the out-patient room. I am told that the D with which a man is tattooed, being very damaging to his character, has been altered. I am informed it has sometimes been altered by something a little more elaborate, such as making the D into an anchor, thus





An important aid to identification at the present day is the photograph, and you can generally, or very often, identify people by their photographs. I think we must all admit that we have found photographs of ourselves, taken many years ago, which are very unlike the individual of

to-day; so that to establish the identity by photographs is not so easy as might be thought. Criminals are now habitually photographed; but the accumulation of photographs is so enormous in the prison world, that the use of them becomes very very difficult. The question whether a man has been convicted before, or whether he has been in prison before—whether he is a novice or an old offender—is an important one to answer one way or the other. There is no more important question to decide. Here is the man, and here is a bureau with 100,000 photographs, and how are you to set to work to look through these hundred thousand photographs? Of course it very soon becomes an impossible task, and it is due to M. Bertillon, the expert of the Paris Préfecture de Police, that the Bertillon system was established. It is a very easy system, and is based on common sense. I will ask you to assume that we have 100,000 photographs; or let us say 90,000 photographs, taking such a number as is divisible by three. The Bertillon system is based upon measurements. The prisoners are first classified according to the length of the head. This gives three great primary divisions: short, medium, and long heads, with approximately 30,000 in each. The next measurement is the width of the head, each primary division being broken up into three groups: narrow, medium, and broad heads. In this way nine groups are obtained with 10,000 descriptions in each. These are again subdivided into three groups, each according to the length of the left middle finger: short, medium, long. This gives twenty-seven sub-groups of about 3300. By a further sub-division of each sub-group, according to the length of the left foot, the number of descriptions is narrowed down to 1100. In the same manner further sub-divisions are obtained by the length from the tip of the left middle finger to the elbow (the cubit), the height, the length of the left little finger, and the colour of the eye, giving groups of respectively about 400, 130, and 60, until finally

only 12 descriptions with photographs are left to look through. In practice it has been found by this ingenious method that identification of criminals can be readily carried out. For instance, let us suppose you have a man who belongs right away through to the "smalls," and then you look them through and find one photograph that is like him, and with this particular photograph, in addition to his measurements, there is a record of a scar of a carbuncle on the neck, a lost toe-nail, and two hearts and an arrow tattooed on his arm. In that way you completely identify the man. Another method which must be mentioned is that of identification by finger-prints, devised by Mr Francis Galton (see p. 507). The lines and whorls on the pulp of the finger ends vary in every individual, and are specific. In London, Dr Garson, Adviser on Identification to the Home Office, combines the Bertillon and Galton methods. Since 1894 finger-prints are also employed by M. Bertillon. The Chinese are credited with having used the tracing of the left index finger as a means of identification from time immemorial. The variations in the interarticular folds are the points relied on in their method. The next point is as to the colour of the hair. In works on medical jurisprudence you find that there are discussions as to how the hair can be coloured. Well, that is an art which has gone ahead in modern times, and it is no longer necessary to discuss it. Ladies habitually, I am told, have their wigs to match their dresses, and you can get the hair dyed to practically any colour you like. Darkening of the hair was done with soot, charcoal, nitrate of silver, lead salts, and so forth. Of course you may very much darken the hair temporarily by a copious use of grease, or even water. Or the hair may be lightened with peroxide of hydrogen.

Another point which is sometimes of importance in identification is the footprints. This is a question which belongs more to the police than to the medical jurist, but I will just mention it. You go to a place where a

murder has been committed, and you find footprints. The prints may be the prints of boots, and, of course, if you find a boot of a particular pattern, and if it is a heavily nailed boot, leaving deep impressions on the ground, the identification of the wearer may be a simple thing. But a man may commit a murder or a burglary without boots on, or in a special pair of boots, and then burn them. And you must remember that occasionally it has happened that a person who is going to commit a burglary has taken care to walk backwards to the house, so that the prints will point in the opposite way to the line of march. Naked footprints are difficult to identify. The print of the naked foot must be measured off into square inches, and one must examine carefully to see into which square and at what point different parts of the foot fall. Then, in the identification of footprints, there is another matter, and that is the line of walk. In a person who is properly taught to walk, the angle of eversion of the foot from the line of walk is about equal on the two sides; but if a man has got a short leg, or something of that sort, you may find that one foot turns out and the other goes nearly straight. If you find that the print made by one foot is nearer the right angle than the other, that may lead to the identification of a splay-footed person. Those matters belong to the arts of the Red Indian rather than to the doctor; still, it is just as well to mention them.

The Tichborne Case.—With regard to the question of identification, I think I may recite the most important case which has occurred with regard to identification, namely, the Tichborne case, in which the Tichborne estates were claimed by an impostor named Orton. This case occupied public attention for some seven years (1866-73), and produced an excitement among all classes which, after studying the facts as they were unravelled by the acute mind of Sir Alexander Cockburn, the Lord Chief Justice, it is difficult to understand.

The Tichbornes are an old Roman Catholic family

resident at Tichborne, near Alresford in Hampshire, since the days of the Conquest. The estates at the time of the trial were said to be worth between £20,000 and £30,000 per annum, so that the stake for which Orton played was not a small one.

Roger Charles Tichborne, the son of Sir James Tichborne (tenth Baronet) and Henriette Félicité Seymour, was born in Paris, where his parents were domiciled, on 5th January 1829. His maternal grandmother was French, and his mother was born in France, and was essentially a Frenchwoman. Roger, brought up amidst French surroundings by French nurses and tutors, was also mainly French, and spoke French fluently as his vernacular tongue.

At the time of Roger's birth, the family estates were held by his uncle, Sir Henry Joseph (eighth Baronet), who had seven daughters and no son, and when the next heir (Sir Edward) lost his only son in 1835, it became evident that Roger was likely to succeed to the title and estates in course of time. It was necessary, therefore, to so shape his education and career that he should be able to fill the position of an English country gentleman.

In 1845 he was placed at Stonyhurst College, the well-known Roman Catholic school; and in 1849, on leaving Stonyhurst, he obtained a commission in the 6th Dragoon Guards (Carbineers), and with this regiment he was stationed at Dublin and other places in Ireland, and also at Canterbury.

While he was at Stonyhurst and in the army, the family seat of Tichborne—then occupied by Sir Edward (who had taken the surname of Doughty on succeeding to the Doughty estates)—was Roger Tichborne's home, and Lady Doughty, his aunt, was motherly and good to him.

Miss Kate Doughty, his first cousin, the only child of Sir Edward, proved attractive to Roger, who fell in love with her and wanted to marry her. Partly on the grounds of affinity, and partly because she appeared to think that

Roger was a little "rackety," Lady Doughty somewhat opposed the match, which made Roger rather miserable; so that eventually he sold out of the army and started for a long journey in South America.

He travelled in a French ship, *La Pauline,* leaving Falmouth in March 1853, and arrived at Valparaiso in June 1853.

On 30th June 1853, he left Valparaiso for Santiago, where he arrived on 2nd July. He remained at Santiago only a day or two, when he returned to Valparaiso.

He sailed from Valparaiso on 27th July in *La Pauline* for Arica, arriving there on 11th August. On 20th August he sailed from Arica to Lima, where he arrived on 23rd August. He stopped some time in Peru, and did not return to Valparaiso until the 20th December.

He went from Valparaiso to Santiago, and left the latter place on 11th January 1854, and made his way from Santiago over the Pampas to Buenos Ayres, where he arrived on 23rd February 1854.

On 12th March he was in Monte Video. Then in April he is heard of in Rio de Janeiro, and on 20th April 1854 he embarked at Rio on a ship called the *Bella*, bound for Jamaica and New York.

Four days later the long boat of the *Bella*, as well as other wreckage identified as belonging to her, was picked up at sea, and it is assumed that she foundered, and nothing has since been heard of Roger Tichborne.

Next let us turn to the facts which transpired at the trial with regard to Arthur Orton, with whom the claimant was ultimately identified.

Arthur Orton, the youngest of the twelve children of George Orton, a shipping butcher of High Street, Wapping, was born on 20th March 1834. His schooling was cut rather short by an attack of St Vitus's dance. He was employed in his father's shop as a boy, and learnt butchering.

In 1849 he was apprenticed to Captain Brooke, of

the ship *Ocean;* and in June 1849 arrived at Valparaiso in his ship. On 25th June he deserted, and took refuge in the village of Melipilla, some miles south of Santiago, where he was befriended and kindly treated by the inhabitants, including the English doctor and his Spanish wife, a certain Don Pedro Castro, and others. Here he was known as Arthur Orton, and appeared to have been petted by the ladies, one of whom, a certain Donna Ahumada, cut a lock of his hair and kept it. He returned to England on 11th June 1851 in the *Jessie Miller;* and on 29th November 1852 he sailed for Hobart Town as "butcher" on board the *Middleton*, Captain Storey. Among the crew were two men named Peebles and Owen David Lewis. From Hobart Town he moved to Gippsland, Victoria, and entered the employment of a Mr Foster, at Boisdale, in December 1856, and remained in his employ till January 1859 at least. From this date the history of Arthur Orton is shadowy (*i.e.*, the history admitted by the defence). In 1862, however, a certain "Thomas Castro"—who was none other than the claimant under an assumed name—becomes foreman to a butcher at Wagga Wagga, New South Wales, a place about equidistant from Sydney and Melbourne. Arthur Orton was a great hulking lad (known in Wapping as "Bullocky Orton") with light hair.

Soon after Roger's departure for South America Sir E. Doughty died, and Roger's father became Sir James Tichborne, tenth Baronet. After the disappearance of the *Bella*, Roger Tichborne's will was proved by Mr Gosford, the agent of the Tichborne estates, who was one of the executors, and on the death of Sir James Tichborne in 1862, Alfred Joseph—Roger's only brother and ten years his junior—succeeded as the eleventh Baronet; and after the death of Sir Alfred in January 1866, his posthumous son, born in March 1866, became the twelfth Baronet, and was, necessarily, a minor when the fraudulent claim to the estates was put forward.

Lady Tichborne, Roger's mother, was eccentric, fussy, ill-tempered, and obstinate. She was constantly nagging at and quarrelling with her husband; she disagreed with her English relatives, and was always fussing about Roger, and trying to thwart him. She wished to prevent his going to school, and to prevent his going into the army. Roger, however, had inherited his mother's obstinacy, and when he had set his mind upon an object he pursued his own course. Stonyhurst, the Dragoons, and the South American tour were all carried through in spite of his mother, to whom he was always dutiful and kind, but in whom he recognised one who was capable of making Tichborne, as he said in one of his letters, a "hell upon earth."

Lady Tichborne believed that Roger had somehow escaped from the wreck of the *Bella*. She used to quarrel with Sir James on the subject, and she would listen readily to the tales of beggars disguised as sailors, who knew only too well how to excite the poor lady's interest and pity.

Almost immediately after the death of Sir James, his widow (in 1863) advertised in the papers for news of her son in English, French, and Spanish. In 1865 she corresponded with one Cubitt, who kept a Missing Friends' Office in Sydney, and in July 1865, Cubitt put the following advertisement in several of the Colonial papers. This advertisement is of importance, as it made public some of the chief qualifications which it would be necessary to be possessed of by any successful claimant.

"A handsome reward will be given to any person who can furnish such information as will discover the fate of Roger Charles Tichborne. He sailed from the port of Rio Janeiro on the 20th April 1854, in the ship the *Bella*, and has never been heard of since; but a report reached England to the effect that a portion of the crew and passengers of a vessel of that name was picked up by a vessel bound to Australia—Melbourne it is believed. It is

not known whether the said Roger Charles Tichborne was amongst the drowned or saved. He would at the present time be about thirty-two years of age ; is of a delicate constitution, rather tall, with very light brown hair, and blue eyes. Mr Tichborne is the son of Sir James Tichborne, Baronet, now deceased, and is heir to all his estates. The advertiser is instructed to state that a most liberal reward will be given, etc., etc. Replies to be addressed to Mr Arthur Cubitt, Missing Friends' Office, Bridge Street, Sydney."

N.B.—The age in this advertisement is given as thirty-two, instead of thirty-six, which would have been Roger Tichborne's proper age.

Up to the time of his disappearance, Roger continued to write gossiping letters to his relatives, and in one of the last of these, in March 1854, he sent a request that he might be put up for election to the Travellers' Club. There is no indication in any of his letters that he did not intend to return, and it is obvious that, supposing this heir to a princely possession to have been saved from the *Bella*, he had every reason to declare himself, and he might have returned home without difficulty. No reason worthy of a moment's attention has ever been suggested for his not doing so.

Roger's education had made him somewhat different from the average young Englishman of his class, but he was singularly clear-headed, and he had made himself perfectly familiar with the details of the property which he was presumably to inherit. His father and uncle wished to re-settle part of the estates, and to this re-settlement Roger's consent was necessary ; but Roger, after thoroughly investigating the *pros* and *cons* of the question, came to a conclusion different from that of his father and uncle, and therefore withheld his consent from the re-settlement, which accordingly was not carried out.

His correspondence with Mr Gosford, the agent, on this subject shows that he was thoroughly con-

versant with every detail affecting the Tichborne property.

Roger was 5 feet 8½ inches in height, and exceedingly thin, with light brown hair and blue eyes, a man of active habits, of gentlemanly mind and demeanour. He wrote a scrawling, untidy hand, and often expressed himself in French idioms, and occasionally made a lapse in spelling; but his letters were those of a gentleman, and bore evidence that the writer had considerable powers of observation. He spoke French fluently, and when he left England he knew no Spanish.

In 1852 his mother cut off a lock of his hair, which she kept, and which was produced in court.

Mr Cubitt's advertisement was a tolerably direct invitation to enterprising rascals to come forward and pretend to be Roger Tichborne.

Arthur Orton was the right age, according to the advertisement, had a knowledge of the sea, had been in South America, and knew Spanish; and at Wagga Wagga was living as Thomas Castro, a huge man who subsequently admitted that he had an intimate acquaintance with Arthur Orton, but stated that he was in reality no other than the lost Roger Tichborne, living under an assumed name, and getting his livelihood as a butcher.

Castro asserted that he was picked up after the wreck of the *Bella* by a ship called the *Osprey*, concerning which he knew nothing, because he was "delirious," he said, for the whole of the three months he was in her. He was landed at Melbourne, but the *Osprey* has never been identified. The claimant believed the captain's name was Owen Lewis or Lewis Owen, and among the men saved with him was one called Peebles. Both the names occur in connection with Arthur Orton's ship, the *Middleton*.

He took the name of Castro after that of a friend whom he had known at Melipilla, in Chili. It was never proved, and is very unlikely, that Roger was

ever at Melipilla, while we know that Orton lived there for many months.

He asserted that he had entered the service of a Mr Foster, of Gippsland, and was engaged at Boisdale and Dargo ; but the books kept on the estate show that while there never was a Castro among the servants, there most certainly was an Arthur Orton. Then it was proved that Castro was an expert butcher, and he had accounted for this by saying that he was apprenticed to a butcher in Newgate Market. It is not shown how Roger Tichborne had become an expert butcher.

In April 1865, Castro, of Wagga Wagga, goes to a schoolmaster and gets him to write to a Mr Richardson, of Wapping, making sundry inquiries about the Orton family. The theory is that Orton had some reason for assuming the name of Castro, and that he was "wanted" by the police, and hence he made his inquiries about his family by means of an amanuensis, and under an assumed name. Why, under any circumstances, should Roger Tichborne make inquiries about the Orton family?

Castro was "discovered" to be Roger Tichborne by Gibbes, an attorney at Wagga Wagga, and he communicated with Cubitt with an eye to the reward. Castro was bankrupt, and after his attention had been drawn to Cubitt's advertisement, he cunningly asked Gibbes if he was obliged to put entailed property in England in his schedule of assets? Then he darkly hints that Castro is not his right name, and that he is the heir to an estate ; then in a day or so he is seen by Gibbes smoking a pipe with the initials R. C. T. upon it, whereupon Gibbes jumps to a conclusion, and writes to Cubitt to say he has found Roger Charles Tichborne.

In these early days his knowledge of the Tichborne family was *nil.* With a view to raising money, he exe-

cuted a will, in which he shows an absolute ignorance of the Tichborne property; proves himself ignorant of his mother's Christian name, and puts in as executors two men named Jarvis and Angel, who were friends of Arthur Orton.

He said at this time that the mother was a stalwart, burly, woman, whereas she was leanness itself.

From this time, June 1866, he acquires a knowledge of a large number of facts connected with the Tichborne family. It is known that he had access to the obituary notices in the *Illustrated London News*, and to a *Baronetage*, and from these sources probably culled many facts. Then he encountered at Melbourne a former gardener on the Tichborne estates; and at Sydney he meets Bogle, a negro who had formerly been valet to Sir Edward Doughty.

In order to raise money he makes a declaration before a notary, in which he states that he left England for South America, 28th November 1852, in the *Jessie Miller*, both date and ship being wrong for Roger Tichborne, but right in a sense for Arthur Orton.

In his early letters to Lady Tichborne he tells her that he has grown very stout, and that she will know him by the "brown mark" on his side (which Roger never had). He calls to her recollection the "Card Case at Brighton," in which Roger never was mixed up; he writes in the hand not of Roger Tichborne, but of Orton, and his letters are vulgarly expressed, and show a gross want of education. Further, Lady Tichborne is informed that he had St Vitus's dance, which was not the case as to Roger, but was true in respect of Orton; and yet this infatuated lady makes up her mind without seeing him, and is eager that he should start for England in order that she may embrace him.

The Claimant arrived in the Thames on Christmas Day, 1866, and, with Bogle and his wife, goes to Ford's Hotel, Manchester Square. Immediately after dinner he goes under the assumed name of Stephens to Wapping, and

makes inquiries in a public-house there about the Orton family, and other neighbours of the Ortons, and more than one of those with whom he conversed noticed his likeness to the Orton family, and one even taxed him with being an Orton.

It was not until the 10th of January 1867, that he went over to Paris to see his mother. He put up at the Hôtel de Lille et d'Albion, and the next day, as he was (or pretended to be) indisposed, and could not go to Lady Tichborne, she came to him at the hotel.

He received his mother lying on a bed with his clothes on, in a corner of the room, and with his face turned to the wall. When she came in he never moved, and she leant over him and kissed him, and said he "looked like his father, and his ears looked like his uncle's."

And so Lady Tichborne recognised the Claimant as her son in the presence of Mr Holmes, his attorney, and her Irish servant Coyne.

The recognition of the Claimant by Lady Tichborne was the climax of the case, and many who were ignorant of the true facts rushed to the conclusion that maternal instincts were infallible, and that this huge, vulgar monster could be no other than the long-lost Roger. From Bogle, the old valet; from Rous, a publican, formerly clerk to the Tichborne solicitor; from an antiquary at Winchester, and from two former troopers of the Carbineers, "the Claimant" acquired a large number of disconnected facts, and he went about accosting Roger's old brother officers and others, and by reminding them of some incident in which they were concerned in former years, surprised and startled them into a recognition. None of Roger's near relations, with the single exception of his mother, could recognise the Claimant. Mr Gosford, the Tichborne agent; Mr Bowker, the lawyer; Chatillon, his tutor in France; all, in short, who knew Roger intimately, could see nothing in common between the Claimant and the missing Roger. On the other hand, there were large numbers, brother officers and

chance acquaintances mainly, who were convinced that the Claimant was Roger Tichborne, and very soon the simple facts of the case were obscured, to use the words of St Paul, by a cloud of witnesses. It would be useless to enumerate those who said "Yes" and those who said "No." Any man who should be away from his friends for fifteen years, and who increased in weight from nine stone to twenty stone, would be difficult to recognise, and it is obvious that the knowledge of isolated facts cannot be received as important evidence, when one knows that the Claimant had a circle of tutors to "coach" him.

Roger spoke French fluently, and knew no Spanish, and none of the letters written during the nine months he was in South America gave any hint that he had acquired the Spanish tongue.

Arthur Orton lived for the best part of two years in a South American village.

The Claimant knew no single word of French, but had a fair knowledge of Spanish. Could Roger Tichborne have absolutely forgotten the French he spoke for twenty-five years, and have retained (after a lapse of twelve years) the Spanish he may have picked up in ten months in South America?

When cross-examined as to his education at Stonyhurst, his mind (in many respects so retentive) appears to be an inconceivable blank. He says Cæsar wrote in Greek, he knows nothing of Virgil, and when a Virgil is put into his hands he says it is Greek.

The Solicitor-General (Sir J. Coleridge) goes on: "What book have you ever read in mathematics?"

"I have no recollection."

"Did you ever read Euclid? Has that anything to do with mathematics?"

"I don't recollect; I think not."

"Has algebra anything to do with mathematics?"

"I have no recollection."

"Have you read Euclid?"

"I believe I did, but I don't recollect."

"Did you ever hear of the Asses' Bridge?"

"I don't recollect."

"Did you ever try to get over it?"

"I don't recollect it."

"Did you ever try to cross the Asses' Bridge?"

"I have no recollection of it."

"Did anybody try his best to help you over the Asses' Bridge? Did you make gallant efforts, as many of us have done, to get over it?"

"I have no recollection."

"Do you remember whereabouts it is—how far from Stonyhurst?"

"I will not put up with your insolence."

"Do you know it better by its Latin name, the Pons Asinorum?"

"No."

Lady Tichborne died on March 12, 1868, and after her death the difficulties of the Claimant began to be serious, and the attorney, Holmes, and Rous, the innkeeper, shortly after gave up the case.

Among Lady Tichborne's effects was the lock of hair cut off from Roger's head in 1852, and this was brought into court and contrasted with the lock admitted by the Claimant (in a letter to Don Pedro Castro, of Melipilla, under date 1st January 1868), to have been cut off his head by Donna Ahumada in 1851.

It was admitted on all hands that these two locks could not have been cut off the same head. That from Melipilla was light, whereas the hair of Roger (of the same date, or nearly) was brown. The Claimant's hair was worn rather long, and was heavily greased and (presumably) artificially darkened. The photograph of Roger taken in South America, was, to ordinary eyes, very unlike the Claimant, every allowance being made for time and fat.

The lobes of Roger's ears were not pendent, but

adhered to the side of the cheek ; whereas the defendant's ears had ordinary pendent lobes.

The interest of the trial consisted in the fact that Roger and the Claimant bore no resemblance to each other, either in body or mind ; and but for the infatuation of Lady Tichborne the fraudulent claim would not have been admitted for a moment. It is probable that when Orton, as Castro of Wagga Wagga, first put himself forward at the instigation of Gibbes, he had the intention of committing a very ordinary fraud, with a view to improving his credit. When, however, he had made fraudulent statements, and had signed a fraudulent will, it was evident that "returning was as dangerous as go o'er," and that the admission of his fraud in obtaining money meant imprisonment.

Arrived in this country, he lived on Lady Tichborne, who had an income of some £2000 a year, and both before and after her death he raised money by issuing Tichborne "bonds," promising a huge rate of interest when he should gain possession of the estates, and be able to redeem them. All who took up a bond were naturally eager for his success, and thus the Claimant's cause was "boomed," and the discussions by partisans of either one side or the other were so bitter that the "Tichborne Trial" was sometimes formally tabooed as a subject for conversation at London dinner parties. The money advanced on Tichborne Bonds is said to have amounted to several hundred thousand pounds. The first trial took the form of a demand for the ejectment of the then tenant from Tichborne House. The Claimant in that trial was plaintiff, and he was "non-suited" only after the trial had extended over 113 days. This trial was in 1871-72.

The public prosecutor then took up the case, and the Claimant was indicted for perjury. The second trial took place in the Court of Queen's Bench before Chief Justice Cockburn and Justices Mellor and Lush. It occupied

the Court for 188 days, and was concluded on 28th February 1874, when the jury, after a very short deliberation, found Orton guilty of perjury, and he was sentenced to fourteen years' penal servitude.

The great interest of the case is to be found in the fact that it demonstrated the value of circumstantial evidence. The direct evidence of Lady Tichborne was wholly valueless, and the evidence of all those who, on acquaintance more or less transient, said "Yes" or "No," was of small value, although the jury might be able to estimate with tolerable certainty the credibility of different individuals.

When, however, the Lord Chief Justice in his masterly summing up reviewed all the circumstances connected with the lives of Roger Tichborne, Arthur Orton and the "Claimant," it became quite impossible to admit that the Claimant was Roger Tichborne, and equally impossible not to admit that he was certainly Arthur Orton. Nobody who reads through the magnificent "charge" of the Lord Chief Justice, which took three weeks to deliver, and occupies 1600 closely printed octavo pages, can fail to come to the same conclusion as the jury, and in as short a time.

CHAPTER XXIII

SEX—STERILITY

Sex—Possessio Fratris—Importance in Law—Hermaphrodites—The Pelvis — Impotence — Sterility — Age — Menstruation — Legal Decisions in Point.

Sex.—Part of the question of identity is the question of sex, which usually presents no difficulties at all. Sex may be of importance to settle identity; and it may be of importance with regard to the disposition of property. You know that entailed property usually goes, in this country, in the male line. A man, we will suppose, is possessed of an entailed estate, and he marries and has a daughter. His wife dies and he is left a widower. He marries again, and has an only child (a daughter) by his second wife. In the event of his death the property would be divided between his daughters, who are half-sisters. But if a second child (a male) has been born to either wife, and the second child lives half a minute, then the entailed property goes to the sister of this ephemeral boy as the heir of her brother. That is known as *possessio fratris.* I bring that forward to show you that supposing a child is born alive, it is important to determine what its sex is. Sometimes a child is born with hypospadias, or something of that kind, and then it is not easy to say what the sex is. Nevertheless in a court of law the sex of a born child may be a matter of very great importance. There is no

indication of sex in a fœtus before the third month, and up to the seventh month the question is difficult very often, because of the resemblance of the penis to the clitoris. At the eighth month the testicles descend to the ring, and on the ninth to the scrotum. Of course at and after birth the sex can usually be decided by inspection of the genital organs. But there are malformed beings, so-called hermaphrodites, in which there is union of the organs of the male and of the female. I may say a true hermaphrodite has never existed—that is to say, a being who has been capable of exercising the functions of both the male and the female; but there have been cases in which both organs have been present. The homologue of the penis is the clitoris, of the scrotum the labia, of the testicles the ovaries, and of the prostate the uterus. By examination and by using your knowledge and common sense, you can generally determine in the case of an hermaphrodite which sex predominates.

With regard to the sex of the dead, of course if the genital organs remain the sex is not difficult to determine. The best guide to sex in the skeleton is the pelvis. There is a diagram on the screen which will show you the distinctions of the male from the female pelvis, distinctions with which you are doubtless perfectly familiar. The symphysis pubis is deep in the male, and the pelvic opening relatively narrow. The average measurements are of importance; the transverse measurement of the female pelvis is $5\frac{1}{2}$ inches against $4\frac{1}{2}$ in the male; antero-posterior $4\frac{1}{2}$ against 4 inches; and the oblique measurement 5 against $4\frac{1}{4}$. These diagrams, side by side, are such as you could not mistake; but it is a very different thing when you have nothing to compare a single pelvis with — that is to say, when you have got only one pelvis. You may get a pelvis which does not show the characteristics of one sex or of the other.

Sterility.—There is another question which also has to be considered, and likewise sometimes goes into courts of

law, viz., impotence and sterility. Dissolution of marriage may be sought on the grounds of impotence. One may say, first of all, that you cannot get a dissolution of marriage on the grounds of sterility; the only thing which the law will recognise is ability to copulate; and if there is ability to copulate the law very rightly does not trouble about sterility, because that is a question which cannot always be decided. With regard to sterility and impotence, you must remember that subjective evidence is of no use at all. If a man comes to you and says that he is impotent; or if he comes to you, on the other hand, and declares that he is very far from impotent, you have to form your own conclusions, because there is nothing concerning which the whole world tells such deliberate lies as the sexual functions. It is very important for you as medical jurists to remember that, and if you are asked to examine a man and to say whether he is impotent or not, all you can say is that supposing the sexual organs are properly formed (if you find a decently formed penis and decently formed testicles) you see no reason why he should not be able to copulate. Remember very carefully that you have to put it in the negative form. There are many conditions which, apart from the condition of the sexual organs, may make a man unfit to use them.

Another point with regard to sexual power is age. The law recognises no limit of age in the procreating power of a male. Of course, males differ enormously in this respect, as well as in other respects. A notable case is that of Sir Steven Fox, who married at the age of 85 and had a child.

The procreative power in a female extends normally over the menstrual period of life, and that period is very variable. It begins most frequently at fourteen, and then, in order of frequency, it begins at 15, 16, 13, 17, 12, 18, 19, 11, 20, 10, so that you have to accept the fact that menstruation may begin as early as ten or as late as twenty. Then you must remember that there have been

on record cases of conception without any previous menstruation. Sometimes there may be great sexual precocity in women, just as there are instances of great precocity in men. Menstruation ceases generally between forty and fifty, perhaps at forty-five most often. But there are no hard and fast lines ; it may be prolonged to fifty or sixty, or even to a greater age. I am now quoting cases which have been recorded as anomalous. Again, conception may occur after menstruation has apparently ceased.

There have been two decisions in the law courts which are of importance—two decisions which are both different, but both based upon sound common sense, and both, I take it, substantially correct. Vice-Chancellor Wickens, in the case of *Conduit* v. *Soane*, declined to regard it as an impossibility that two *married* ladies aged fifty-seven and fifty-two respectively could never have any children. Vice-Chancellor Kindersley, in the case *Forty* v. *Forty*, decided that an *unmarried* lady aged fifty-three might be presumed to be beyond child-bearing. By comparison of the two decisions you get a common-sense view of the matter under different circumstances. I am always warning you not to attempt to be precise where precision is impossible. You must remember that in regard to a woman the law does not concern itself with anything beyond the power to copulate. A woman when she marries is supposed by the law to be *habilis ad matrimonium*, fit for the marriage condition, and able to bear her part in the act of copulation, and if a divorce is sought for on sexual grounds, the law only concerns itself with that phase of the matter. For instance, an obstetrician might declare that although there was a vagina the uterus was undeveloped, and the woman could not bear any children ; the law would not take cognisance of that, but if there was inability to copulate a divorce would be granted. There are cases on record of so-called atresia vaginæ, where the vagina is practically non-existent, and such cases have been pronounced suitable for divorce.

CHAPTER XXIV

RAPE—SEXUAL CRIMES

Rape.—Precautions in Administering Anæsthetics to Women—Sexual Insanity — Statistics of Rape — Superstitions with regard to Venereal Disease—Definition of Rape—Legal Points—Pathological Aspects—Scots Law—Blackmail—Virgo Intacta.
Sexual Crimes.—The Criminal Law Amendment Act.

Rape.—Now I come to something a little more definite and more important, namely, the question of *rape.* I warn you with regard to rape that it is one of those accusations which are very often brought against medical men, and especially against dentists who have given an anæsthetic to a single woman without a witness being present. You must be exceedingly careful about giving an anæsthetic to a female without a witness being present. Rape sometimes is merely a delusion on the part of an hysterical woman; you must beware of that. On the other hand, *rape* must often be regarded as one form of insanity. Very often rape has meant more than a mere gratification of the sexual passion, it has been a sexual act accompanied by brutality; it is one of the forms of insanity which is recognised by all asylum keepers. A few years ago London was startled and horrified by a succession of murders committed by a man who was never identified, but who was known popularly as "Jack the Ripper." A number of women were found who undoubtedly had been, one cannot say violated, because most of them were prostitutes, but they had been killed during the sexual

act. And more than that, you may remember a painful case which occurred some three or four years ago in which a young man who had been in a well-known idiot asylum near London did exactly the same kind of thing in Kensington. He met a woman there, copulated with her, and killed her. When I deal with insanity I shall deal with affective insanity. There is an ideational insanity and an affective insanity. Affective insanity may be defined as the fact that a man is affected abnormally by normal conditions. Shakespeare says :—

> "Some men there are love not a gaping pig ;
> Some that are mad if they behold a cat ;
> And others when the bagpipe sings i' the nose
> Cannot contain their urine ; for affection,
> Master of passion, sways it to the mood
> Of what it likes or loathes."
>
> (*Merchant of Venice*, Act IV. Sc. 1.)

That was probably written about the year 1600, a great many years before affective insanity was talked about.

You may take it that a great deal of sexual crime is a form of affective insanity. Again, you must remember that rape is most often perpetrated upon children of tender age. Casper collected a number of cases of rape. He recorded 136 cases, and out of these no less than 99 were effected upon children of between two and a half and twelve years of age ; 20 between twelve and fourteen, so that under the age of fourteen years, or before puberty, there were 119 out of the 136 cases. From fifteen to eighteen years there were 8 cases ; from nineteen to twenty 5 cases ; 1 of forty-seven ; and 1 of sixty-eight. I want to insist that the large majority of the victims were children of tender years. Why? One reason is to be found in a very old tradition, mentioned in some of the mediæval writings, that one of the ways of curing obstinate venereal disease, notably gonorrhœa, was copulation with a virgin, and there is no doubt that a

great deal of rape has been perpetrated with that intent. I warn you that these and other sexual crimes are a great deal more common than you have any idea of. You never get a country assize without cases of this kind; they are not a class of case which it is advisable to publish in detail, and as a rule in the general press there is very properly no mention of them.

The definition of rape is "the carnal knowledge of a woman forcibly and against her will." Now first of all we ask "What is force?" The law lays it down strictly that "force" may be moral force. For instance, if a man were to threaten a woman that he would bring her into trouble with her mistress or the establishment she was working in, or make it difficult for her to get her livelihood, that is force in the eyes of the law. It is very important to remember that moral force is quite as strong as physical force. The next point is, "What is carnal knowledge?" There again the law has laid it down very strictly indeed, that if the vulva be touched by the penis, that is carnal knowledge. The act of insertion is not necessary, the act of emission is not necessary; so that you must remember that, technically and legally, if in obedience to moral force or a threat the penis touches the vulva, that is rape. I would emphasize the fact that a rape of this character leaves no physical traces behind, and between a rape which leaves no physical traces at all and that which leaves changes of a gross kind there is every gradation. Of course if the size and development of the male and female is very different, as in the case of a big man and a little child, which has often happened, you may find injuries done to the sexual organs of the female sufficient to cause death. The vagina has been split, and peritonitis has resulted, and so forth. There was one very curious case near Edinburgh, where a couple of men riding on a cart met a young woman in the road. One forcibly held her, and the other had connection with her. Not only so, but they filled the vagina with stones

and all sorts of things from the roadside, and treated her with great brutality; and that is not an isolated fact at all. We must all be ready to recognize that such cases are probably cases of affective insanity. You may say, as lawyers always say, "Oh nonsense, the man is a brute, and wants to be punished." Quite right; he is a brute, and wants to be punished; but if a man has affective insanity are you going to cure him of that insanity by two years' hard labour? When he comes out of prison and is fed again, will he not wax fat and kick just as before? It is a very nice point as to whether the pathological view of some of these crimes, or the strict legal view that they are crimes and not diseases, is the best one for the public. In considering the punishment for crime of every kind, I am very much inclined to say that in the case of young offenders and first offenders one should always make an example of them and inflict corporal punishment, which may be, and often is, a preventive, not only to the boy, but to his fellows. With juvenile offenders, if you give them a good short sharp punishment I think you will very likely do good. But when you deal with an adult and a more or less hardened sinner, the sooner we banish from our minds any idea of vengeance the better. "Vengeance is Mine, I will repay, saith the Lord." We have to get away from the idea of vengeance; all we have to do is to protect society. Take the question of rape or assaults in railway carriages, which are of the same order, and for which we find the press crying out for flogging. Physiologists will tell you that flogging is the worst thing you can do. But if you take the physiological view that the man is mad, you put him under lock and key and keep him confined for life. The pathological view of some of these crimes is very much safer for the public than the legal view. You may hear of a man being guilty of a tremendous crime. One man will say, "The brute, flog him." Another will say, "Poor devil, put him in an asylum." The surest protection

to society is to put him under lock and key, and not let him come out again. I do not suppose the public would tolerate another possibility in connection with sexual crimes, viz., the unsexing by surgical methods; but these are subjects upon which you ought to endeavour to make up your minds. I do not mean to say at all that punishment is not a very good therapeutic agent; I am inclined to think that the *Betula alba*, or common birch, might with advantage be put in the pharmacopœia.

Well, to proceed. In cases of rape, when you are called to such a case, note the time. There is a law in Scotland, not in England, that accusations of rape must be brought within three days. Of course there are many cases of rape which are a little like what Byron describes—

> "A little while she strove, and much repented,
> And swearing, I will ne'er consent, consented."

That is not rape, and it is very important to remember that. There must be justice, and I hold very strongly that a woman may rape a man as much as a man may rape a woman. A woman may rape a boy (morally not legally), and that also has happened not seldom. A girl, having consented to the act, recognizes later that she is pregnant, and to get out of her trouble she says she was not a consenting party, and that there was force employed. In the history of rape such cases are not at all uncommon. When you are called to such a case you see what injury has been done—whether there has been a recently ruptured hymen, whether there have been more serious injuries, and whether there are any marks or bruises about the body; and you would examine the clothing for seminal stains. In the same way you may find evidence about the person or clothing of the accused.

Now we must remember one or two things—that sometimes after the acute specifics in children there may be not only purulent discharges from the vagina, but there may be extreme sloughing of the genital organs. In the out-

patient room you will often have children brought to you with the statement by the mother that some lodger or other man has been taking liberties with the child. Now in one point of view, when cases of that kind are brought they are very serious. If it be true, and the case be taken to its logical conclusion, it means two years' hard labour or a term of penal servitude for the man ; therefore you must be very careful how you give an opinion on insufficient evidence, and remember that there is such a thing as blackmail in this world. You must make sure in such a case that the child has not been tutored. You will very often find a child in such circumstances using the expression that the man touched her with his "person." Now that is an adult expression, and when you hear such an expression you have the right to revolve in your own mind how far the child has been tutored. You must also remember that in dirty children a little leucorrhœa is not uncommon ; you may even have considerable sloughing. In works on medical jurisprudence it is stated that an animalcule may be present in the vagina which somewhat resembles a spermatozoon, the *Trichomonas vaginalis.*

Sometimes you are asked to say whether a girl has been violated, whether or not a girl is *virgo intacta.* I would have you go very cautiously and very circumspectly to work on any such examination, and I almost think you would be right to say that you cannot tell, and that therefore you decline to give an opinion. It is, I suppose, true as an average fact that after connection the hymen is ruptured and undergoes considerable shrinkage ; but it is a fact that hymens vary in quantity and quality ; that while some are big and easily ruptured, others are very much more distensible. Again, you must remember that the hymen has been seen in a woman known to be a prostitute. Again, a hymen may be ruptured by other means than by carnal intercourse, and it is obvious that mere mechanical rupture of a hymen may be produced by anything which is big enough to do it. Therefore, by

inspecting the hymen you are not competent to say whether that woman is *virgo intacta*. If you are called upon to examine, it might not be advisable to refuse, and you would say that the hymen was or was not ruptured, but that it might have been ruptured by disease or by an accidental injury of another kind, and you could not take upon yourself to say whether the conditions were caused by sexual intercourse. I think that is the proper line to take.

There was a case some years ago which excited a great deal of attention, and one of the medical witnesses was found to declare that the girl was *virgo intacta*. That was all very well, but I think it was saying more than he ought to have said. For instance, supposing you are asked to examine a girl, and you find the hymen has been ruptured, and there is very little hymen left. Suppose, in consequence, you allow yourself to say that she is not *virgo intacta*, you may blast her reputation for life, and quite unjustly. To what extent rape may be committed between a man and woman of about equal power is very doubtful.

Sexual Crimes.—Now I would remind you of the provisions of what is called the "Criminal Law Amendment Act, 1885." That law defined certain sexual crimes. For instance, it lays down that procuration of women under twenty-one is a misdemeanour punishable by two years' hard labour. It was said at the time of the passing of the Act that there were agents in this country procuring women for prostitution in other countries, and so forth. Then procuring the defilement of women by threats, fraud, or the administration of drugs is a misdemeanour punishable by two years' hard labour. The defilement of a girl under thirteen is a misdemeanour punishable by penal servitude for life. The attempt to have carnal knowledge of a girl under thirteen is a misdemeanour punishable by two years' hard labour, and offenders under sixteen years of age may be whipped. Carnal

knowledge of a girl between the ages of thirteen and sixteen, or carnal knowledge of an idiot or imbecile girl, is a misdemeanour punishable by hard labour. By this Act it is a misdemeanour, punishable by hard labour, to have carnal knowledge of a woman under the age of sixteen. That is all very well; but prostitutes do not carry their birth certificates about with them. We have to look at the protection of the male as much as at the protection of the female, and we have no right to pass laws which give women facilities for blackmailing. It is this point which has brought many of these cases to nought. There are many girls of sixteen 5 ft. 9 in. high, and strong in proportion, and it is impossible to tell whether they are sixteen, or eighteen, or twenty.

The question has arisen whether a pregnancy may arise after rape. That is an idle question, and it is no use trying to decide.

CHAPTER XXV

SEMINAL AND BLOOD-STAINS

Seminal Stains.—Difficulties—Examination.
Blood-stains.—Mode of Procedure—Tests—Spectrum of Blood—The Red Blood Corpuscles—Blood on Knives—Menstrual Blood.

Seminal Stains.—The detection of seminal stains is sometimes an important matter. It is sometimes an easy matter, and sometimes it is very difficult. If rape has taken place in the open country you may get mud, dirt, urine, fæces, discharges of blood, semen, etc., all mixed up together; and then of course it becomes a very difficult thing to detect spermatozoa. But when you find unmixed seminal fluids upon linen you may form some conclusion about them. The best way of examining them is to take a few shreds of the suspected stain, steep it in distilled water very feebly acidified, and then examine with the microscope. In the present day there are various methods of staining which may help you.

Blood-stains.—I have now to say something about *blood-stains.* A policeman may bring you a piece of linen, let us say, and, *à propos* of murder, or rape, or anything else, he may ask your opinion as to whether a certain stain is blood or not. When you are asked such a question proceed very circumspectly. I have often asked students at examination, "If a policeman were to bring a piece of garment with a spot upon it, and

he asked you whether it was blood, what would you do?" The answer in many cases has been, "Oh, I would use the spectroscope." I ask, "Have you got a spectroscope?" Answer: "No, sir." "Then you would not use it." There is a tendency very often to run after the last new thing, and to run after the most out-of-the-way thing, and to forget the common things. I want to say about blood what I have said about many other things—that it is not detected by any single test. The detection of blood is by the convergence of evidence on to one point. Here is a fabric, and if that were brought to me I should record first of all the size and character of the piece of fabric, and I should measure it. I should say it was somewhat irregular in shape, three inches by four inches, with a torn edge; that the linen had been stamped, and that I could see the letters—part of an I, L, and V, and parts of C, O, and L. I should examine the fibres with the microscope, and say, probably, in this case that the fabric was made of cotton, that it was mainly white, but that it was crossed by thin lines of a very faint blue. Sometimes you may get a mixed fabric. It is a very easy thing to put a few fibres under the microscope and to describe them, and a proper description of the fabric might lead to the identification of the prisoner. Having described the fabric upon which is the stain, now proceed to describe the stain. Be careful to handle it gently and not to work it about. You have to come to a knowledge of that stain in various ways. First of all I find that the stain has made the fibres of the material distinctly stiffer. An iron-mould does not do that, and there are many other stains which do not do that; neither would an ordinary dye. But this piece of fabric is distinctly stiffened. The next thing is to examine it with a pocket-lens, and by this means you may very often succeed in seeing definite little clots upon it. I do not see any clots in this, therefore I content myself with the fact that

it stiffens linen, and that fact goes a long way towards blood. When I was Examiner at the University of London, I once gave as a test for the Honours Examination a fabric stained with a mixture of wheat-flour paste and logwood. It was astonishing to find how many of those men said that the starch granules in that paste were blood-corpuscles. Therefore be careful to take all circumstances into consideration.

Ordinary blood-stains are red, but when they are very old they may lose their characteristic colour. The next point in favour of the stain being blood is that it readily gives up its colouring matter to water. If you take some water and put into it a piece of the fabric and shake it, you very soon find that the fabric parts with the colouring matter to the water. Of course the time occupied by solution depends very much on the age of the stain. If the stain is very old and dry, the solution may take some time to come about. The stain I have here is between twenty-four and forty-eight hours old. You see I have a red solution from it. I pour off some of the red solution and heat the remainder. Now please excuse me if I allude to a very common thing. Sometimes I question students on this point. They say the colouring matter is soluble in water, and I say, "Would you use hot or cold water?" Many a man hesitates, and does not give the answer. *Of course* you use cold water, because blood contains albumin; and if you coagulate your albumin—that is, if you use water above 180° F.—you defeat your object. On boiling this solution I get it muddled and coagulated, and the coagulum is not soluble in a small quantity of nitric acid. Therefore I have something red, clotted, soluble in water, which contains albumin. If it is not blood, what is it? I pause for a reply. That really is the test for blood. But remember that you must not use one test only. There are several confirmatory tests for blood, but never omit this preliminary one, because it is

the most important. One of the most common of the confirmatory tests is tincture of guaiacum and ozonic ether, which you know well, and are using every day in the wards. But remember there are other objects which cause that blue coloration with tincture of guaiacum and ozonic ether, such as sundry vegetable juices. It is not exclusively caused by hæmoglobin. I think men are sometimes under the impression that guaiacum and ozonic ether is an infallible test for blood, but it is not; but it is a very useful confirmatory test. Another test of very great use is the microscope, because by it you can see the corpuscles. Another confirmatory test is the spectroscope.

Now remember what the spectroscope tells you. The spectrum of oxyhæmoglobin is characteristic; it gives you two absorption bands between the green and yellow, and between lines D and E of the spectrum. Now spectroscopy is almost a science by itself, and the determination of the exact position of absorption bands is not a very easy matter; and I would warn you that there are red colouring matters which give absorption bands very close to those which are caused by hæmoglobin, and I remind you that the test of hæmoglobin does not consist so much in the occurrence of two absorption bands in a particular position, as it does in the fact that these absorption bands can be made to alter their form and position, that the two can be changed into one. And here I have before me a rough sketch of these spectra, showing that after reduction, either by carbonic acid or ammonium sulphide, the two absorption bands are united into one, and the single band is nearer the green than the yellow, a little nearer E than it is to D; and then, by shaking the blood in air you oxidise it, and then you get two absorption bands again.

There is another test for blood, and that is the obtaining of hæmin crystals. That, again, you have seen in your physiological lectures. Add a speck of sodium chloride

and a drop of glacial acetic acid to a drop of blood, and let the blood evaporate, and then you get hæmin crystals, which, I remind you, are rhomboidal in shape and reddish in colour. Those tests all help you to say that a given spot on a fabric is blood; but by far the most important of these is the first I showed you. Moreover it can be carried out with a little cold water and a flame. By that alone I think you would be justified in saying that in all probability the stain was blood. An important point is that blood upon a garment very often helps to convict a criminal, and the point is, "Can you say that blood upon the clothing of a suspected criminal is human blood?" In the present state of our knowledge I should say emphatically no. A great deal of work has been done in measuring the corpuscles, and it has been shown that the corpuscles of different animals vary in diameter and size generally. But what I wish to say is that our knowledge on this point is not sufficiently precise, nor is it sufficiently easy to apply, especially in old stains, to hang a man upon. The microscopical examination of blood, however, is exceedingly important. A man was arrested on a charge of murder or wounding, and blood was found upon his garments, and this blood was put under the microscope, and it was found to contain, not round corpuscles, but oval corpuscles; it was the blood of a bird. The man was a poulterer, and the spot of blood upon his garment was not any sign of a crime, but simply a mark of his profession. So, again, you might find the nucleated corpuscles of a fish; and that would be a valuable piece of evidence, assisting not to incriminate, but to exculpate the suspected person. Now when you go to examine a stain with the microscope you may find other important evidence. For instance, you may find a hair, and you have to determine whether it is a human hair or whether it is the fur of some animal. Careful microscopical examination in this respect is sometimes of great value. You may find that the hair found upon the blood-stained garment or upon the knife

is identical with the fur worn by a murdered woman. If the two hairs exactly coincide that would be a very important link in the evidence.

Now as to examining knives. A knife may be brought to you perfectly clean, and you want to see whether there is any blood upon it. Suppose a knife has been used for a murderous act and has been wiped clean. The place to look in is the nick used for opening the knife and in the name-stamp. It is there that the stuff is wiped in, and by picking it out with a pin you may get some solution containing hæmoglobin, and that would be a very valuable piece of evidence. It is important to remember where to look and what to look for. Menstrual blood is said to be acid, and the presence with blood-stain of vaginal epithelium and so forth would be an important piece of evidence.

CHAPTER XXVI

PREGNANCY—DELIVERY—ABORTION—INFANTICIDE

Pregnancy. — Feigned — Stay of Execution — Quickening — Jury of Matrons—Case of Christine Edmunds—Concealed Pregnancy—De Ventre Inspiciendo—A Case in Point—In the Dead—Corpus Luteum.

Delivery. — Pretended — Concealed — Unconscious — Sudden—Post-mortem Signs of Delivery—Lineæ Albicantes.

Abortion.—The Law on the Subject—Premature Labour—Instruments Used—An Illustrative Abortion Case.

Birth.—Its Relation to Legitimacy—Possessio Fratris—Tenancy by Courtesy—Birth in Law—Twins—Criteria of Life—Scots Law—French Law—Viability.

Legitimacy.—English and Scots Law—Period of Gestation—Non-Accessibility of Husband to Wife—The Gardner Peerage Case—Immaturity.

Infanticide.—Legal Aspect—Concealment of Birth—The Dead Child—The Mother—Variations in Children—The Lungs—The Fœtal Vessels—The Umbilical Cord—Meconium—Artificial Respiration—Cause of Death—Overlying—Drink.

I NOW go to another subject, which I shall touch upon lightly, because I know that you have had the whole thing taught to you much more efficiently than I can pretend to do it. I refer to *pregnancy*, and I shall only allude to it in its medico-legal aspects. Now pregnancy may be feigned. For instance, it may be feigned for the purpose of extorting money. A woman may go to her paramour and say she is pregnant by him, and so forth. Then pregnancy may be feigned for the purpose of producing a false heir; a woman may pretend to be pregnant if she wants a son,

and very important questions in relation to property are connected with her having a son. She pretends to be pregnant, and when the time comes she buys a boy baby, and it gets smuggled into the bed. That has been done, and in recent years.

Then pregnancy may be feigned in order to stay execution. According to the old views, partly theological and partly legal, if a woman was convicted of murder it was lawful to hang the woman, but was not lawful to hang the innocent baby which was possibly in her womb. For this reason pregnancy has been pleaded for a stay of execution, and there have been nice discussions as to when the product of conception has civil rights and obtains a soul. That is a sort of thing we might discuss and not get much further with, and therefore I will not detain you with it. But the law decides that in order that execution may be stayed the woman must be "quick" with child, and accordingly great importance has been attached to the fact of quickening. Of course we know that a fœtus is "quick" from the very day of its foundation, and there is no exact time when a fœtus quickens, though in the later months of pregnancy the mother may be conscious of the movements of the fœtus, and that consciousness of movement goes by the name of quickening.

Jury of Matrons.—So that when a plea of pregnancy is made, the old form, which is still adhered to, is that a jury of matrons is empanelled, who examine the woman who pleads pregnancy, and inform the court whether she is *quick* with child. The last case of the kind in this country which I remember was that of Christine Edmunds, the Brighton poisoner. She pleaded she was pregnant, and then a jury of matrons was empanelled, who decided that Miss Edmunds was not quick with child.

Pregnancy, of course, may not only be feigned, but it may be concealed. It may be concealed to avoid disgrace, and it may be concealed by a woman who has the intention of having abortion procured ; in addition, it may be con-

cealed by a woman whose intention it is to commit infanticide. Pregnancy is sometimes a very important matter. It sometimes happens that the male owner of an entailed estate dies and leaves no heir, but he leaves a pregnant widow, and there comes the possibility of a posthumous child. The estates do not follow to the next living heir until the result of the widow's pregnancy is known. When there are great estates and great issues hanging upon the results of the pregnancy, of course there is a strong temptation for fraud; and the law of England issues, or used to issue, a writ known as *de ventre inspiciendo*, of which I have a case here. Sir Francis Willoughby died leaving no son, but a pregnant widow; whereupon the heir prayed for a writ *de ventre inspiciendo*, the result of which was a declaration on the part of the sheriff and twelve wise women that she was pregnant. Whereupon the court ordered the sheriff "safely to keep her in such a house, and that she was to be viewed daily by some of the ten women named in the writ," etc. Ultimately the Dowager Lady Willoughby was delivered of a daughter.

I do not think I need trouble you with the signs of pregnancy, which are given in your books on midwifery.

With regard to this question of pregnancy, you may have to determine it in the dead as well as in the living; and you must bear in mind the fact which I told you—that the unimpregnated uterus resists decomposition, and that a body is hardly ever too decomposed to enable you to judge as to whether a woman was pregnant.

Corpus luteum.—Amongst the signs of pregnancy post-mortem is the corpus luteum, that is the remains of the Graafian follicle in the ovary. The corpus luteum of pregnancy is very much more visible than the corpus luteum of menstruation which is not followed by pregnancy. The difference between the corpus luteum of pregnancy and of menstruation is said to be as follows:—The Graafian follicle bursts and expels the ovum;

and if no pregnancy has followed, then at the end of three weeks the diameter is three-quarters of an inch, and there is a central reddish clot and a convoluted wall. If no pregnancy follows the corpus luteum shrivels up and disappears. At the end of a month it is smaller, the clot may be reddish and the wall yellowish; and at the end of two months there is an insignificant scar, and at the end of six months it is absent. But if pregnancy follows, then at the end of a month it has got larger instead of smaller; and at the end of two months is said to be seven-eighths of an inch in diameter, with a pale clot, and you can testify to its presence till the end of the pregnancy. The difference is due to the afflux of blood to the sexual organs in the one case and not in the other.

Delivery.—Closely connected with pregnancy is the question of delivery, which is after all the terminal phenomenon of pregnancy, delivery being defined as the expelling of the contents of the womb. It may be pretended, or it may be concealed, just as pregnancy may be pretended or concealed. The signs of delivery are evident first of all in proportion to the near approach of maturity of the fœtus; and secondly, in proportion to the interval which has elapsed. If a woman aborts in the early days of pregnancy, it may be difficult to say anything has happened within a little time of the occurrence. But if she goes on to her full term, and the contents of the uterus are expelled, you may testify to the fact of delivery for some time afterwards. There are many questions connected with delivery, and the question of delivery is very closely connected with infanticide. One of the questions which is to be asked is, "Can a woman be delivered unconsciously?" I take it the answer is in the affirmative if there is good evidence that she was unconscious from anæsthetics or opium, or injuries, or anything of that kind. But that is not the question. "Can a woman *otherwise healthy* be delivered unconsciously?" It is certain that a woman may be delivered

very suddenly indeed. A woman was admitted into my ward with pneumonia, she having been delivered suddenly and quite unexpectedly the day before, and she stated positively that she had mistaken the on-coming of her pregnancy for the needs of defæcation. That is a subjective symptom, and it is a thing which I confess one can hardly understand. One must have experience to be able to judge of a matter of that kind. All I can say is that a man never mistakes the needs of defæcation for the needs of micturition ; there is no confusion in that matter. But it is a plea which is sometimes put forward by women, and it is one which is very unlikely to be true, but you will be leaning towards the side of mercy very often if you pay some little attention to it. Babies have often been expelled into privies, and at Barking, at the outfall of the London sewers, they used, some years ago, to receive an average of five fœtuses a year. That does not sound very many, but I doubt if they got there unconsciously. On the other hand, it is evident that while a woman is sitting on a privy the uterus may expel its contents very suddenly indeed, but that she should be unconscious of it is quite another matter.

Delivery may take place post-mortem, that is, the uterus may be made to expel its contents by the pressure of the gases of putrefaction. The gases of putrefaction are formed in the abdominal cavity, and exercise a great deal of pressure, and there seem to have been cases in which the uterus has expelled its contents, and has been almost inverted by the pressure.

As to the signs of delivery and recent delivery, that again is an obstetric matter, which I may simply pass over and refer you to your obstetric teaching and experiences.

Lineæ Albicantes.—One of the things you are sometimes asked is whether a woman has at any time of her life been pregnant. I told you yesterday that the presence

or absence of a hymen was after all not an absolute proof of copulation one way or the other. And again I would say that the lineæ albicantes on the abdomen, once formed, tend to last for ever, but they may be caused by anything which distends the abdomen.

Abortion.—The next subject with which I have to deal is also one of very great importance, namely, *abortion.* Here, again, the law is very comprehensive. The crime of abortion is defined as "unlawfully administering to any woman, or causing to be taken by her"—and here comes a very important thing in parenthesis—("whether she be with child or not), with intent to procure her miscarriage, any poison or any other noxious thing, or using for the same purpose any instrument or other means whatsoever; also the use of the same means with same intent by any woman being with child." Now that is very comprehensive, and, of course, the judges, and lawyers, and juries look very much to the question of intent. I wish to warn you, and to say how great is your responsibility when in the practice of the obstetric branch of your profession you find it necessary to bring on premature labour; and I would appeal to you when you find such a procedure is necessary, that unless circumstances should be too strong (and circumstances are sometimes too strong), never to do so without a consultation. If it were said that you had done any unwarrantable act with intent to destroy the contents of the uterus, or to bring about labour, and the death of the woman resulted, you might get into serious trouble. The crime of procuring abortion always has been common in every age of the world, and I am sorry to say that it appears to be as common now as ever it was. Listen to what befell a former student of this college only last year. A woman came to him pregnant, and she said she wished to have abortion procured. He told her it was a criminal act, and he would not listen to her at all. One day came a knock at his door, and this woman almost

fell into the passage, feeling ill. She was put to bed, and she aborted in his house, and died as a result of an operation performed somewhere else. A friend came and told me about it, and asked me what should be done. I said, "Go instantly and inform the police, and let the man do it himself." His only safety, under circumstances of that kind, would be in absolute openness; there should be no concealment of any kind. That was done, and the whole matter passed off without implicating him one little bit. But it was a very awkward position to be placed in, and one which, if he had faltered for a minute, might have blasted his professional reputation for life.

Another case occurred only last year at the West End. A young doctor had been guilty of an illicit intimacy with a woman, and she suddenly died of peritonitis, and he was accused of having procured abortion, and he was actually committed for trial charged with having done so. But luckily the whole thing was refuted, and there was no evidence of abortion, but there was found an ovarian abscess which had burst, causing peritonitis. These are good cases, showing how careful you should be in dealing with a pregnant uterus, and how careful you should be in making post-mortems in these matters. It was a very fortunate thing that the post-mortem in the second case fell into the hands of a skilled pathologist.

When abortion has been procured we may have to determine first of all whether or not that which has been expelled is the product of conception or not. Of course there are such things as uterine moles, clots, and so forth, which it might be alleged were the products of conception, but with regard to which you are not likely to come to any misunderstanding if you carefully examine them. Then when abortion has been procured, you have first of all to find out whether it was necessary to procure it or not. If it was proved to be necessary in order to save the woman's life, no criminal indictment would lie. The next point is as to the methods used. The methods used

are very often the recognised ones—tents, injections, and so forth, such as are employed by the skilled obstetrician for bringing about expulsion of the contents of the womb in order to save a woman's life. But very often sharp instruments are used by those who procure abortion and make it their business, and it is extraordinary to find what coarse and dangerous instruments are used by them. For instance, there is a case on record where a woman was killed by the rib of an umbrella being put up the vagina, which perforated the vagina, and she got septic peritonitis and died. Knitting-needles and all sorts of things are used. But there is nothing like a good case.

On Friday, August 6, 1880, at the Central Criminal Court, before Mr Justice Hawkins, Mr and Mrs Colmer were put upon their trial for the wilful murder of Mary B. Mrs B., aged thirty-six, was a solicitor's widow, keeping a boarding-house, and in March 1880 she became pregnant by one of her lodgers. Colmer lived at Bristol, keeping an Anglo-American eclectic and progressive medicine warehouse (always be suspicious of these high-sounding names), while Mrs Colmer lived at Yeovil, describing herself as herbalist and M.D. Pennsylvania. On March 17 the lodger drove Mrs B. to Yeovil to consult "Madame" Colmer, and drove her back again. On March 19 Mrs B. went by train to Yeovil, and she was proved to have been some hours at Mrs Colmer's house; and Colmer, who had been summoned by telegraph from Bristol, was there also. It was proved that Mrs B. fainted and lost much blood while in Mrs Colmer's house. She returned home in a very prostrate condition, and died the next day. The inquest proved that she had been delivered of a three months' child, and that a sharp instrument had been used for the purpose. Both prisoners were sentenced to death.

Here again I have to remark that by law the crime of procuring abortion is a felony; and if in the act of committing a felony the felon causes the death of

another person, that is murder. So the abortioner, when he fails in his attempt, and causes the death of the woman, commits murder; but the sentence is very rarely carried out in these circumstances.

Mr Justice Hawkins summed up in this case in a very exhaustive address, in which he read the Act (which I have previously read to you), and said the only question they had to determine was whether these two persons, or either of them, had been shown to be guilty of the offence contemplated by the statute. They were convicted, but the sentence was commuted to one of penal servitude for life, which is very generally thought to be an act of mercy; but whether it is so or not I think is open to debate.

Birth.—Now there comes the question of birth in its relation to legitimacy, and I would remind you that birth is a very important fact. Perhaps that is a truism, but it is legally a very important fact, even though a being born does not survive. And whether a child has been born or not is a fact which often influences the disposition of property, as I showed you by means of the diagram which I put upon the blackboard in illustration of what is known as *possessio fratris.* Again, there is what is called tenancy by the courtesy of the law in England. Tenancy by courtesy, as I understand it, is this: that if a man married an heiress—that is to say, a woman who has property entailed on a male — and if she has a son, then her husband enjoys the property for life, even though the wife and son both die. But since the passing of the Married Woman's Property Act a tenant by the courtesy of the law has become a *rara avis.*

Now, what is birth? In order that birth may be established in the eyes of the law a child must be entirely born, and there are cases where that point has been argued. Entirely born means that the child shall be entirely free from the body of its mother—that is

to say, the whole of the body shall be out of the vagina. It does not seem to be necessary that the umbilical cord shall be cut, or that the placenta shall have come away. When a child is born you must, of course, always notice the exact time; and in cases of twins that is a very important matter. If twins be born they do not both inherit; the first-born gets the property *in tail male*. You all know the Biblical case, where one put out its arm and a red string was tied round it, and then it withdrew the arm again, and the brother came first. In the case of twins it is very important you should be able to say which of these was born first.

The next point is, that the child must not only be born, but it must be born alive. And in some of these cases there have been great disputes as to whether a child was born alive or not. The question then arises, What are the *criteria* of live birth? I need hardly remind you that if a child enjoys property *in tail male*, and lives only for a minute, the fact that it lived is of very great importance.

Now there are two *criteria* of life; one is movement and the other is crying. With regard to movement, in 1806 there was the case of *Fish* v. *Palmer*, which was tried by the Court of Exchequer. It appears that an infant was born to Mr Fish in 1796, which was supposed to be stillborn, and on the death of his wife he resigned her property to the legal heir. Some circumstances occurred afterwards which induced him to bring an action and to attempt to prove that the child had not been born dead. Dr Lyon had declared an hour before birth that the child was alive; and, having directed a warm bath to be prepared, gave the child to the nurse to be immersed in the warm water. It did not cry nor move, nor did it show any symptoms of life; but while in the water, according to the testimony of two females—the nurse and the cook—there twice appeared twitchings and tremulousness of the lips. Dr Lyon then

directed them to blow into its throat, but it never exhibited any other sign of life. Several physicians were examined as to the deductions to be drawn from these symptoms. Ultimately it was decided that the child was born alive. That is an interesting case, and it was practically decided on the testimony of the nurse and cook that they saw twitching. The Scotch law demands as proof of life that the baby shall cry. Of course, if a child is born and cries lustily, the matter is settled; but disputes do not arise in plain cases of that sort, but only in those instances such as I have read to you, where there is a great deal of property and very little life. I have said that the Scotch law demands crying as evidence of life; but in the first place the child may be born dumb. It may therefore move without crying. The next point is that the child may cry before it is born, and there have been several instances on record in which a child has cried in the vagina; and it is said there are one or two cases on record in which a child has cried *in utero*—that is to say, having got its mouth opposite the orifice, it has made some sort of noise;—so that you may get crying without birth, and birth without crying. It seems almost stupid to take up your time with all these little points; and although there is a maxim, *De minimis non curat lex*, still you will find, when property is in the balance, that the law does care about trifles, and will play with them by the hour together.

In France there is not only the question of live birth, but there is the question of viability—that is to say, whether the creature born is capable of going on living. If the creature is so deformed that it cannot go on living, then the French do not recognise it as a real child. According to Coke, a monster cannot inherit; "a being which hath not the shape of mankind cannot be heir to or inherit land, although brought forth within marriage"—that is Coke's dictum. Still a

dictum of that kind does not help us very much, because where does the shape of mankind end or begin?

Legitimacy.—Now the next point one has to decide in reference to birth is the question of legitimacy. That is a very important matter. According to the law of England, any child born in wedlock is legitimate; that is to say, if people are married at two o'clock, and a child is born at three o'clock—to take a very extreme case—that child is legitimate provided the people married are not within the limits of affinity as set forth by law. By the law of England a child born out of wedlock cannot be legitimatised; but according to the law of Scotland the child can be legitimatised by the subsequent marriage of its parents.

Now, seeing that a child born in wedlock is considered as legitimate, it follows necessarily that the legitimacy of a child born in wedlock can only be upset by the force of bad moral circumstances; and whenever the legitimacy of a child has been upset, it has always been as the result of bad moral circumstances.

The legitimacy of a child has been brought in question in a notable case which occurred in Scotland, where a minister of the Scotch Church married, and a child was born at a time after wedlock which caused some scandal to the elders of the church in which he officiated, and to the congregation; and then the legitimacy had to be gone into. The congregation wanted to expel him, and to hold him up to obloquy. Finally it was settled that, although the child was born at the end of the sixth month, the evidence went to show that it was a premature child, and there was no real evidence to show that the child had not been procreated in wedlock.

I may remind you as to the period of gestation. The ordinary period of gestation is two hundred and eighty days, or nine calendar months, or ten lunar months, or forty weeks. But pregnancies may be protracted; and

there are cases on record where a pregnancy has been protracted to the 300th, 308th, 315th, and 322nd day.

I would remind you that questions of legitimacy have arisen when a child has been born in wedlock and there has been a non-accessibility on the part of the husband to the wife—*i.e.*, where for some reason they have been living apart, and have not been accessible to each other. But unless there is strong proof to the contrary, if a man be, as the old phrase says, "within the four seas of the realm," then his accessibility to his wife is taken for granted. Of course, if a man is in an asylum or a hospital—and still more, if he is in prison and under lock and key—the law would admit that there was non-accessibility.

The Gardner Peerage case is one which has occupied a good deal of attention. It came before the House of Lords in 1825. Allan Legge Gardner, the son of Lord Gardner by his second wife, petitioned to have his name inscribed as a Peer on the Parliament roll. The Peerage was, however, claimed by another person, Henry Fenton Jadis, who alleged that he was the son of Lord Gardner by his first and subsequently divorced wife. It was contended that the latter was illegitimate, and in order to establish this point the evidence adduced was partly medical and partly moral. Lady Gardner, the mother of the alleged legitimate child, parted from her husband on board of his ship on the 30th January 1802. Lord Gardner went to the West Indies, and did not again see his wife until the 11th July following. The child, whose legitimacy was disputed, was born on the 8th December of that year. Therefore the plain medical question was whether a child born forty-four weeks and four days after intercourse (from January to December), or twenty-one weeks and three days (from July to December), could be considered to be the child of Lord Gardner. If this were answered in the affirmative, then it follows that this must have been a premature or a very protracted birth. There

was no pretence that this was a premature case, the child having been mature when born. The question then was reduced to this. Was this alleged protracted gestation consistent with medical experience? Many medical witnesses, comprising the principal obstetric practitioners in the kingdom, were examined on this point. Their evidence was very conflicting, but the large majority concurred in the opinion that natural gestation might be protracted to a period which would cover the birth of the alleged illegitimate child. On the moral side of the question, it was clearly proved that Lady Gardner, after the departure of her husband, was living in open adulterous intercourse with a Mr Jadis, and on this ground Lord Gardner obtained a divorce from her after his return. He subsequently married a second wife, by whom he had the claimant, Allan Legge Gardner. It was contended that the other claimant was really the son of Lady Gardner by Mr Jadis. The decision of the House was that Jadis was illegitimate, and that the title should descend to the son of the second Lady Gardner.

Therefore you see that in spite of the medical evidence as to the possibility of such a protracted conception, the decision was one of common sense, and one with which we must all agree. The decision appears to have been based chiefly upon moral circumstances, for had not the first Lady Gardner been living in open adulterous intercourse at the time of her husband's departure, it is highly probable, from the medical evidence bearing that way, that the legitimacy of the child would have been allowed. I remind you again that a large amount of property was hanging in the balance, and the point was one worth fighting for, and I daresay any amount of fees were paid to the lawyers and to the doctors.

The next point is as to what degree of immaturity is compatible with life. Of this there are two cases which may be quoted, the Scotch case of which I told you, in which a child was born 174 days after marriage, and it was shown

that the child was exceedingly immature, and that it wanted a great deal of care taken of it. This was heard not in a court of law, but in a moral court, and the elders decided that there was no proof that the child had not been procreated within the period of wedlock. There was a foreign case where a child born at the twenty-fifth week lived.

Infanticide.—Now we go to another subject which is of very great importance, and that is the question of infanticide, and the question of concealment of birth. I would remind you that not only is infanticide a crime, but concealment of birth is likewise a crime, by 24th and 25th Vict. Cap. 100, Section 60:—"If any woman shall be delivered of child, every person who shall by any secret disposition of the dead body of the said child, whether that child died before, at, or after its birth, endeavour to conceal the birth thereof, shall be guilty of misdemeanour, and, being convicted thereof, shall be liable, at the discretion of the court, to be imprisoned for a period not exceeding two years, with or without hard labour." Infanticide, that is to say the killing of a newly-born child, is murder, and these cases usually excite great sympathy, so that those who have been convicted of infanticide are practically never hanged. In almost every case the children, who are the victims, are illegitimate. A girl has been seduced and a child is born; the birth of the child very likely means the mother's ruin, and she tries to conceal the birth and to kill the child. It is not at all surprising under these circumstances that there should be a great deal of sympathy excited. Now in order that the crime of infanticide may be established, we must have certain evidence that the child has lived, and we have to answer certain questions. First of all, a dead child being found, we may be asked whose child is it? or is the dead child the child of the person charged? And therefore we have to say whether the prisoner has been recently delivered. Again, we have to decide in reference to the

child; is it mature? was it born alive or dead? and if born alive, what was the cause of death?

As to the first question, this will have been fully discussed before you in your obstetric lectures. As to the maturity, that was alluded to when we were discussing age.

Now we come to the question, was the child born alive or dead? That is a very important matter, and you will find in works on medical jurisprudence that there is a great deal of hair-splitting, if I may say so, on that question. What are the signs of live birth?

The great sign of live birth is the fact that the child has breathed, and if the lungs have been inflated there is no difficulty at all in the matter. Lungs which have been inflated are perfectly different in appearance from those which have not been inflated. The lung which has never been inflated looks more like liver than lung, and when the thorax is opened such lungs are found lying near the posterior wall of the thorax. Moreover, a non-inflated lung does not crepitate, it is dark in colour, and sinks in water. The lung which has been inflated floats in water, it crepitates freely, and if the child has given some really lusty cries you will have no difficulty. On the other hand, if you find that a very few air-cells have been inflated, what have you to say? I advise you to be exceedingly cautious as to what you say under these circumstances. You can only judge by appearance, and using a lens you may see a few air-cells have been inflated on the surface, which cause a characteristic mottling. But do not make too much of trifles. It does not follow because a sickly child has given a gasp, and has got a little air into its lungs, that it has lived in the proper sense of the word. Taking a merciful view of the case, it may be a question of feebleness of respiration on the part of the child which has led to its death. Do not therefore take extreme views. In works on medical jurisprudence you will find tables given upon

which you are asked to come to definite conclusions. There is the weight of the lungs in proportion to the weight of the body. It is said that a lung, inflated during life, in consequence of the afflux of air and blood, weighs more than before inspiration has taken place. It necessarily does, but I do not think these proportionate numbers are absolutely certain, or, to put it plainly, I do not think they are sufficient to hang a woman upon, and after all that is the point. You must always have in mind the fact that children differ enormously, and that a child at full term may weigh only two or three pounds, or it may weigh as much as twelve or fourteen pounds. Then again, just as some people inherit big noses or big hands, others may inherit big lungs. Therefore I say I think these proportionate figures are not good enough, and I do not advise you to use any of the hair-splitting arguments of that kind in a coroner's court. Gas may form in the lung as the result of putrefaction, but such gas is readily expelled by pressure, whichi s not the case with inspired air.

Another point which you must remember is that if a child has lived some time you will be able to come to a conclusion by examining the fœtal vessels. For instance, you will be able to say whether the foramen ovale is closed, whether the ductus arteriosus is closed, and again you will be able to form a conclusion sometimes by the state of the umbilical cord. If you find that the umbilical cord shows any signs of inflammation around the root of it, or, still more, cicatrisation, then, of course, that would be proof positive that the child was born alive.

Another point which is sometimes dwelt upon is the expulsion of meconium by the child from its bowels. I do not think you must take that as a sign of life. Of course it may be so, but it is perfectly clear that if a flabby child is manipulated the meconium may be squeezed out; you may squeeze out the meconium from a child just as you may squeeze the juice from a lemon.

A point to which I attach greater importance is the presence of food in the stomach. It is not conceivable that a child could have milk in the stomach, or any other form of food, unless it had been able to suck.

Then, again, you must remember, in regard to the state of the lungs, they may be fully inflated, and still the child may not have been born alive; but in that case, of course, there would be evidence forthcoming that artificial respiration had been resorted to. When a child is stillborn, one of the first things we have to do is to perform artificial respiration, and it must be performed for some time. The emptiness of the bladder is also of some use as a sign of live birth.

If the child is dead, how did it die? A child may die from neglect—that is to say, by the omission of certain things which were necessary—or by active interference—that is to say, by acts of commission. Of course children have been killed by accidentally getting the cord round their necks, by hæmorrhage from the cord, and so forth; and you would, of course, look to see whether that had happened. Children may also be killed in other ways; and I would remind you that such a thing has been known as putting a knitting-needle through the fontanelle. So that in making a post-mortem you would examine the child's body very carefully to see if there were any marks made by the insertion of sharp instruments into the belly or the fontanelles. Then it is alleged that children have been suddenly expelled from the uterus and killed in that way. It is stated that a pregnant woman has been mounting a pair of steps when the pains of labour came on, and the child was shot out on to the floor and killed. Well, you of course want evidence of it. We must admit the possibility; women do go up ladders, and they do have full uteri, and they do have sudden births, and it is really a matter of evidence in any particular case, and I do not think it need be very seriously discussed medically. If there is evidence

on such a point you ought to receive the evidence with the greatest possible caution, for your common sense will tell you such a thing is very unlikely.

A form of killing children is smothering, and that is a crime which is very common in London; and it is called death from overlying. That generally occurs with very young children, sometimes newly-born infants; and it occurs most often between Friday night and Monday night, as shown very conclusively by the Registrar General's returns. I take it that drink is answerable for a good deal of the overlying in London. The child gets between its drunken parents, and they lie and roll upon it; and sometimes, I have no doubt, intentionally. When you are asked to make a post-mortem of a case of death from overlying you must see whether there is evidence of death from asphyxia. I have no doubt that infanticide in that way is much too common.

CHAPTER XXVII

WOUNDS

Varieties of Wounds — Defence of Malapraxis — Ante-mortem and Post-mortem Wounds — Bruises — Hæmophilia — Weapons and Instruments — Homicidal and Suicidal Wounds — The Case of Abdul Aziz — Accidental Wounds — Multiple Wounds — Manslaughter — Gunshot Wounds — The Uxbridge Tragedy and Mr Bowlby's Commentary—*Regina* v. *Paul Mai.*

I BEGIN to-day the medical jurisprudence of wounds. The medical jurisprudence of wounds is indissolubly mixed up with the surgery of wounds, and the man who has the most knowledge of wounds would be able to guide a court with the greatest certainty with regard to the legal bearings of them. We need not, I think, trouble about the definitions of wounds.

Varieties of Wounds.—Now when you are confronted with a wound on the living body, the first thing to decide is whether that wound is dangerous to life. All I would say on that head is you must take no pedantic or ridiculous view of what a dangerous wound is. Every wound is dangerous to life, no matter how small. Cases have occurred in which septic poisoning has resulted from the prick of a pin, but such rarities must not tempt you to take extreme views. You must see whether the wound is near organs or vessels which are very necessary for life, an injury to which would have been likely to cause death quickly. Then, wounds have been spoken of as "incised,"

"lacerated," "punctured," "contused," and so on, and in describing wounds these qualifying adjectives are sometimes necessary. Now when a wounded man is brought to you, and he has a stab, or bullet wound, or anything else, you have to examine its exact situation—length, breadth, depth, and direction. It may be necessary for you to probe the wound; and when you probe a wound be careful to do so with very great gentleness, and it is perhaps advisable to call the attention of another medical man to the fact that you are using no force. I say that because trouble has occurred, in one case where a man was shot in the neck during a Fenian disturbance in Ireland: suppuration of his wounds set in, and he ultimately died of them; and the defence here—and it is a very common defence—was that the man did not die of his wounds, but of malapraxis; that is to say he died because the wounds were mismanaged by the surgeon, and it was sought to prove that he had used the probe with unnecessary force, his lack of skill having so increased the damage that the man died. The same thing happened to no less a man than Liston, who was called to a gentleman wounded in a duel, and who was bleeding profusely from a wound in the thigh. Liston departed from the ordinary surgical practice of cutting down and tying the bleeding vessel *in situ*, and performed the more serious operation of exposing the external iliac and ligaturing it. The man died. When a man is killed in a duel, that is murder by the man who shoots him. The defence in this case was that he died of surgical malapraxis. It matters not whether the defence is successful or not, it is important for you to remember that that kind of defence is brought forward, and that when you are dealing with a wound, especially with a wound which has been inflicted with murderous intent, you have to exercise the greatest possible caution, and remember that a man who may be upon his trial for murder will use every possible means to get off. When you examine a wound you must note whether there has

been much effusion of blood, whether the part is much inflamed, and so forth. One very important thing is this: a body may be found with wounds upon it, and you have to determine whether those wounds were the cause of death. You have also to determine whether the wounds were made post-mortem or ante-mortem. The determination of this is comparatively a simple matter. Wounds made ante-mortem give evidence of vital phenomena; there is retraction of the edges, hæmorrhage, and, if the man has lived long enough, inflammatory action and attempts at repair. By examining the wounds you can tell whether one or other of these phenomena is present. There is no retraction of the edges of a wound made post-mortem, and you know that is one of the great differences between operative surgery on the dead subject and on the living subject. But if you inflict a wound on a corpse very soon after death, before the muscular irritability has died out, then you may get a certain amount of retraction of the edges, and it is possible that if putrefaction sets in in a corpse you may get considerable hæmorrhage from divided veins.

Again, bruises undergo change of colour with age, and the presence of these changes of colour in a bruise may be important; but it is exceedingly difficult to tell the difference between the effects of time and the effects of putrefaction. With regard to wounds and bruises there is one point which you must remember, and that is hæmophilia. Sometimes an enormous amount of hæmorrhage may take place as a result of very slight injury. I knew one case of hæmophilia in which the thigh was hit with an indiarubber air ball, and the patient had large hæmorrhage into his thigh which nearly cost him his life. There was a case many years ago, which occurred at Southampton, which caused a great deal of excitement at the time. There was a schoolmaster in whose house a boy died rather suddenly, and the coroner's jury returned a verdict of death from natural

causes. But something happened which caused suspicion to gather round the case. The body was exhumed and further examined, and it was discovered that the boy had subcutaneous hæmorrhages practically all over his body, and it was shown that this was the result of a flogging he had had from his master. The boy had in fact been flogged to death. That case occurred in 1856, and caused great excitement. Not much was known then about hæmophilia, but it was conceivable that this was an unfortunate hæmophiliac, and that the flogging he had had may not have been so terrible as was made out. However, the schoolmaster got a very long term of penal servitude.

With regard to wounds, I remind you that internal viscera may be ruptured and death may result without any external ecchymosis or bruising. For instance, in aguish countries, enlarged spleens have been ruptured by a squeeze; and in the same way livers have been ruptured by accident, and hæmorrhage and death have resulted, though there has been very little external evidence of mischief. One point about incised wounds is that it is said an incised wound may sometimes be smaller than the weapon which made it, owing to the elasticity of the skin. That is to say, if a man gets a punctured wound with the point of a sword, when the sword is withdrawn the wound left looks so small that you would hardly think the sword could have made it. I mention it as a possible source of error. Then when a wound goes right through a body, as with a small sword, the edges of the aperture of entry are turned in, and the edges of the aperture of exit are turned outwards; but remember that when the sword is withdrawn this may be reversed. Then when wounds are made you have always to answer a suggestion as to whether they were made by this or by that weapon, or in this or that way. In a case of abortion before the court, testimony was given that there was a wound near the os uteri, and the witness had a series of obstetrical instru-

ments handed to him, and was asked whether in his opinion the wound which was found post-mortem might have been made by one or more of the instruments which were handed to him. That is the kind of question which is very often put. Very often the suggestion is made by the prisoner that the wound has been made, not by any lethal weapon, but by falling accidentally against something which was very like a lethal weapon. For instance, a man might be knocked down and might hit himself against the projecting lock of a door. Again, a penetrating wound is said to be made sometimes by a man falling upon a nail sticking up in the floor, and so forth. I cannot lay down any exact rules for your guidance in answering questions of the sort I have indicated—whether a wound was likely to be made by an instrument of the kind shown or not. When I was house-surgeon I had to attend a police court to give evidence in a case of assault, and I found I had to testify as to the wounds inflicted on a certain Bridget Macarthy. I went to the out-patient book and looked up Bridget Macarthy's case, and by the aid of this and my own memory I recalled a woman who had a series of slight wounds about the scalp, which she said a friend of hers had made with the pointed end of the snuffers. She alleged that her friend, in a moment of alcoholic frenzy, had rushed at her with the door-key and the snuffers and inflicted the wounds upon her head. When I went to give evidence, the woman appeared in the witness-box swathed like an Egyptian mummy; she had on her head an incredible amount of bandage, and she told the magistrate in a voluble way how she "bled like a pig" from the wounds upon her. I began to think I had got hold of the wrong person in the records of the hospital, and I began to be afraid that I had made a mistake. However, I went into the witness-box and took the bandage off on the spot, and there was nothing underneath except what I have told you; there were signs of some little wounds about the head which had got quite well.

Are Wounds Homicidal or Suicidal?—You are very often asked to say whether the wounds found upon a dead man are homicidal or suicidal. You are generally able to give some idea on this head. For instance, a wound may be in such a position that it could hardly have been inflicted by the dead person—for instance, between the shoulders; it is hardly conceivable that a man could inflict a death wound upon himself by a blow between the shoulders. But here, again, you have to remember that the tricks of mad suicides are endless.

With regard to self-inflicted wounds, you must remember that a suicide who goes to cut his throat, if he is a right-handed man, takes a knife in the position I show you, and begins on the left side high up, wounding the hyoid, or sometimes higher up, and the wound is oblique from left to right and from above down. These wounds are generally deeper at the beginning than at the finish. When you find wounds in that position you will have the right to assume that they have the characters of suicide. But do not say too much. On the other hand, if a man cuts another's throat, he approaches him, and the wound is made on the right side of the throat as a rule. But here again, you must remember that a murderer has come behind his victim, and in such a case the wound may be very like that which is produced by a suicide. Again, I remember at the hospital a man who cut his throat; he was a right-handed man, and his wounds were entirely on the right side of the throat. He cut his throat with the stump of a blade of an old dinner knife, and held the blade in both hands, and persistently hacked at his throat, making a series of wounds. They had all the character of homicidal wounds. You must bear these points carefully in mind when trying to come to a conclusion.

Sometimes the character of the wound may lead to the detection of the murderer. A sheep is killed, and, I believe, a pig too, by transfixion; the neck is transfixed and the butcher turns the blade round. You will see that

this method has been pursued if you notice a sheep in butchers' shops. A man being found with his throat cut in this artistic manner led to the detection of a butcher.

A curious case was that of the late Sultan of Turkey, Abdul Aziz. He was found dead in a bath with both brachial arteries divided at the bend of the elbow. There was a medical board to sit upon the deceased sultan, and they decided that the wounds were suicidal, and that they had been made with a pair of embroidery scissors belonging to one of the ladies of the harem. But Western Europe was very incredulous, for it is hardly possible that a man who had divided one brachial artery could use that arm to divide the other brachial artery. It was subsequently found that he was first killed, and then these wounds were made after death. I think the sultan was smothered, but the wounds I have mentioned were not self-inflicted ones. Then you may sometimes have to consider, or you may be asked, whether a wound was accidental; and all I would say is, that I do not think you can possibly give an opinion as to whether a wound is accidental. Many years ago there was a case before our courts which caused considerable excitement, and that was the murder of a Mr Moon by his mistress, Flora Davey. The history of the case was this. This lady and gentleman had been to the Derby, and when they came home from the Derby, they had supped together, and while they were having supper some altercation arose, and Flora Davey seized the poultry carver and stabbed Moon just between the fifth and sixth ribs on the left side, making a wound five inches long, and just wounding the apex of the heart. He died, and the question was whether it was accidental, whether conceivably he had got hold of the poultry carver, and that she seized his hands in the tussle. There were several medical witnesses in the box to say it was probably accidental. But the evidence was not credible. There was very little evidence to show that it was accidental or suicidal. Remember that you would

want a rather exaggerated movement of the arm to get round to make a wound such as this was, to get the point of the knife in between the fifth and sixth ribs, and wound the apex of the heart.

Again, in a struggle a man may be wounded by a number of people, and if he dies you may be asked to say whether it was the wound inflicted by Smith, by Jones, or by Robinson which caused death. Of course you have nothing to do with the question as to who inflicted wounds, that is a matter of common evidence; but in examining the wounds you could dismiss this or that, and say they were not fatal. Then the question may arise, Did the man die of the wound or its treatment? That I have already alluded to. And then there is a statute of limitations with regard to wounds. Supposing a wound is feloniously inflicted on another person, and that person lives a year and a day, that wound cannot be regarded as the cause of death; that is the law. Short of that the acceleration of death by a wound amounts to murder or to manslaughter, no matter how ripe for death the person may have been before the wound was inflicted. To give a common instance, if you give a man a shove or a kick, and by so doing burst an aneurism, that would be manslaughter, notwithstanding that that shove or kick may have been of a mild character. Or take such an instance as a schoolmaster boxing a child's ears and bursting an abscess internally, and so killing the child; that would be technically manslaughter. It is no excuse to show that any one had a deadly disease upon him; if you hasten his death it is quite enough.

Gunshot Wounds.—We will go to another class of wound, namely, gunshot wounds. When you are confronted with gunshot wounds you must get every information you can. You must examine the weapon and the ammunition, and you must get a knowledge of the wadding (supposing there is any). Of course wads or wadding are very rare now, but I found a man the other

day — a market gardener — who was wandering over his fields with an old muzzle-loading gun, and he had a ramrod and powder-horn and a shot-flask, and he was ramming the charge home with bits of newspaper of that morning. It seemed like a study from the antique, but you must remember that such things may happen. Supposing, for instance, that man had killed somebody, and you had recovered a bit of the wad, and that it was composed of that morning's *Little Pedlington Mercury*, that would be a very valuable clue. And in former times the material of which these wads were extemporised often formed a clue to the murderer.

Now when a person is killed by a gunshot wound, you must remember that it is of importance to note the position of the aperture of entry and the aperture of exit, for that will give you a clue to the direction from which the shot was fired. By taking the bearings in that way some useful information has been obtained. There is a case on record in which a man at Greenwich was killed. Sir Astley Cooper was called to see the man who was killed. He examined the wound, and noticed the position in which the dead body was. He saw that the shot had passed through the body and hit a wall on the other side. There was a window in the direction from which the shot would come, and Sir Astley Cooper came to the conclusion that if the person who fired the shot from the window did not wish to show his own body to the murdered person, he must have fired the shot with his left hand. I need not go into all the facts, but Sir Astley's reasoning led to the apprehension and ultimate conviction of a left-handed person. But you must remember that the apertures of entry and exit of a bullet may be very misleading. For instance, many years ago the late Duke of Coburg was shot, at an entertainment in Australia, by a Fenian with a saloon pistol. The bullet entered on the right side of the ninth dorsal vertebra, and it was found under the

skin to the right of the umbilicus. It was naturally assumed at first that this bullet had probably gone right through the liver, and that the wound was almost necessarily fatal. But happily that was not the case. It had run round the rib between the planes of the muscle and the abdominal wall, and the Duke quickly recovered.

With ordinary powder there is very often blackening, and very often singeing, and the presence of blackening and singeing may be taken as evidence that the weapon was moderately close to the body when it was fired. I have here for your inspection the suit of clothing of a workman, and I ask you to notice that a large hole has been burnt through a stout moleskin jacket, a waistcoat and trouser band, both of thick corduroy, and a stout cotton shirt. The whole of that burning was the result of a pistol shot. The owner of these clothes was found dead on the floor in front of the fire, and when the doctor got to him his clothing was smouldering, and it was thought at first that he had probably had a fit, and that something out of the fire had set his clothing alight. The weapon was not discovered until afterwards. It is a case worth recording and remembering. Near where the man lay was a chest of drawers, and in the top drawer was found the pistol. Then the bullet was found, which fitted the pistol. The theory is that he shot himself while standing in front of the drawers, that he fell back in front of the fire, dropping the pistol into the top drawer, and then that the first person who came into the room after the event shut the drawer, and shut in the evidence of the cause of death. The case is interesting as showing the amount of burning which may take place. In this progressive age civilisation has given us a large increase of murderous weapons; that is a curious commentary on our civilisation. A great many of the modern murderous weapons are smokeless, and are made to explode with fulminates and things other than gunpowder, and there is consequently little or no blacken-

ing, and I take it that the risk of setting fire to clothing is thereby lessened.

Now I will read you a case bearing on this question of gunshot wounds, which I think is one of the very best commentaries in medical jurisprudence which I have ever read. It is a commentary by Mr Bowlby, of St Bartholomew's Hospital, on the case which was known as the Uxbridge tragedy, which was tried at the Central Criminal Court on December 18, 1884, before Mr Justice Hawkins :—Elizabeth Gibbons, aged 54, and her husband, James Gibbons, aged 67, lived alone together in a house at Hayes, near Uxbridge. They lived comfortably, and were well-to-do. James Gibbons arrived home from a journey between 10 and 11 P.M. on November 15, had his supper, and went to his bedroom. At 11.30 Elizabeth Gibbons ran for a neighbour, saying her husband had shot himself, and James Gibbons was found dead in his room, lying on his face. There was in the room a six-chambered revolver, about six inches long, which it was admitted had been purchased by the deceased. Five chambers were empty, but in the sixth was a cartridge which was jammed. This revolver had *not* what is called a rebounding lock, so that for each discharge the process of recocking would have to be performed. There were four wounds on the body, viz. :

(1) In left cheek, oblique, right to left and before back from canine tooth to mastoid process. Upper jaw shattered. Bullet found near mastoid process deep amongst the muscles of the neck. The skin round entry was blackened, but the hair not singed, so that in the opinion of Mr Bowlby the pistol "might well have been held at a distance of several inches."

(2) Just below left clavicle, two inches outside the nipple line. Direction backwards and downwards, the bullet being found in the substance of the left subscapularis. Entry clean punched and not blackened. The hæmorrhage amongst tissues and around brachial plexus

was very extensive, and the subclavian artery was found divided.

(3) On the left side, half an inch below nipple and two inches outside nipple line. Direction left to right, above down, behind forward. The fourth rib was perforated, the wound in the skin corresponded with the wound in the rib only when the arm was raised to the level of the shoulder. When the arm was by the side, the skin wound was just below the fifth rib. There were two torn holes in anterior surface of pericardium, the right ventricle was opened near the apex, there was blood in the pericardium, and the anterior mediastinum was full of blood. The bullet was found in the left lobe of the liver to the right of the ensiform cartilage. The skin round the wound was neither scorched nor blackened.

(4) Behind the left shoulder. Direction forward and a little upward; bullet found beneath the skin on the front of the neck. Skin round considerably blackened. To make this wound the weapon must have been pointed directly forward from behind.

A fifth bullet was found in the room. This had probably been fired and missed its aim.

The clothing (shirt and jersey) showed perforations corresponding to wounds 2, 3, and 4. The holes corresponding with the shoulder wound were singed and burnt, but there was no sign of scattering of powder grains round the holes. The holes corresponding to the subclavian and heart wounds were clean punched and not singed, but there was evidence of powder scattering round the holes. Bowlby inferred (from experiments made with a similar pistol) that for the infliction of the shoulder wound the pistol must have been held about one inch from the shirt, and for the subclavian and heart wounds about six inches. As to the sequence of the wounds, the subclavian wound was probably anterior in point of time to the heart wound, because the blood had been effused with force, which could scarcely have hap-

pened after the opening of the right ventricle. Would the case be regarded as one of suicide? No, and for the following reasons:

(*a*) It is very unusual for a suicide to inflict a series of such severe wounds, and in this case it must be remembered that (whatever may have been the order of the wounds) each of the three wounds in front would have disabled him. The face wound would be likely to stun or stupefy him. The subclavian wound would exhaust him, and cripple the left hand, and the heart would cause very rapid exhaustion.

(*b*) If the three front wounds were suicidal, the face wound was probably inflicted with the pistol in the right hand, and the heart wound *certainly* with the pistol in the left hand. The deceased was a right-handed man, and the change of the pistol from one hand to the other was at least improbable.

(*c*) The shoulder wound *could not* possibly have been inflicted while the pistol was in either hand of the deceased, and the theory that it was caused by the deceased falling on the pistol is in the highest degree improbable, especially when it is remembered that the deceased was found on his face.

(*d*) As to the heart wound, Mr Bowlby found it impossible to hold the pistol in his own hand in the position and direction of the wound, and with the arm raised (as it must have been) without having the muzzle almost in contact with the side, which the absence of blackening and scorching of the clothing, and the scattering of powder-grains on the clothing seems to negative. It must be remembered that the pistol required recocking between each shot. Mr Parrott, of Uxbridge, and Mr Bowlby were agreed that the case was homicide. The jury returned a verdict of murder against Mrs Gibbons. She was respited.

You get in that case almost all the points of importance in connection with pistol wounds, and the arguments

put forward are exceedingly able. They are, perhaps, a little fine-spun for a common jury.

Now there is another very interesting case which brings in several points, and which I will therefore read to you. It was the case of *Regina* v. *Paul Mai*, and was tried before Mr Justice Grove in 1872 at the Central Criminal Court. Prisoner, a German aged twenty-one, was charged with the murder of Hermann Nagel on August 21 of the same year. The prisoner and deceased arrived in London from Germany on August 10. They entered upon a life of dissipation, and took up their residence in a brothel in Chelsea, and by the 21st all their money was gone and their valuables had been pawned, and they were destitute. On the 11th, Mai had bought a pistol, and it was stated that the said pistol was always in the possession of the prisoner, and not of the deceased. In the evening of the 21st they wrote a joint letter, drank a bottle of champagne, and went into a bedroom together, locking the door. The report of a pistol was heard, and then, after a minute's interval, a second report, and then a fall upon the ground. On breaking open the door the deceased was found lying on a sofa on his right side, with his right arm over the end of the sofa ; and Mai was found at right angles to the sofa, on the floor, with his legs under the sofa. The pistol was close to Mai's left hand. The deceased's shirt had been pulled up ; the prisoner's had not, but was scorched by the powder. The bullet wound extended from the left third rib in front to the eighth rib behind, and was oblique from before back and from without in. Mai's wound was close to the heart. We may infer from these facts that the wounded man on the floor was wounded by the second shot (and not by the first, as stated in his "dying" declaration), and that the pistol was held close to the body in both instances, and that both wounds were *possibly* suicidal. In the absence of any evidence of the position of the wounded man at the time the shot was fired, the direction of the wound is not of much value. The case is

unique as being the only instance of two persons conspiring to commit suicide with a pistol. The prisoner was acquitted on the ground that there was not sufficient evidence of their having had a joint purpose when they went into the bedroom together, notwithstanding the joint letter, in different handwritings, which was found directing one of the prostitutes with whom they had been living to take possession of sundry goods at the pawnbrokers. The man was probably just as well acquitted, but the reason for it was questionable.

CHAPTER XXVIII

DROWNING—HANGING

Drowning.—Definition—Asphyxia—Syncope — Fallacies — Examination of the Body—Froth in the Air-passages—Treatment—Artificial Respiration.
Hanging.—Asphyxia—By Dislocation—Tyburn—Resuscitation after Hanging—Barber-Surgeons' Company.
Strangulation.—The Spanish *Garrote.*
Smothering.—Infanticide—Burke and Hare—"Burking."

WE pass on now to death by *drowning.* The man who is really drowned dies by inhaling water into his lungs instead of air. It does not follow that every man who is found dead in the water has been drowned, and so the definition is perhaps a little important. When a man is really drowned he dies asphyxiated; and we have to consider how a man may die who falls into the water. He may die of syncope. He may fall into the water because he faints, and if he falls into it with his circulation already stopped, when he is pulled out and his post-mortem is made you will not find the signs of asphyxia. A man who falls into the water, especially from a height, does not necessarily die from drowning; he may knock his head. People have been known to dislocate their necks by diving from a great height into shallow water. People have been poisoned, and their bodies thrown into the water afterwards in order to mislead. So that when you are confronted with a body apparently drowned, you must look it over very carefully, because you do not know

whether it has been drowned or not. If the body has been drowned you will find the signs of asphyxia, and I need not say more. If the person has made, as he generally does, violent efforts to free himself of the water and to inhale air, you will find that the respiratory passages to a greater or less distance are filled with froth. That goes without saying. If a man is getting water into his air passages and then he blows air from his lungs into that water, and so backwards and forwards, he whips up the water and air into foam. Therefore the occurrence of froth, in the bigger air-passages at all events, is an important indication of drowning. If a man has been drowned, he may be full of water—that is to say, his stomach and his lungs may be full of water. On the other hand, he may have water in his lungs, but none in his stomach. Then, if a man has been drowned there are certain external signs, *e.g.*, the external signs of asphyxia —there is a blueness and ashy paleness. Then if the water has been cold you get contraction of the skin, well-marked cutis anserina, and very commonly retraction of the penis. Then remember that "a drowning man will clutch at a straw." It is certain that a man who is drowning does clutch at anything with which his hands come into contact. It very often is found that a drowned man has in his hands something from the water in which he was drowned, such as wood, stones, or weeds; and sometimes you find mud and gravel under the nails. All these little points may be of very great importance.

Now one word about the treatment of the drowned. You are called to a drowned person, and you have to treat him. How long may a person be immersed and yet recover? Well, I do not think it is any good trying to answer that question. You hear stories of people being under water for two minutes, three minutes, and five minutes, and so forth. It is an interesting speculation. But the practical point is, directly a person is hauled out of the water, do not stop to ask questions, but go to him

at once and try to resuscitate him. Asking questions is merely losing time. If the case is not recoverable, that is not your fault, but if you let precious moments slip by, that will be your fault.

I used to be told in my physiological lectures of somebody who allowed a bitch to drop some of her puppies directly into a bucket of water. They were resuscitated, I dare not commit myself to saying after how long a time, but I think it was hours. But then those puppies had never breathed, and probably the heart was ready to start immediately it met with some encouragement. You all know that respiration may not be going on when a baby is just born, and artificial respiration has to be performed, and is often rewarded with success. So we may take it that if a person faints when he falls into the water he will be more likely to be recovered than a person who has struggled and filled his lungs with froth and all kinds of matter which impede the entrance of air. When a person is taken from the water, remember that the first thing you have to do is to empty him. That is sometimes forgotten. It is of no use trying to pump air into a person full of water. On that account, therefore, you must be careful to get the head low. Also you must be careful to get your fingers to the back of the throat. You do not know what you are going to find there; you may find seaweed, and other substances impeding the respiration. You must clear the respiratory passages, and place the patient in such a position that the water can run out. When you have done that, the next point is to perform artificial respiration. Now it is generally admitted that Sylvester's method is the best. You may have seen it done in the hospital over the way. In performing artificial respiration you must imitate normal respiration; you must not go at it in a hurry. A man breathes, at the most, sixteen or twenty times a minute, and you must not go quicker than that; ordinarily fourteen to sixteen times a minute is enough. Artificial respiration

is purely mechanical, and if you are performing it aright you ought to be able to get evidence that air is moving through the trachea; and if it is being done aright and you apply the stethoscope to the trachea you can hear the air going in and out. This has nothing to do with recovery, it is mechanical. So that having got the patient empty and then lying on his back, you begin your artificial respiration by an expiratory movement. You stand at the head of the man, take hold of the arms at the elbows and begin by pressing the elbows against the side of the thorax, so as to give the whole thorax a squeeze, and in doing that you must squeeze the lungs and squeeze some air out. Having done that, you take the arms and bring them right back over the head, and in doing that you draw up all except the lower ribs, and you tend to produce a vacuum, and if the ways be clear, air will rush through. It is said sometimes, that you ought to pull the tongue forward. Well, it is a very good thing, but I do not think it is common for the tongue to be much impediment to the entrance of air into the larynx; still it is sometimes. I remember asking a student at an examination what he would do to a drowned man, and he gave an efficient if somewhat brutal method, stating most volubly that he would put a piece of whipcord through the tip of the tongue and tie it to his (the patient's) waistcoat button. It was not a bad notion, though the patient might resent it afterwards if he recovered. But if you have the patient's head a little on one side, there is not much tendency for the tongue to fall back. Lord Lister pointed out that in death from chloroform asphyxia, when one pulls the tongue forward it is not by removing any mechanical impediment that one does good, but by giving a sharp tug on the tongue you open the glottis by reflex muscular action.

Next, what aids to artificial respiration may we practise? Certainly, while you are performing artificial respiration, let somebody get the clothes off; then wipe

the man dry, and put hot bottles to his feet, and employ friction to his limbs. You may also get some good by the injection of ether subcutaneously, and some benefit may be produced also by the injection of stimulants into the rectum. Then what good can you get from the employment of electricity in these cases? It is very doubtful if it is going to produce much good; but if you are going to use it to a drowning man you must know what you are going to do to him. If you use electricity to a drowning man it is as an aid to artificial respiration, and nothing else. That aid is brought about by stimulating the phrenic nerve and causing a violent descent of the diaphragm. The best way is to get a faradising battery and apply one rheophore at the root of the neck just below the omohyoid as near as you can get, and then, when the arms are above the head during the inspiratory act, place the second rheophore about the level of the sixth rib, and if you are successful you will get a vigorous descent of the diaphragm, with a full inspiratory movement. I have done it often, and have failed to do it equally often. I cannot tell you why. I ask you to remember that you may not always succeed. It is very important that if you are going to use electricity you should not leave your patient while you go and fetch a battery; but a battery may be fetched while artificial respiration is in progress, and may be very useful.

Hanging.—Next as to death from *hanging*. When a man is hanged, how does he die? That depends on circumstances. Hanging may be purely death from asphyxia—that is to say, almost entirely by compression of the windpipe;—but ordinarily hanging is a complicated process. In judicial hanging the executioner tries, as an act of mercy, to dislocate the vertebral column. With this object, as you know, a long drop is given. The other day a drop of ten feet was spoken of; and I need hardly say that, if you have a fairly big man and give him a drop of ten feet, your apparatus must be very

strong. Care must be taken that the man's head is not pulled off, as was done once in Dublin. In that case the amount of fall was calculated very carefully, and Professor Haughton was consulted, who was equally eminent as a mathematician and as a physiologist, and he took carefully into consideration the weight of the man and the strength of the spinal column. Allowance was made for the elasticity of the rope. But the executioner was an economist, and he used a rope which had been stretched before, with the result that the criminal's head was pulled off. It was called brutality, but why it should be called so I cannot conceive. If you are going to kill a man, I do not know that it matters whether you dislocate his spinal column or pull his head off. When a man's spine is dislocated death is probably instantaneous; the respiration and circulation cease immediately. But that is not always the case. Hanging is a little different from drowning, because in ordinary hanging you are certain to get compression of the jugular veins, and therefore in hanging there is a good deal of congestion of the face. It is said that in hanging there is sometimes cerebral hæmorrhage. That I do not think could occur very often. In hanging you not only get compression of the veins, but very often there is rupture of the carotid arteries—not always of the external coat, but of the internal and middle coats. That has been found post-mortem in these cases. It is said that there is sometimes as a result of hanging erection of the penis; but I do not find any accurate account of that phenomenon, although we know that injuries, especially to the upper part of the spinal cord, are very apt to cause priapism among other symptoms.

Now you may have to determine whether a man has been hanged before or after death—that is to say, whether death has been really due to the hanging. If death has been due to hanging you ought to find signs of asphyxia. That is a very important matter. If death

has been due to hanging you ought also to find bruising and extravasation in the tissues of the neck. A tight cord round the neck leaves a mark, and that mark must differ according to the nature of the cord. If it is a stiff, hard cord, which has been pulled very tight, the pattern of the cord will probably be imprinted on the neck. On the other hand, if it were a silk handkerchief that the man hanged himself with, there would be a mark of a different kind. In old days the criminal was taken in a cart all up what was called the Oxford Road (now our Oxford Street), and hanged at Tyburn, very close to the site of the Marble Arch. The rope was adjusted around the criminal's neck, and the cart was driven on, and the criminal was left to dangle. Under these circumstances death was very often far from instantaneous. Sometimes the sentence on the criminal was that he was to be hanged by the neck for a certain period of time. And certainly there were cases of persons escaping, no doubt with the connivance of the hangman. It is said that if a man had a good stout larynx, and perhaps ossification of the cartilages, and if the rope were artistically adjusted, he might manage to hang by the neck for a considerable time without being killed. There is a story that in the old days of the Barber-Surgeons' Company, when that corporation had the right to the bodies of executed criminals, they cut a man down at Tyburn (or perhaps it was Smithfield, for it was there people used to be hanged before they took them to Tyburn), took him into their hall, and resuscitated him. And if you go to the Barber-Surgeons' Hall you will see a very magnificent four-fold Italian screen of stamped leather, which connoisseurs say is a remarkably fine specimen. That is said to have been presented by the gentleman who, having escaped death from hanging, went to Italy, and, as a token of gratitude to the Barber-Surgeons, sent them this screen.

Strangulation.—Now strangulation is not quite the same

thing as hanging. If a man is hanged from a beam the mark of the rope must be more or less oblique, but in strangulation without hanging the course of the mark is horizontal. In Spain executions used to be effected by means of the *garrote*—that is to say, the criminal was made to sit against a beam, and the rope was passed round the neck and tightened behind by means of a screw, and he was killed instantaneously. I do not suppose it is a bad way of executing criminals. Of course in such a case the mark of the rope would be transverse. When a man has been throttled or garroted criminally you may find the marks of finger-nails on the throat, and if you do find such marks they are important evidence.

Smothering.—Death may occur from suffocation. People have been smothered in bed time out of mind. Infanticide by parents who overlie their children in bed on Saturday nights is common in London. In the days before the Anatomy Act was passed, Burke and Hare were criminals who went about to get subjects for the dissecting-room; and in order to do so they employed the method which came to be known as "burking"—that is to say, they went behind a person, closed the mouth and nose, and simply held him forcibly until he died. It is said that in some cases pitch-plasters were put over the mouth. Burking consisted in stopping the respiration forcibly, and it left little mark. However, the whole matter was ferretted out and the criminals punished.

CHAPTER XXIX

DEATH BY FIRE

Accidental—Criminal Burning of a Body—Ante- and Post-mortem Burning — Death by Burning — Asphyxia — Lightning — Good Conductors of Electricity—Case of Lightning Stroke—Dendritic or Branching Burns—Death by High Tension Electric Currents—Symptoms—Treatment—Post-mortem Appearances—Spontaneous Combustion—Death from Heat and Cold.

ANOTHER form of death is by *fire*. Death from this cause is usually accidental. The interest in deaths by fire is that a body may be burnt to mislead, and the question arises as to whether you can tell whether a body has been burnt during life or after death. The answer is, "Yes, in the majority of instances, but possibly not always." When a man is burnt you get redness around the burn, and a blister; that is to say, you get signs of vital reaction if the man was burnt while alive. If a man is burnt after death, on the other hand, you neither get redness nor blistering. Those are two of the things to which you should look. Next, when a man is burnt, how does he die? I take it that in the vast majority of cases he dies of suffocation. You cannot have a man burnt to death without his being exposed to the products of combustion; and it is probable that the carbonic oxide and the smoke render him unconscious, and he dies of asphyxia. It is supposed, for instance, that the physical suffering of martyrs who died at the stake was not great. Well, it is a comfortable doctrine for us to hold, and I must say it seems exceedingly likely. We know very well that if one gets into the smoke of a pile of burning wood one has got

to move uncommonly quickly or suffocation will follow. It is said that the executioners could, so to say, favour the victim by making the wood a little damp, so that there was a great deal of smoke, and insensibility came on very quickly. When a person dies in that way, asphyxia is very quickly produced; sometimes after extensive burns you may find ulcers of the duodenum. The exact pathology of these ulcers is not very certain.

Lightning.—A very important form of death from the point of view of the medical jurist is death from *lightning*, and it is interesting to ask how lightning kills, and what are the signs of death from lightning? A man is killed by lightning because he becomes part of the conductor for the lightning between the cloud and the earth. Lightning may kill a man instantaneously without leaving a mark, or, on the other hand, it may cause a great deal of damage to the body. We know that lightning obeys, broadly speaking, all the laws of electricity, one of which is that it travels by preference, if I may put it in that way, through good conductors. And when a man is struck you must remember that the lightning will take the good conductors of his body. Dry skin is a very feeble conductor indeed; if you have your hands perfectly dry, and then catch hold of the brass conductor of a battery you may feel little or nothing, but if you wet your finger it is quite another matter, because of the moisture being a good conductor. When people have been struck by lightning it has very often happened that they have been wet through. Lightning is practically always accompanied by rain, and people who have been killed by lightning have generally first been caught in a thunder shower. Moreover, people who have met their death by lightning have generally put themselves near good conductors, that is to say, they have stood under a tree which is wet through, and the trunk of the tree is a good conductor because of the moisture, and thus it comes to the wet man, who is also a good conductor. When lightning has taken a man in its course, it is very curious

that if he is, as he is sure to be, of unequal conductivity in different parts of his body, it takes the good conductors by preference, such as money, or a watch chain or watch. That has been very noticeable in men who have worn a long chain round the neck, and carried the watch in a fob in the trousers ; again and again it has been found that the links of that chain have been fused as well as the back of the watch, and that the watch has been stopped. Then the lightning goes down one trouser-leg, and very often makes for the metal in his boots. Bearing out that fact, which is a very important one, I will read you a most important case. It is most excellently reported, and in it you will see that all the points I have been insisting upon were borne out. It occurs in Vol. XIII. of the Clinical Society's *Transactions*. Mr Wilks, of Ashford, records that on June 8, 1878, four labourers were overtaken in a thunderstorm. Three of them took shelter in a shed, while the fourth remained outside to pass water. Scarcely had they taken shelter when the window of the shed was blown out by a "blaze of lightning," and when the three men went to look for the fourth (named James Orman), they found the tree against which he had stood stripped of its bark, Orman's boots at the foot of the tree, and Orman himself lying naked two yards off with nothing on him save part of the left arm of his flannel vest, albeit that two minutes before he had been completely clothed in a coarse labourer's suit and a pair of new hobnailed boots. The clothing was scattered over the ground in all directions. The man stated that while passing water he felt himself hurled in the air, but never lost consciousness. The eyebrows, whiskers, and beard were scorched, the chest and belly covered by branching burns. Down each thigh and leg was a long burn. In the right heel was a wound through which could be felt the comminuted *os calcis*. There was a compound fracture of the right leg. The man made a good recovery. As regards his clothing, the jacket was split in halves, the shirt torn to rags, and burnt

where it had touched the buckle of the waist-belt and the watch in the fob. The flannel vest was torn, the trousers were in two bits, all below the knees being torn to ribbons. The belt had the buckle burnt out, the knee straps were burst. The boots had completely lost their laces, the eyelets burst in places, the leather torn, the right sole rent, and the right heel tip partly torn off, with one nail missing. The watch was burnt right through "as with a soldering iron" and the chain almost destroyed. Mr Wilks directs attention (1) to the almost complete immunity of the nervous system, due probably to the high conducting power of the wet clothing; (2) wherever there was a piece of metal there was development of heat; (3) the man was aware that the heel of his right foot was habitually raised when passing water.

That is a very interesting case, and the damage in the heel was probably due to the break in the continuity caused by his raising the right heel in the act of passing water. I show you a photograph of the clothing, which is in the College of Surgeons' Museum. You will notice also that in the account there is mention of branching burns—dendritic burns—upon the body, and all kinds of speculations have been made about these appearances. They have been said to be photographic marks, and so forth; but I should be inclined to think that the most probable explanation is that these markings correspond with the lines of sweat. We know that if a man comes to consult us in the summer, and you ask him to take his clothes off, if you look carefully you will see sweat markings all over his body in the grooves left by the folds of the clothing. My idea is that the electricity follows the lines of greatest moisture.

Now death from lightning is tolerably common, and supposing a man is found dead in the open, it is very desirable that you should be able to form some conclusion as to whether death took place from lightning or not. But there have been cases of death from lightning where there has been nothing to show; there have also been cases of

death from lightning where the lightning has made a hole like that produced by a bullet. Now in these latter years not only have we to deal with death by lightning, but also from high tension electric currents. Electricity is now omnipresent, and the question is, can we come to any conclusion supposing we find a man dead, as to whether his death may have been caused by the electric current or not? I need hardly remind you that in America they have been trying to execute criminals by the high-tension electric current, which they call "electrocution." This subject has been worked out by Dr Thomas Oliver, of Newcastle-on-Tyne. Alternating currents are said to be most dangerous, but the evidence on that point is a little inconclusive. The causes which predispose are damp clothes, sweating hands, and the carrying of good conductors. At St Peter's, Newcastle, in January 1897, a youth carried an iron rod through a factory, and accidentally brought the top of it in contact with the terminals of an arc-lamp, and he was killed instantaneously.

The symptoms are first of all a sudden tetanic rigidity of the muscles, so that a patient cannot relax his grasp. There are sudden pains, local burnings, sometimes followed by sloughing. A peculiar cry is often uttered generally when the contact is broken. The patient is found pale, slightly cyanosed, pulseless, with mucus escaping from the mouth and nose; there is now and then gasping respiration and the pupils keep dilating. Artificial respiration must be resorted to at once. This also would be the treatment in supposed death by lightning. Rigor mortis is usually marked. That is important, because John Hunter found that cows which had been killed by lightning had not rigor mortis in a marked degree; but it is probable that it had occurred and passed off before he tested them. The abdominal viscera and large veins are deeply congested, heart flaccid. Right heart full of blood, left empty; brain engorged. Pupils widely dilated immediately after death. Blood contains oxyhæmoglobin, and re-

duced hæmogoblin. Oliver records a case in which the heart of a dog resumed its contractions after a quiescence of thirteen minutes, showing that artificial respiration is not to be lightly discarded. When you try artificial respiration in any of these conditions you must be persevering and your perseverance will not infrequently be rewarded.

In connection with death from fire there comes the question of *spontaneous combustion ;* and it is a very interesting speculation as to whether such a thing ever occurs. I may state positively that I think there is no evidence whatever of a living human being having ever spontaneously ignited, and I think it is quite unreasonable to suppose such a thing could happen. Spontaneous combustion does happen in nature ; that is to say, things catch alight which have not been set fire to. Coal catches alight not only in a coal-mine, but in the bunker of a ship. One can only assume that in such cases a process of oxidation and heating goes forward, and that some inflammable gas catches alight at the temperature thus created. Cotton, in the same way, will ignite in the hold of a ship, and in engineering works heaps of cotton waste and oil have often been known to ignite. More remarkable than that is the ignition of a haystack. It is well known everywhere that if grass be cut wet and stacked wet the hayrick is very likely to ignite. Those of you who have ever examined a hayrick which has ignited will recognise the fact that the smell is quite peculiar. It is *sui generis ;* it is not like burning hay, neither is it like the smell of a dung-heap. You will find that grass which ignites is the seat of a fungoid growth, which growth takes place very rapidly. Just as the yeast plant in growing brews alcohol, so one must assume that the fungus which grows in wet grass brews an inflammable something—I cannot be more definite than that—that the heat gets very great and the inflammable something ignites. It is remarkable how little exact knowledge there is upon this very important and frequent occurrence.

Is there such a thing as spontaneous combustion of the

human body? I can no more believe in a living body igniting than I can believe in grass which is still growing catching alight before it is stacked. It is, however, perfectly certain that some human bodies are exceedingly inflammable, and I have read to you the account of a body in which the gases generated by decomposition proved to be strongly inflammable; and there is no difficulty, to my mind, in believing that gases may inflame spontaneously if the heat generated be sufficient to cause inflammation, using the term inflammation not in its pathological sense, but in its proper sense. We also know that the occasional rise of temperature in the dead body is accepted as an undoubted fact. So that there can be no doubt that some bodies are very inflammable, and I see no inherent impossibility in the spontaneous ignition of a body post-mortem. Most of the cases of so-called spontaneous combustion have been in women, most of them in fat women, most of them in alcoholic women. Spontaneous combustion has been made use of by the novelist, and you will find an account of it in *Jacob Faithful* or *Bleak House*. Not only are such cases found in works of fiction, but I will give you one from the *British Medical Journal* of April 21, 1888, recorded by Dr Mackenzie Booth. He records a case of apparently great combustibility in a drunken military pensioner. He was seen to enter a hayloft, drunk, on February 18. A light was noticed through the skylight of the loft, which was also noticed to be extinguished subsequently. In the morning smoke was seen issuing through the roof, and the man was found dead and the body largely consumed. Dr Booth found the remains reclining against the stone wall, and kept in position only by one of the joists and the burnt remnant of the flooring under him, which prevented him from falling through into the stable beneath. Combustible material, such as wood and straw, was near at hand, and not consumed. That is a carefully recorded case, and the others are like unto it; and that is all I can say. With regard to

spontaneous combustion in connection with the human body there has generally been a light present, and the subjects have very often been in a drunken slumber. There is a case recorded from France, and there have been similar ones reported, in which the body was found consumed, but not the muslin curtains near it. I think there can be no question that sometimes a body is in a condition in which it is likely to smoulder, and I think spontaneous combustion, if it occurs, is a thing which takes place post-mortem and not ante-mortem. I think also that it occurs in a fat, flabby drunken person who has been in a drunken slumber, in whom the cessation of life has been due to a fatty heart, the whole circumstances being favourable to the growth of a microbe which brews combustible gas or alcohol. I prefer to say "a combustible something" because, when we do not know what it is, it is much better to say so.

Very little is known of death from *heat and cold*. It is well known that people can stand enormous ranges of temperature, that man may continue to live at the Pole, that he continues to live at the tropics, and that the ranges of temperature which a man can bear in a Turkish bath are extreme. The causes of death from high temperature we do not know. Of course at certain temperatures you will get coagulation of the tissues, and then death may result. Death from cold is usually accompanied by numbness, torpor, and stupor, and it is well known that if the Alpine climber yields to the temptation to sleep he is done for. People stand cold just in proportion as they are fed; if a person is properly fed and clothed he can stand any degree of cold any length of time. It is the same with the lower animals.

The expression "starved by the cold" is a common one, and there is no doubt that death from starvation and death from cold are to a certain extent allied; but as to the post-mortem appearances which would enable you to say a person died of cold or of extremes of heat, I think I have not sufficient evidence to lay before you.

CHAPTER XXX

STARVATION

Death from want of Water and from want of Food—Fasting Men—Entombed Miners—Sarah Jacobs, the Welsh Fasting Girl—Diabetes and Tuberculosis.

DEATH from *starvation* is divisible into two classes. First, cases in which solid food is withheld and water is obtainable; and next, cases where both food and drink are withheld—that is to say, death from hunger and thirst combined. Death from the latter cause is very much more rapid than when food alone is withheld. Death where water is withheld is probably death from uræmia, because the body is not flushed and the waste products are not carried away by the kidneys; and the person generally dies delirious, and often comatose, the body smelling very foul. Death from lack of food only is a totally different thing; and whereas a person will only live a week at the outside where both food and water are withheld, we know, as a result of music-hall experiments, that a man may go on living for six weeks with no food, or with very little food indeed. And I think that these music-hall experiments, which have been common of late years, have been useful—I wish to say so definitely. There may have been trickery in them. We know a man may get a very great deal of food in the guise of water; he may get colourless alcoholic food and syrups and

albumen ; and where water is given *ad libitum* a good deal of food may be incorporated with it. But it is certain that those people who have exhibited themselves for money and fasted for six weeks have lost a prodigious amount of weight—that is to say, several stones. I think the exhibitions have been useful for this reason—that if people are put in circumstances where no food is obtainable, but water is obtainable, they may know that if they keep quiet they have a reasonable prospect of escape. Take, as an instance, entombed miners. In a mine there may be water but no food, and if it is known that by taking water and keeping quiet one may survive until rescued, it is a very important fact.

One of the most interesting cases of death from starvation is the case of Sarah Jacobs, the Welsh fasting girl, and it is one of the few cases where both food and water have been withheld. The account is probably quite trustworthy. Public attention was first called to the case by the vicar of the parish in which she lived, who wrote to the *Welshman* newspaper on February 19, 1869, stating that Sarah Jacobs, who was twelve years of age, had "not partaken of a single grain of food of any kind whatever during the past sixteen months. Medical men," he said, "persisted in saying the thing was impossible," but for his own part he fully believed in it, and he ended his letter by suggesting that a skilled and scientific investigation of the facts should be made.

After this letter there was of course endless discussion upon the subject. There were believers and infidels on the point, and amongst some of the superstitious peasantry the Welsh fasting girl became almost an object of veneration. She was visited by numbers of people of all classes, and her parents profited considerably by the "show" which they had started.

On December 9, all the arrangements for watching Sarah Jacobs were completed. A local medical man and four nurses undertook the task, and we have in their evidence a detail of her daily symptoms. Sarah Jacobs

was very hysterical, and seems to have had very slight left hemiplegia.

When the watching commenced she appeared, when naked, to be healthy and plump. The following official report was made by the watching committee:

"Thursday, Dec. 9, 1869, Llethernoyadd.—Four nurses arrived at 2 P.M. The whole of the room in which Sarah Jacobs was lying was carefully examined; all the furniture carefully looked into; all contents of drawers removed; the bed on which the girl was lying was carefully examined, and each covering singly; the girl's body, clothes, and her hair were fully examined. Nothing of the nature of food (saving an old shrivelled-up turnip under the parents' bedstead) was found anywhere."

The medical report on December 9, was as follows: "Cheerful; face flushed; eyes brilliant; pulse regular, averaging 86 per minute; temperature in the mouth 98° after two minutes' rest. She has a warm water bottle at her feet. She seems quite well, and says she has no pain anywhere if not touched.

(Signed) "H. H. D., M.R.C.S.
"THOMAS L., M.D.

"Dec. 10.—No change. She continued cheerful and happy, and read aloud during the day. Pulse above 100.

"Dec. 12.—During Sunday afternoon she was visited by the doctor, who made the following entry in the Sister's diary:—State of Sarah Jacobs this day at four o'clock P.M.: Not so cheerful as when I last saw her before, face not flushed, but temperature of the mouth 98° after ten minutes' rest; pulse regular, averaging 112 per minute. She has not asked for anything, neither could she possibly have had anything without our knowledge. She has no pain whatever unless she is touched, but occasionally a little headache. She passed a quantity of urine; the head nurse thought her 'not so well,' eyes were sunk and cheeks flushed.

"Dec. 13.—Passed urine, and the cork came out of the

water-bottle, and the bed had to be changed." The opinion was that the girl was thirsty, and pulled out the cork of the bottle with her feet.

"Dec. 14. — Had a true fainting fit. Pulse 112. Voice not so strong. Face very much flushed, lips dry. Passed a small quantity of urine. A peculiar smell was also noticed—'not like the usual smell of death.' It was not urine, nor yet from the feathers of the bed. She slept, but was very restless, and passed some more urine.

"Dec. 15. — Her eyes were sunk in and her nose pinched. Her voice was much lower, and she was unable to read. Pulse 120; face not so flushed. A dusky redness of the cheeks and nose. She conversed pleasantly and coherently. Towards evening she awoke from her sleep and shivered a little. She was very restless, and the smell of her breath was very noticeable. This was the last day on which urine was found in the bed.

"Thursday, Dec. 16, 3 A.M.—She was rolling from one side of the bed to the other. At half-past three she wished the bed made, and they made it. She was taken out of her bed, and the father having carried another bed in, the girl was lifted into it. Both parents, especially the father, were in and out of the room during this watch. Between 3 A.M. and 6 A.M. she was quieter. At this latter hour the sister nurse found her looking very pale and anxious in the technical sense of anxiety. Her eyes were sunk and her nose pinched, and the cheek-bones more prominent. . . . Her arms and hands were cold, her feet and legs were the same. Very restless, and appeared to be sinking. . . . Her lips were very dry, and her mouth seemed parched. Friction to the right hand and hot flannels to the legs and feet made her 'much warmer.' She was, however, still restless, turning till 11 A.M., when she got quieter. After that she was reading, but did not seem to care for it as she did before. This morning the 'peculiar smell about the bed' was so bad as to make the sister nurse 'feel quite ill.' Towards the afternoon she began to talk to herself. The

pulse was variable, rising as high as 160. That night she became delirious. The breath was still very offensive. She was not still two minutes the whole night, but kept calling out, etc. The nurse's scent-bottle was missed, and was found ultimately in the bed.

"Dec. 17.—At 2 P.M. the girl died, sinking gradually, and having been during the last hour of her life 'in a stupor,' and unable to be roused."

"At the inquest J. T., being sworn, said as follows:—I am a surgeon in practice at N—. Yesterday, in conjunction with Mr P. (Dr L. being present) I examined the body of Sarah J., said to be about 12½ years old. It measured about fifty-four inches, was plump and well formed, and showing indications of puberty. I opened the head, and found the membranes of the brain considerably injected; the substance of the brain was not very vascular, but perfectly healthy and of proper consistence, and there was no difference between the sides of the brain. An incision was made from the top of the girl's chest to the lower part of the body; there was displayed a fine layer of fat from half an inch to an inch thick along the incision; the contents of the chest—lungs, heart, and great vessels—were perfectly sound and healthy, and contained very little blood. On examining the alimentary canal I observed there was not the slightest obstruction from the mouth to the termination of the gut. The stomach contained about three teaspoonfuls of dark gelatinous fluid, having a slight acid reaction with litmus paper. The small intestines were empty, but the colon and rectum contained about half a pound of excrement in a hard state. The liver was healthy, the gall-bladder considerably distended with bile, kidneys and spleen perfectly sound, urinary bladder empty. The body was perfectly free from disease, judging from the healthy appearance of the organs."

As soon as the girl was dead people were very angry indeed, and wanted to say that those who watched her

and arranged for the fasting committed manslaughter. Certainly the ethical question involved is a very nice one. Your duty as a medical man is clearly this: you have no right to sit by and see a person starve while there is such a thing as a stomach-tube. On the other hand, you may say the girl could have eaten if she had liked, and that the parents were consenting parties. There can be no question that the case was one of fraud. Fæces were found in the intestine, and they must have been evolved from something in the way of food. It was an unfortunate case altogether. It is of some use scientifically, because there is the daily record of a case of starvation, with the temperature, pulse rate, and so forth.

There has recently been a case of a woman who starved her servant girl to death, and got seven years' imprisonment as the result. In these cases you must be very careful to ascertain whether the emaciation, which is almost always present, could have been caused by disease. Examine very carefully for tuberculosis. Remember diabetes also. The defence put forward in the case to which I have just alluded was that the girl did not die of starvation, but of diabetes, which was answerable for the rapid wasting and the voracious appetite which was alleged. But there was no record in this case of the urine having been properly examined, and that defence was not accepted.

CHAPTER XXXI

LIFE ASSURANCE

Expectation of Life—Male and Female Lives—Premiums—Tuberculosis—Rating Up—Refusal of a Life—The Viscera—The Urine—Fraud.

LIFE assurance is exceedingly common. People insure their lives with the object of making provision for their families, and very often also with the object of borrowing money, and the two objects are perhaps about equally common. There was some time ago a notable case before the public of fraudulent personation in connection with life assurance. When a man gets in the hands of money-lenders his downward descent seems to be rapid, and there seems to be nothing he will not stick at. It is very necessary to remember that in life assurance the medical officer is liable to be deceived—that is to say, intentionally deceived—by the proposer. Life assurance is a contract in which the underwriter for a certain annual sum promises to pay to the proposer's executors or representatives a lump sum at death. Now, of course, it is a well-known fact, which the statistics of the Registrar-General have made abundantly clear, that the death rate in a country like England is tolerably fixed, and that therefore the expectation of life at any particular age is tolerably fixed also. Thus, the expectation of life of a male at one year of age is about forty years. At ten years of age the expectation of life is forty-seven years in a

male; it is rather greater in the female right away through:

At 20	the expectation of life in a male is		40 years
30	"	"	33 "
40	"	"	27 "
50	"	"	19 "
60	"	"	14 "
70	"	"	9 "
80	"	"	5 "

These are actuarial facts. They are based upon an immense amount of statistics, and have been worked out by mathematicians.

The first thing I would remind you about life assurance is that it is a matter of business, and that the statistics of life expectation are not theory, but facts. Life assurance offices would have no need to trouble in the least about medical examinations *provided everybody who passed the office door came in and insured.* If everybody in the country insured his or her life the offices would have no trouble at all, it would be simply a matter of calculation to find out what the premium should be. But everybody who insures his life is not sound. Very often people insure their lives because a "still small voice" within them tells them that they are not quite sound. A man goes on perfectly gaily until he perhaps, *à propos* of nothing in particular, staggers in the street, or faints, or feels giddy and queer; and then he thinks about his wife and children and the future generally, and proceeds to insure his life.

It is the same with a woman; she does not trouble about insuring her life as a rule, and insurance among women is less common than among men. It is a very interesting and remarkable fact that while the expectation of life is greater in women than in men, among *women who insure* it is less; all offices have proved that the insuring woman, age for age, is a greater risk to an office than an insuring man. Women rarely insure,

because the provision of the family is a matter which usually rests with a man. The woman who insures very often has to bear the battle of life like a man, and cannot stand up against it so well. Moreover, the woman who insures is often a person who has got into debt, and women of that kind are very "bad lives."

Life assurance offices employ the services of medical examiners, and if they did not there is no doubt that they would be defrauded to a great extent. It is quite impossible to appraise the value of a doctor to an insurance office. A man has a house in the country, perhaps keeps a big mastiff, and on the door is the motto, *Cave canem*—beware of the dog. The owner of a house of that kind would be very wrong to assume that the dog is of no use to him because it has never bitten a burglar. He will never be able to tell how many intending burglars have put an eye over the fence and thought better about proceeding any further. In the same way, if there is a doctor to an insurance office the swindler as a rule gives it a wide berth. The first thing which a proposer has to state is his age, and of course that is a thing which the man has to prove; he must bring his birth certificate. I need hardly say that the amount of premium a man pays is in proportion to his age. For instance, a man wishes to insure for £100 at death —I take £100 as a convenient figure, but you may multiply it to any extent—and if that man is 20 or 22 years of age he will have to pay somewhere about £2 per annum. His expectation of life at that age being about thirty-eight years, he will pay some £76 in hard cash, and the accumulations of interest will be sufficient to pay the office and give his executors £100. If the candidate is 40 years of age he will have to pay more—about £3, 5s. a year; if he is 50 he will pay about £4, 11s.

The next point is the family history. If it is very bad, it means that the candidate should be "rated up." For instance, if there is a strong history of phthisis, and

if the applicant be a young man with a delicate aspect, then, recognising that he is still young, and that the period when a man is most liable to tuberculisation has not yet passed, I should rate him up severely, or not accept him at all. If I accepted him I should probably add fifteen years to his age; that is to say, if he was 19 I should rate him as if he were 34, so that instead of paying £1, 18s. a year he would have to pay £2, 16s. If on examining such a subject I found the slightest indication of anything wrong with the lungs—such as a faulty percussion note at one apex—I would not have him at all. But if the applicant was a sailor aged about 35, or an officer in the army of that age who had been through a campaign, and showed no signs of tuberculosis, then, even if the family history was not good, I should consider him an average risk and take him at the ordinary rates. In life assurance, in all its bearings, you have to use your common sense. There are other hereditary diseases, such as cancer, diabetes, insanity, and so forth, and these have to be taken into consideration. But much more important than the family history are the *habits;* indeed, there is nothing so important, from a life insurance point of view, as habits. If you are satisfied that a man is intemperate, it is better to go without him; you cannot appraise his life at all; he is always a very risky life. Of course you examine a candidate carefully, especially the heart and lungs; and we cannot lay down any rule with regard to these cases. But I should say that if he has any valvular disease of his heart—I am rather peculiar in that—I would not have him at all. Of course one must be exceedingly careful in the matter of lung or visceral disease. Then comes the question of urine. Permanent albuminuria seriously affects the expectation at different periods of life. If you found a young man with permanent albuminuria and an hypertrophied heart you would not take him, especially if he was thin. If, however, the albuminuria was only transient you would have to consider the matter otherwise.

Now with regard to the examination of the urine, which is a very important thing, you must be sure that you are not being deceived. The urine must be passed in your presence. I remember a man coming in to insure his life. He was very smart, and had on a big fur coat. I said to him, "Will you pass me a little urine into this vessel?" I sat at a table writing, and I noticed that the sound of his passing the urine was very odd; it was a succession of pop-pops like the sound made by water coming out of a narrow-necked bottle. I looked up from where I was writing, and I could not see what he was doing because of the big coat. But as he finished I saw his hand go into his side pocket. You have always to be looking out for fraud, and it crossed my mind that the urine was not his own. But, on the other hand, it would be very awkward to make a mistake; it would be very awkward to wrongly accuse a man of fraud of that kind. I confess I was in very considerable doubt as to what to do until he put the glass beaker, containing the urine, into my hand. Directly I got it into my hand I knew what to do. I said, "We cannot take you; this urine is thick and as cold as ice." It was, in fact, a cold sample from which the lithates had precipitated. We found he had been trying to deceive at another office. He had brought somebody else's urine in a bottle. There was no albumen in the urine he gave me, but he had been rejected elsewhere for albuminuria, and some of his urine obtained subsequently was found to be albuminous. One of your duties in life assurance is to take the height and complexion of the applicant and see him sign his name, so as to prevent personation as far as possible. It requires a very great deal of practice to know how to deal with some of these cases; a young man who examines for life assurance has his education to get in this matter. Remember that if you are fidgety and reject candidates for trifles you will be keeping away valuable business from the office. You have to reject at once really bad lives about which there is no

question; but it is a very fine line which divides proper caution from an improper fidgetiness, and I do not think I could do any good by endeavouring to lay down rules for your guidance; you will require to serve a considerable apprenticeship before you can justly appraise these things. But I warn you to be careful and look out for fraud.

The forms of proposal and tables of expectation of life are given in the Appendix, page 514.

CHAPTER XXXII

INSANITY

Congenital Insanity. — Idiocy — Epilepsy — Hydrocephalus — Microcephaly — Congenital Syphilis — Hemiplegia — The Mongolian Type—The Idiot Savant—Cretins.

Toxic Insanity.—Toxins—Gout—Drugs—Alcohol—The Expression of the Emotions—Duchenne—Sir Charles Bell.

Insanity due to Cerebral Disease.—Syphilis—General Paralysis of the Insane—Delusions—Hallucinations.

Symptomatic Insanity.—Mania—Melancholia—Delusions—Dementia.

THE examining boards require a certificate that students have attended a course on "Medical Jurisprudence, including Insanity." It has always been my custom to deal shortly with insanity. I shall divide my remarks on insanity into three parts. I shall first of all treat insanity as a form of disease; I shall then deal with the legal relations of the insane person; and I shall lastly consider the plea of insanity in courts of law, showing when such pleas are allowed and when disallowed. You are further bound, by the regulations, to visit lunatic asylums, and it would be folly, not to say presumption on my part, if I were to enter too fully into the symptoms of insanity. But I cannot deal with the legal relations of the insane without first discussing that form of disease or that group of diseases which we call "insanity." It is a protean group, and contains a large number of cases in which

there is some obvious defect of the brain. But in other cases the defect of the brain, if present, is not apparent to the pathologist. It has been said that man differs from the lower animals in this : that the lower animals are specialists, having one faculty or one faculty mainly. We might try for ever and yet never be able to build a hexagonal cell in the way that the bee does. But the bee's whole energy is devoted to that, and as far as we know, it has very few faculties outside that one. If there is ever a mad bee who is bent upon building square cells instead of hexagonal cells, I suppose the law of the survival of the fittest would very soon come into force, and that mad bee would not be sent to an Asylum but would be extinguished.

Now, man is infinite in faculty ; and that being the case, the forms of insanity are almost infinite. The study of insanity by books is very difficult and not very satisfactory, and I have read—I say it advisedly—a large amount of "insane" literature which is most unprofitable reading. One wades through oceans of metaphysics—I am speaking for myself—and it is only occasionally one touches bottom. The literature being enormous it becomes a very difficult task indeed to compress into a few hours any collective or rational account of insanity, and I almost despair of doing so.

Congenital Insanity.—Now, in order to come to some idea of insanity, there are certain methods which I think we may pursue. First of all, there are forms of insanity which are definitely due to disease of the brain. In dealing with these insanities I will begin with the congenital or infantile diseases of the brain, diseases which begin perhaps before birth, or at most very soon after birth.* These various forms of idiocy have been

* I would express my indebtedness for many of the facts which I am able to record to the late Dr Langdon-Down and his son Dr R. Langdon-Down, the owners of the large Training Home at Hampton, Wick ; to Dr Grabham, the late superintendent of the Earlswood Asylum, and to Dr Mott, the pathologist of the London County Council.



FIG. 1.—Hydrocephalus.



FIG. 2.—Microcephalic Idiot.

PLATE I.

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classified; and the latest classification, I find, is into pre-natal, natal, and post-natal.

Among the causes of idiocy are a neurotic inheritance especially in the children of intermarriage of relatives. Again, it is said that the children of intemperate parents are sometimes idiotic; and occasionally idiocy appears in the victim of hereditary syphilis. It is further said that idiocy may result from shocks to the mother—maternal impressions—and one cannot help believing that there may be something in that, though of course it is almost insusceptible of rigid proof.

There are other causes of idiocy which take place at birth; and all those who have had to deal with idiots are agreed that prolonged parturition, in which the head is subjected to considerable pressure, is a very potent cause of idiocy. In all idiot Asylums you will find a certain proportion of children whose births have been prolonged, and who very likely have been recovered from insensibility by artificial respiration. Then as to post-natal causes of idiocy, one may mention epilepsy. And I may say in passing that repeated fits, whatever they may be caused by, whether by idiopathic epilepsy, by tumor cerebri, by disease of the kidneys, or any other cause—repeated fits are a potent cause of cerebral degeneration, leading to idiocy and imbecility. Injuries to the head, frights, meningitis, and febrile diseases, are all potent causes of mental defects in early life.

We may now turn to the illustrations. The first (Plate I., Fig. 1) is that of a *hydrocephalic idiot.* It is an extreme case of hydrocephalus; and in an extreme case of that sort with the obstruction to the flow of blood from the brain, and the enormous pressure to which the brain is subjected by intraventricular accumulations of fluid, intellectual development is more or less impossible. I need say no more on a subject which is self-evident.

The next (Plate I., Fig. 2) shows a *microcephalic idiot.* To properly show the smallness of the head, the

hair should have been shaved off. There is no absolute relationship between smallness of head and idiocy, but a head less than 17 inches in circumference involves idiocy. There are many people with big heads who are idiotic; that is to say, the brain itself is big, but is deficient in quality. But there are many people with relatively small heads who are sharp and clever; and although they may not be geniuses of a high order they are quite capable of earning their living. But the microcephalic idiot is the idiot of lowest type, and occasionally you meet with microcephalic idiots who are little better than machines, that is to say, they have no intellectual development at all. I remember seeing a microcephalic idiot at Earlswood Asylum. The head was scarcely bigger than a cocoanut. He was seventeen or eighteen years of age, and had no natural affections; he did not care for the nurse who fed him any more than he did for a stranger; he never expressed any desire for food or drink; he was fed by the clock, and the food was put into the back of the pharynx and he swallowed it. Of course, he had absolutely no intellectual development of any kind. He was dirty, and passed his urine and fæces under him. He had to be constantly watched and washed like a baby. They had taught him, with infinite pains, to express like a parrot his need of micturition, but he never spoke until, like a machine, the warm urine trickling down his legs evoked the utterance. So his conversation was more ornamental than useful. That is a form of microcephalic idiot of the lowest type, a type that is rarely met with, and may be regarded as a curiosity, even in idiot asylums.

The next picture (Plate II.) shows a youth with a deformed head, with very slight mental feebleness. He has a high overhanging forehead and a short antero-posterior diameter. There is not much wrong with his intellect however.

I will next describe a case of which I have no



Deformity of Head, without much mental deficiency.

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Hemiplegic Idiot.

[*Face page* 400.

illustration. It is that of a boy who does not look very idiotic, but is incapable of taking care of himself, and who is a congenital syphilitic. The characteristic features about him are a muddy complexion and sunken bridge to the nose, and there is the particular conformation of the permanent incisors with which you are familiar. These are signs which indicate congenital syphilis. In congenital syphilis there is disease of the vessels and a certain amount of arterial sclerosis, and the brain is relatively starved. One must assume that that boy has arterial sclerosis from the disease which he has inherited, and that possibly the prefrontal lobes have been particularly affected in their nutrition.

The next (Plate III.) shows an idiot with hemiplegia. I have told you that many of these cases have had their heads squeezed at birth ; that is presumably the case with this patient, and as a result she has defective intellectual development, and she also has defective motor and muscular development. She is hemiplegic, and the hand is a typical hemiplegic hand. You can see that the left arm hangs feebly, that the wrist is flexed, and that there is some contraction of the hand. Probably she is hemiplegic because at birth, owing to prolonged pressure, she had hæmorrhage spreading over one-half of the brain, affecting the pia mater and cortex. Dr Spencer, as many of you must know, wrote some years ago a most valuable paper on the post-mortems of still-born children. He showed that in a large number of children who were still-born, with most of whom there was great difficulty at birth, there were hæmorrhages in the meninges, very often compressing the brain. Sometimes these hæmorrhages followed natural birth, sometimes they followed the use of forceps. In a book on idiocy which I was reading the other day, it was urged that in these prolonged births, in order to escape idiocy, forceps should be applied with promptitude. But I think there are two sides to that question. And when you consider how soft are the skull

bones of the newly born child, you will realise that it is a dangerous experiment to apply forceps; and in applying forceps you may very likely produce a little damage which may not kill, but which may do worse than kill, it may let a child live who will never be able to earn its living in this world. To have one's cerebral cortex compressed in the first moments of life is a hazardous experiment. Before speaking of the results of applying forceps one must, I think, follow the children till they have passed through the Board schools and consider the records of the standards they reach. There seems to me no doubt that a large number of these cases of idiocy are due to hæmorrhages early in life, and a certain proportion to the use of instruments.

The brain, as you are aware, is divided into the motor area, the intellectual area, and the sensory area. Sometimes all three of these areas are affected, sometimes only one, sometimes two. You may get a great deal of motor trouble and not much intellectual trouble; or you may get a great deal of intellectual trouble and not much motor trouble.

Here is a patient (Plate IV., Fig. 1) who has evidently had damage to the motor tract and suffers from spastic ataxy. He has jerking movements of the hand and also of the feet, which are due to a degeneration of the lateral tracts following injury to the motor area within the skull, which of course incapacitates the patient more or less for life.

It is an exceedingly good picture; indeed you can see it almost move. You can detect the spastic condition of the face, and you can see the athetotic movements of the hand, and it is a most admirable snapshot, and I think it is very instructive indeed. It is doubly instructive because we have assurance that there is fair intelligence But there is no speech, there is partial deafness; he writes, which is extraordinary because of the movement of the hand.



FIG. 2.—"Mongolian" Imbecile.

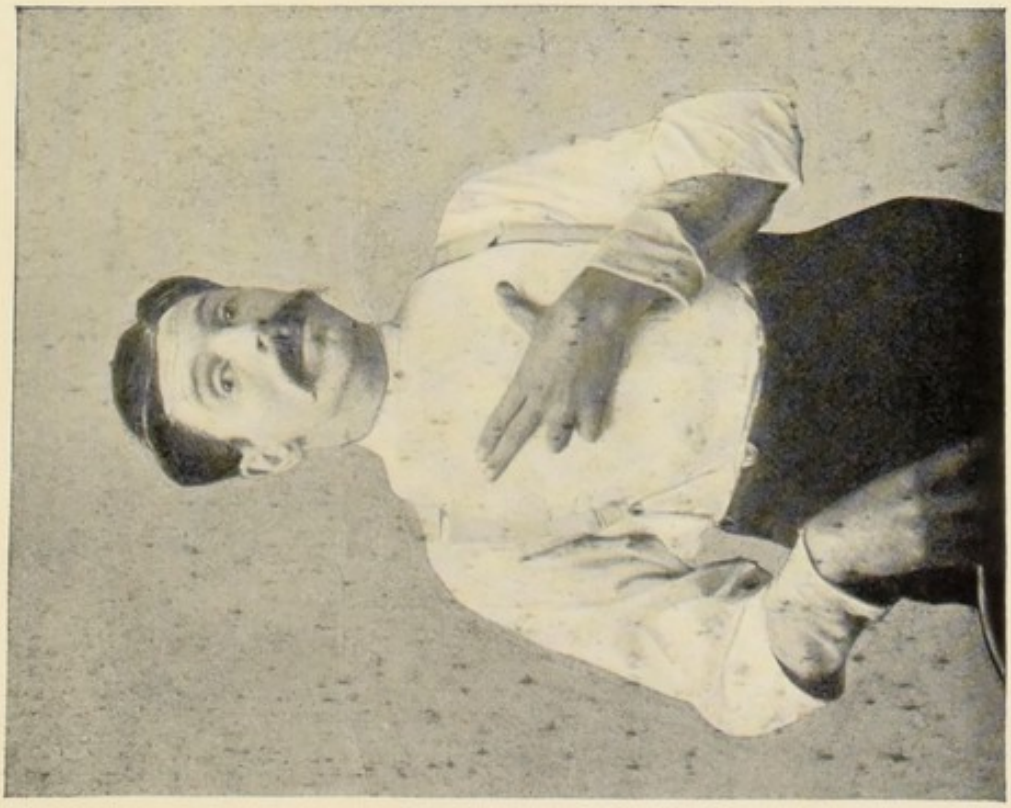


FIG. 1.—Spastic Ataxy and Athetosis.

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The next illustration (Plate IV., Fig. 2) is interesting. It is that of a patient of the "Mongolian" type, so-called because of the "slitty" eyes set obliquely and arranged as they are in a Tartar or Chinese. If you draw a line joining the inner and outer canthus you will find that in the Mongolian it forms a relatively acute angle with the vertical line of the forehead; whereas in the European it either forms a right angle or an obtuse angle. Many of these Mongolian idiots are very imitative, and many of them are capable of a good deal of education.

Plate V., Fig. 1 gives another illustration of a "Mongolian" patient who has grown up and is now a woman, but still incapable of taking care of herself. This picture shows the rounded pinna of the ear which is set far back. In some of these idiots there is a high arched palate. That is one of the common congenital defects which you look for in idiots. And the hand is without the creases upon it which the palmists make so much of, from the want of use of the hand. One might almost say that the hand is expressionless or featureless.

The next picture (Plate V., Fig. 2) is from a photograph of a good-looking boy who is an "idiot savant." In all Asylums you will find idiot savants. He is quite incapable of taking care of himself; he has no judgment of any kind. I am told he has a most remarkable memory, and his peculiar aim in life is the study of "Hymns, Ancient and Modern." I am told that if you state a number to him he will immediately repeat the hymn of that number; and I think "Hymns, Ancient and Modern," number several hundred. If you give him a line from one of them he will immediately tell you the number. Therefore he has a most remarkable memory of a kind. And such idiots are not uncommon. There used to be at Earlswood—and I saw him when I visited Earlswood—an idiot quite incapable of taking care of himself, but who had a most extraordinary

memory. When I went to the Asylum the Superintendent said to me, "Ask that man anything you like." It was rather a strange thing to be told to do; I said, "What kind of thing shall I ask about?" And he said, "Any ordinary bit of knowledge." I said, "Tell me about Socrates." The idiot then drew himself up like a child would who was about to repeat a lesson, gave a cough, and told me about Socrates. He had got the information from some book such as "Mrs Magnall's Questions." He knew a good deal more about Socrates than I did; he knew when he was born, why he was condemned, the name of his wife, and everything that was essential to be known. This he repeated without difficulty. The Superintendent gave a grin and said, "Would you like to ask him anything else?" I was afraid that the man might ask me something. I said, "What do you know about comets?" Immediately he gave me—I presume correctly—all the facts about the chief comets; their periods of revolution, the names of the best known, and so on. Nothing that had ever been read to this patient did he ever forget. The words which had been read to him seemed to have stuck to the cells of his brain like so much superior glue and nothing would eradicate it. One curious fact was this. The Superintendent said, "You asked him about Socrates and you are not the only person who has done so. I suppose they ask him because that patient and Socrates seem about as far apart as the poles. Did you observe that in the middle he made a mistake and went back and corrected it, and then went on again? That was not because he really recognised that it was wrong and then corrected it; it was because the person who read the account to him originally had made a mistake and had gone back at that point and corrected it and then went on with the story." Thus you see the mistake was as ineradicable as the story. Nothing can show better than that the condition of the idiot. Of course, when you get faculties of that kind combined



FIG. 1.—Morbid Timidity following Injury.

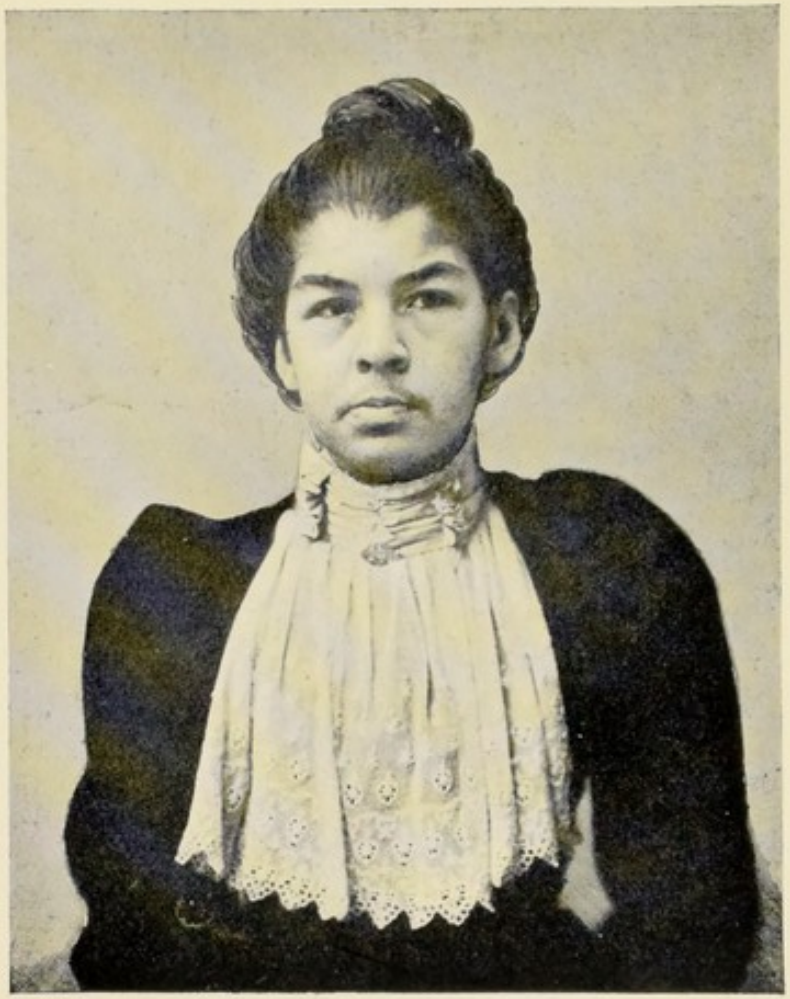
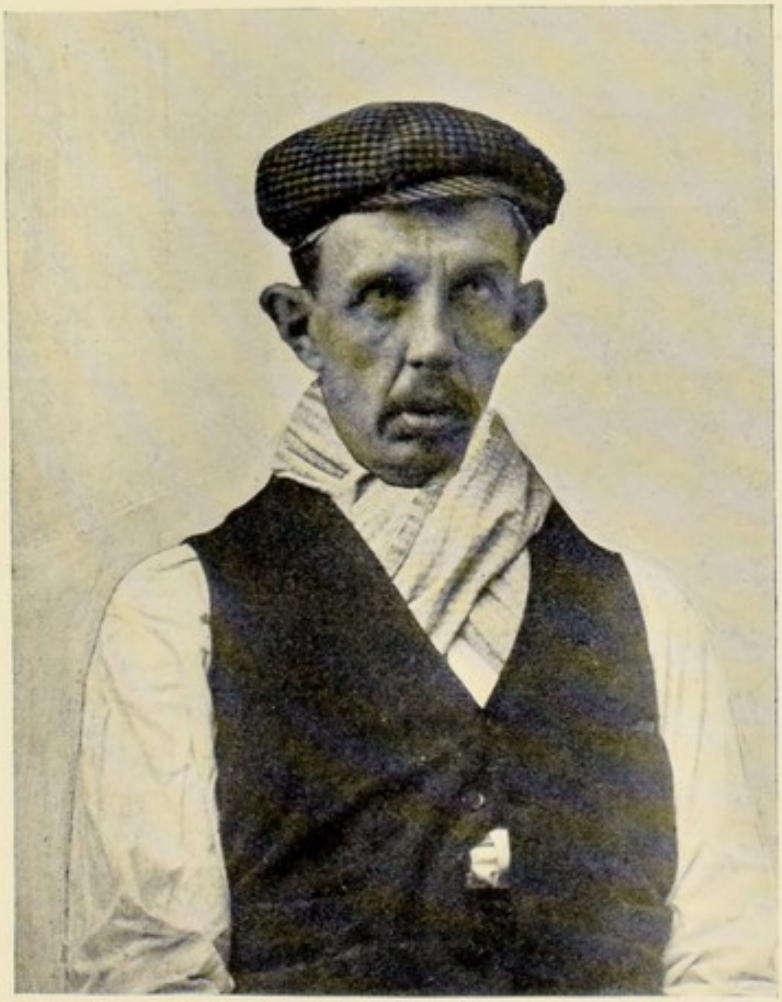


FIG. 2.—"Ill-favoured" Imbecile.

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"Ill-favoured" Imbecile.

[*Face page* 404.

with judgment you get the genius. There are persons born who have certain faculties developed in the most peculiar and wonderful way. Take for instance the musical faculty. In some people it is there almost by instinct, and you will find that little children, before they have been taught any instrument at all, will, on their own motion, come and pick out correctly the tunes they have heard on the barrel organs in the street, and nothing will prevent them doing so. Take mathematics as another example. There are people with wonderful powers of mental calculation, like George Bidder. George Bidder could easily multiply three figures by three figures, and indeed I am told that the idiot savant I have spoken of could do so. George Bidder could multiply, by a great effort and prolonged strain, eleven figures by eleven figures. He was a genius, became an engineer, and was very successful in his profession. But unfortunately, you sometimes meet with a hypertrophied faculty but with no judgment to guide it.

In the boy whose picture is shown in Plate VI., Fig. 1, there was a history of injury to the head causing meningitis. He has no sign of paralysis, but the expression is admirably caught. He is good-looking, but very timid and has a morbid horror of dogs and of water.

The next picture (Plate VI., Fig. 2) is from the photograph of an ill-favoured imbecile. She is a young lady born in the tropics. She was very late in speaking, and she had a fit when two years old, and then a second fit. There is a strong neurotic history, and one of the facts mentioned about her is that as a child she was fair, but the colour of her hair completely changed as she progressed in life, and now she is dark. She is also growing quite a perceptible moustache. The next picture (Plate VII.) also shows an ill-favoured idiot.

But you may get idiocy without ugliness, as the next two pictures show, one of a girl and the other of a boy.

Their countenances would not lead you to suppose there was any brain defect, but neither of them have any judgment or any intellectual faculties at all.

Cretins.—Now we come to another form of idiot, namely the cretinous idiot, of which, through the kindness of Professor Murray of Newcastle, I am able to give two good illustrations. (Plate VIII., Figs. 1 and 2.) To show the change which has taken place in our knowledge of the pathology of this condition I ought, perhaps, to reserve that illustration for my lectures on Medicine, and show it to you when I lecture on diseases of the thyroid gland. The cretinoid idiot of this type suffers from faulty development of the thyroid gland. The patient shown (Fig. 1) is twenty-eight years of age, so as far as years go she is a woman. But she is deformed, with a flabby fat skin, thick lips, half-open mouth, weak muscles, and absence of thyroid. There are fatty tumours above the clavicles, and intellectually she is a hopeless idiot. I would remind you that we meet with cases after birth and also late in life, which are allied to the above and are called myxœdema. Fig. 2 shows the effect of thyroid feeding upon this young woman. She is still not exactly a "phantom of delight," but she has grown four inches, displays a most fascinating grin, and the amount of mammary development that has taken place is very remarkable. I take it that in the whole range of pathology and in the whole range of therapeutics there is nothing so astounding as the effect of thyroid feeding upon these patients. I saw a case at Richmond four or five years ago that had grown four and a half inches in a year, and from being a hopeless idiot had learnt the alphabet and was beginning to read. Of course these patients require constant thyroid feeding, and they relapse if the feeding is stopped.

All the patients whose condition we have hitherto been considering are properly considered insane, and they

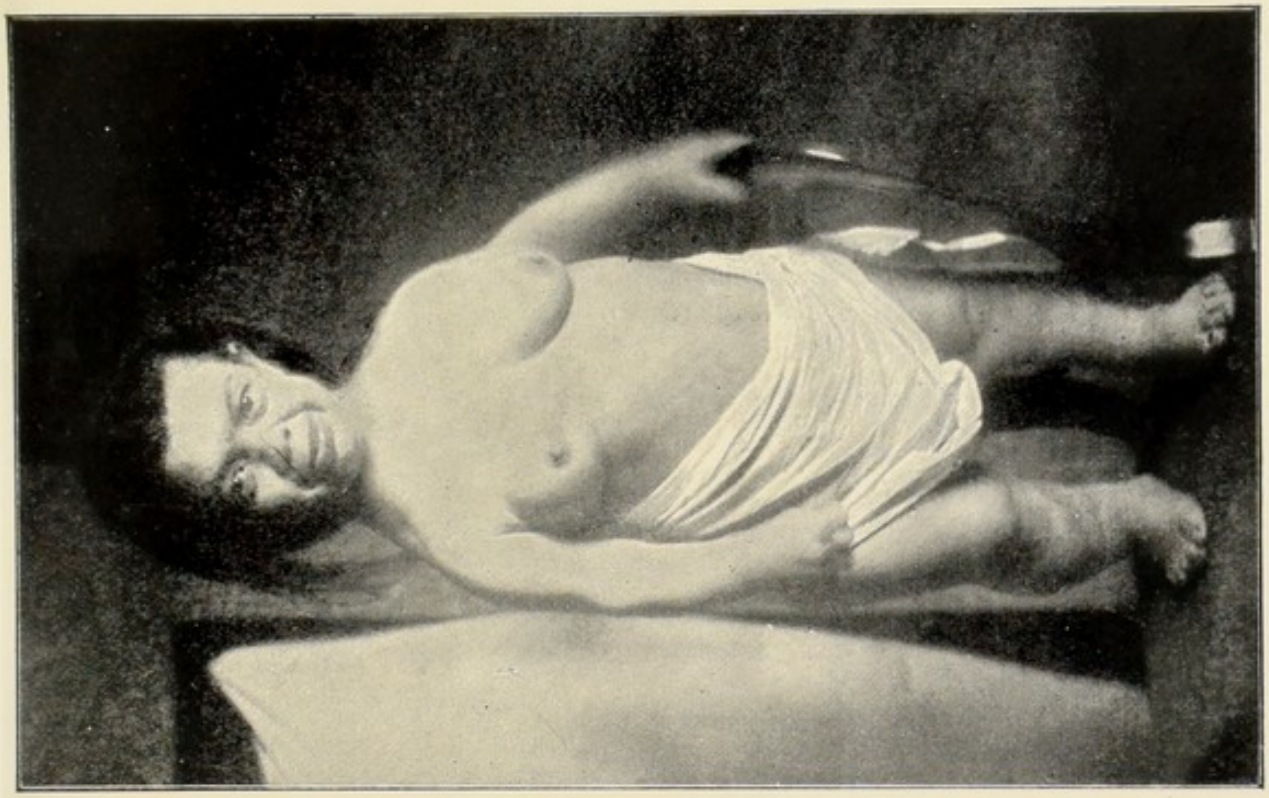


FIG. 2.—Cretinous Idiot after Treatment.

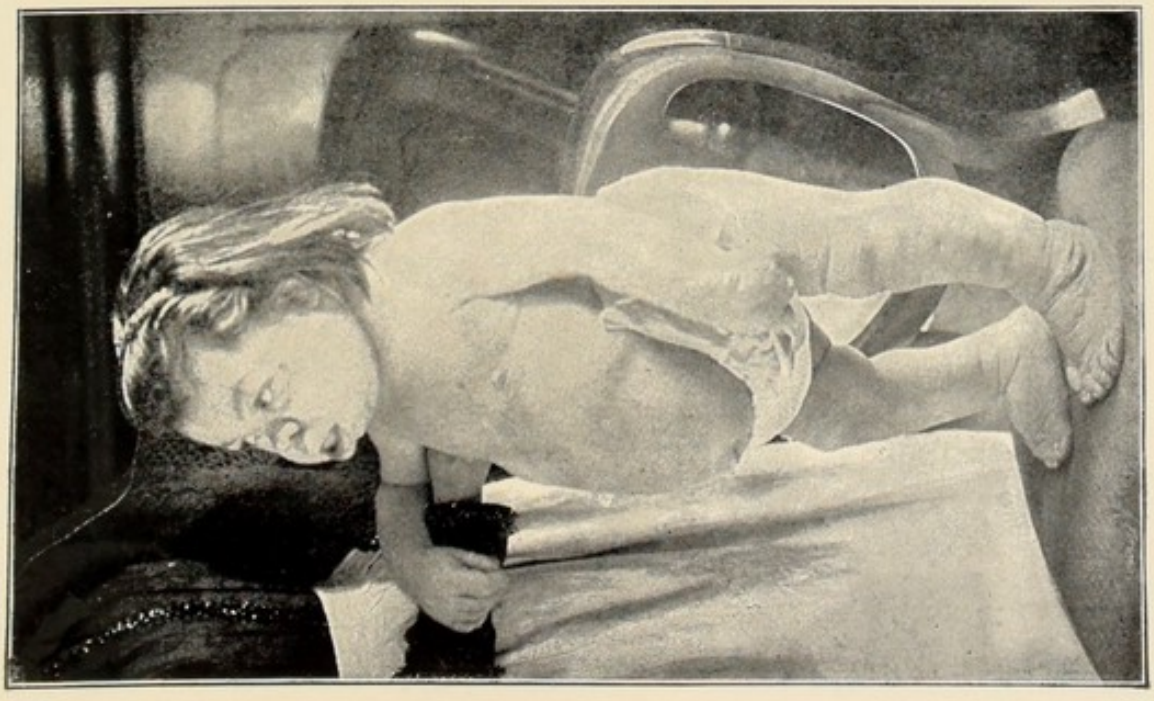


FIG. 1.—Cretinous Idiot before Treatment.

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are insane by virtue of want of proper cerebral development, and we are in no doubt as to the cause of the defects.

Toxic Insanity.—Next I think I may deal with certain other forms of insanity which are well understood. Those are the *toxic insanities.* Perhaps amongst the toxic insanities I ought to take the cretinous idiot first; although it would be difficult to say perhaps, in the present state of our knowledge, whether the idiocy be caused by defect, or by the positive addition of something which ought to be destroyed.

Amongst the toxic insanities one may mention shortly toxins which lead to delirium, and most toxins seem capable of causing delirium. We find delirium as a common phenomenon in all fevers. The mere mention of that fact, of course, is sufficient for my purpose. Insanity has sometimes been traced to malarious fever. We sometimes see little children become idiotic after the infantile diseases; we see little children or adults lose their mental power after such a condition as enteric fever. We know that there has been a great excess of insanity lately in this country, of which influenza has probably been a potent cause; and there is an "acute febrile mania" which is described by all specialists who deal with the insane, which seems to be well known in Asylums and which is really indistinguishable from the acute delirium of a febrile condition.

I may remind you that there are toxins which produce not only a delirium but a mental derangement without delirium. Look at the gouty man. Before his paroxysm nothing pleases the gouty man; he is angry without a cause, and he knows it. He is fidgety and most sensitive to noises, and is a nuisance to his friends and a most uncomfortable person to deal with. For the time I doubt whether you have a right to consider him sane. But the gouty fit comes and that condition then passes off. During the past year I had in my wards in

the hospital three or four children with a form of cerebro-spinal meningitis. Three of these cases got well, and I was constantly alluding to the fact that two of these children were not delirious, but they were naughty, and one of them was very persistently naughty—screamed and would not do what she was told, but her naughtiness was due to the toxin, and when the fever passed off the child was a charming child and did everything that was right. One must remember that you may get a toxin which may produce a change in character without anything like wild delirium.

Then I may remind you that there are certain drugs which act upon the brain, and that they all act differently. Taking such drugs as Indian hemp, opium, belladonna, and alcohol, I would remind you they all produce a different form of delirium. In belladonna poisoning the delirium is, as I have had occasion to say, often an everyday busy delirium; the patient sets about doing what he habitually is accustomed to do, only he does it at the wrong time. People who are poisoned by Indian hemp are said to get a strange want of appreciation of time and space. One can only judge of that by what one reads. People who are poisoned by opium, if the amount taken is not very large, are troubled by dreams and nightmares, and the dreams are often of a very wild and curious description. But the person poisoned with opium is in a very negative condition, very different from the person who is poisoned with alcohol. The person poisoned with alcohol has his controlling power taken from him, and it is a common saying "*in vino veritas.*" You cannot say "*in morphina veritas*," but "*in morphina nihil.*" The man who is drunk is said to show something of his true nature, and undoubtedly that is true. And it serves to give point to the fact that our faculties are infinite; to remember that the moods of the drunken man are infinite also. We shall find that the symp-

toms of insanity are infinite. And one of the reasons why the literature of insanity, hitherto, has been so uninstructive is that the study of it has been very largely from the surface; it has been very largely by description of symptoms; and the symptoms of insanity are so varied, the mental conditions met with are so infinite, that it is almost hopeless to try to get order by describing the symptoms only. In order to give some point to that, I will just remind you that Duchenne wrote a book on the anatomy of the expressions. And Sir Charles Bell did the same thing. Duchenne tried to show the anatomy of the expressions, and that the expressions of anger, love, good humour, and so forth, are due to the movement of certain muscles. And it probably is true that no mental condition is without some corresponding muscular movement which originates in the brain. That is remarkable, but I believe it to be true; and, of course, we can tell whether a man is angry or good tempered by looking at him, and it would be quite idle to ignore such a fact as that. It may be a matter of interest to remind you that Duchenne in this book of his on the anatomy of the expressions gives a list of passions compiled from Plato, Aristotle, Descartes, Hobbes, and the great writers who have written upon these mental conditions, and he tabulates eighty such conditions. And among them are: wonder, prying, desire, longing, envy, emulation, joy, pride, self-satisfaction, veneration, vanity, laughter, conceit, covetousness, baseness, meanness, greediness, gluttony, luxury, pity, care, sadness, vexation, fear, despair, worry, mistrust, grief, tears, fright, dulness, shame, remorse, regret, shock, timidity, anger, discord, disgust, fury, hatred, jealousy, contempt, mocking, malice, vengeance, enmity, courage, trust, firmness, esteem, kindness, high-mindedness, gratitude, security, repentance, drunken-ness, cowardice, sensuality, irresolution, lowliness, panic, anguish.

You have only to think about that list and you must all recognise that every one of these conditions that are tabulated is capable of facial expression, and facial expression is given to them every day by the trained actor, and it goes to show, not only how infinite are our emotional states, but how the movements of the body and mental endowments are inextricably blended.

Insanity due to Cerebral Disease.—Now we come to another class, namely, those cases of insanity which are definitely due to brain disease in the adult. I would remind you that you may have extensive and gross lesions of the brain without insanity. In my wards a few months ago, I repeatedly drew attention to a patient who had had extensive hæmorrhage into the left side of the brain, which had caused complete paralysis of the right side of the body, but we could not detect in that patient any cloud in his intellect. He was quick to answer questions, and he reasoned well. Therefore, in that case there was extensive brain disease but no intellectual trouble. The reason probably is that the prefrontal part of the brain was not damaged, and that the damage was limited to one-half. As our knowledge advances, we are able to detect diseases of the brain which occupy a very limited area, and I need hardly say that in examining a lunatic, as in examining a healthy person, it is a most important matter to be sure as to whether there is or is not disease of the brain, however minute. In my wards at the present time, you will find a woman who has symptoms like those of locomotor ataxy. At the same time she has dilatation of her pupil and want of movement in the pupil, and she has paralysis of accommodation of both eyes. She has no paralysis of the ocular muscles. We have been able to say that she has disease of part only of the nucleus of the third nerve in the *iter* between the third and fourth ventricles of the brain. That is a sample of modern minute diagnosis, and an interesting example of spinal

cord disease and brain disease going together. Further, the patient to whom I have alluded may be said to have no disease of the brain, but that the disease is rather in the vessels, supplying that part of the brain. So we take the brain disease back to disease of the vessels, and there is high probability that the disease of the vessels is due to syphilis. That being the case, there is a high probability —a probability which is made great because improvement has already begun — that she will improve with anti-syphilitic remedies in sufficient quantity. It is a most instructive case. She is not insane, but supposing she becomes insane, the absolute diagnosis of disease of the arteries of her brain, and the knowledge that if one artery be affected from such a cause others may be similarly affected is most important. I am glad to call your attention to the excellent work which has been done on syphilitic disease of the brain as seen in Asylums, by Dr Mott, F.R.S., who was a distinguished student of this college.

Next let us consider those chronic changes in the brain and spinal cord which are accompanied by intellectual changes as well as motor changes in which we find alterations of the mind as well as of the muscles, and which are often spoken of as General Paralysis of the Insane. The pathological change is one which entails degenerative changes and shrinking of the nerve elements, inflammatory changes in the vessels, thickening of the pia mater, shrinking of the convolutions, etc. It is a disease of middle life, more common in cities than in the country, more common in men than in women, a disease which is acquired rather than inherited, predisposed to by worry, excitement, drink, and syphilis.

This degenerative change may start anywhere in the nerve centres, perhaps in more than one spot at once. The patient may come with the early symptoms of loco-motor ataxia or you may notice some want of control over the emotions.

Tremor of the hands, lips, tongue, unsteady and unequal pupils, changes of voice, articulation and handwriting, undue somnolence, a sudden "fit" of convulsions like a "bolt from the blue," and the familiar motor and sensory changes which accompany posterior or lateral sclerosis; these are the symptoms which warn the physician that his patient has "general paralysis of the insane," or G.P.I.

The mental symptoms are often characteristic and are marked by morbid exaltation. The manner may strike one as unduly effusive and the emotions and accompanying gestures be uncontrolled, and we may be in doubt whether the patient is extravagantly optimistic and conceited or is definitely insane.

He may have definite "delusions of grandeur" as to his prowess, intellectual endowments, and income, and in relation to the latter he may commit extravagant acts which may bring his family to ruin.

Of course there is no real mental "exaltation." That which has been thus named is due to want of *control.* The sane man can control his actions and his ideas, the patient with the shrinking and degenerative neurones or G.P.I. can control neither. All conventionalities are dropped, and not infrequently the patient commits thoughtless petty thefts in shops or elsewhere which bring him into trouble.

Just as this disease may give its first manifestation in the legs rather than the intellect, so the intellectual change is not always in the direction of exaltation, but may be in the opposite direction of depression, pessimism, melancholy. The muscular and mental weakness both gradually increase, fits and somnolence increase, control over the bladder and rectum is lost, and the patient dies bed-ridden "sans everything" in three or four years from the outset at most.

Now, the mental symptoms in general paralysis are often spoken of as symptoms of exaltation, and it is said

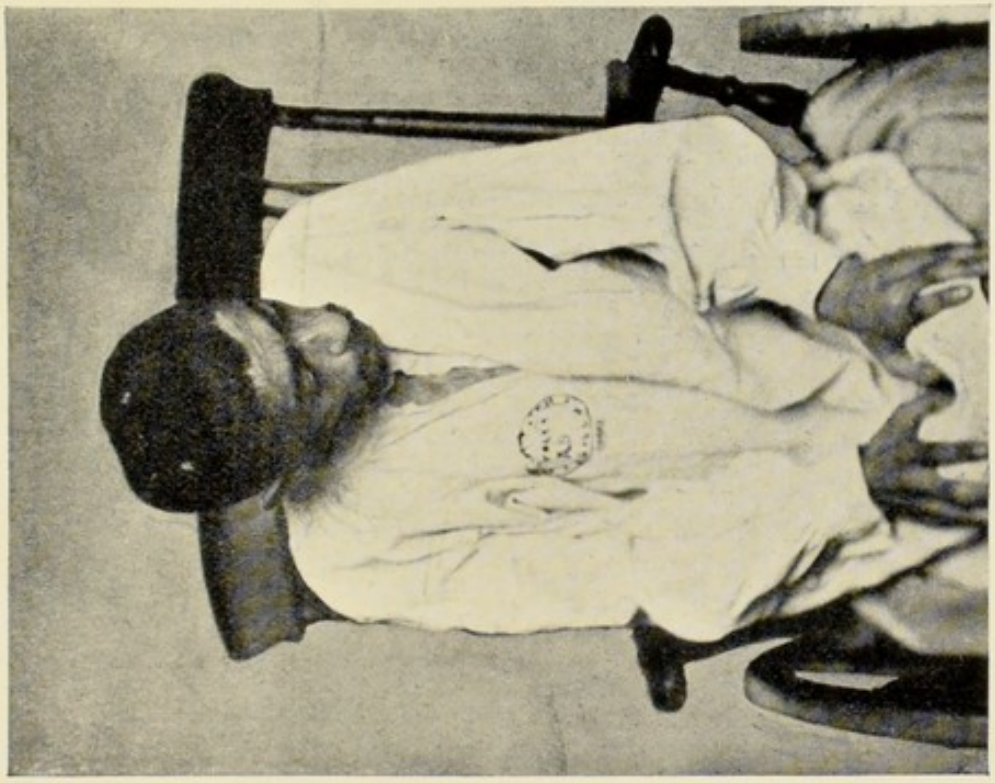


FIG. 2.—General Paralysis: "Depression."



FIG. 1.—General Paralysis: "Exaltation."

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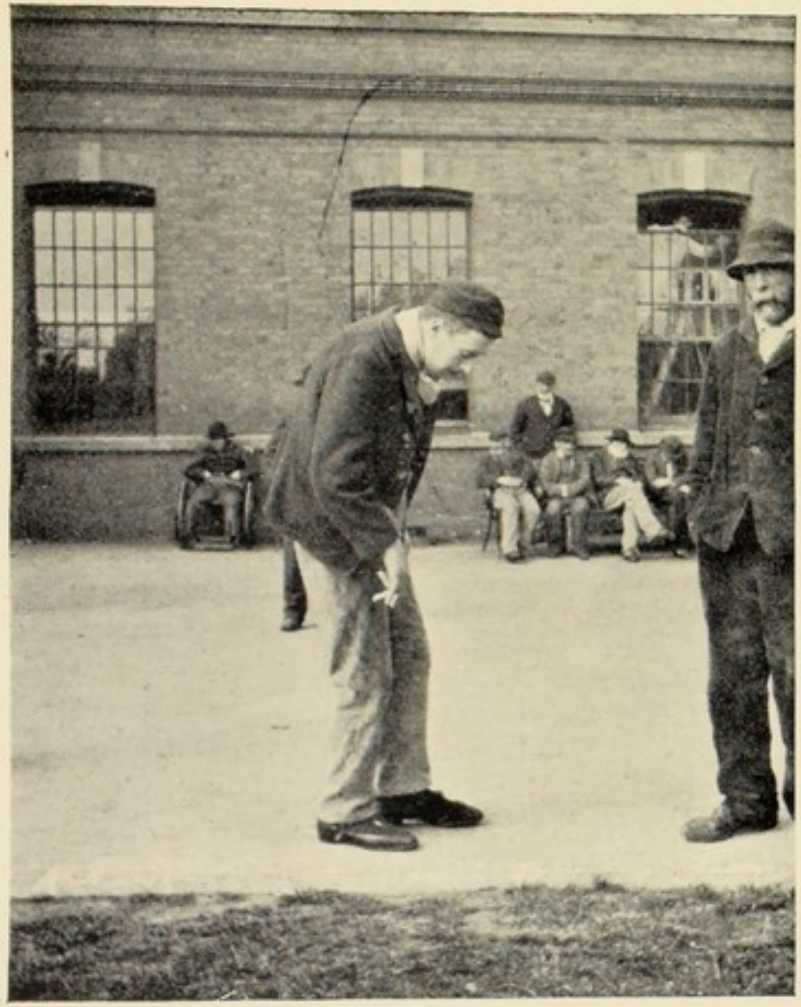
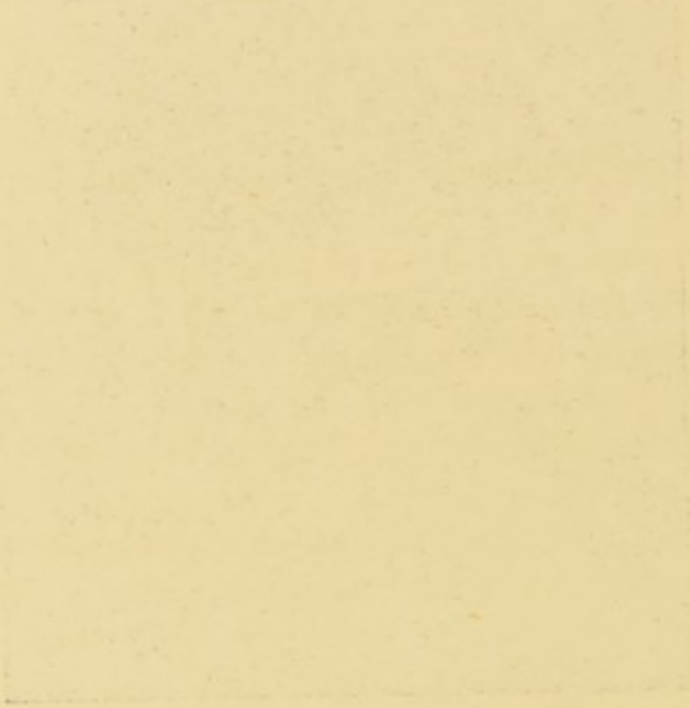


FIG. 1.—General Paralysis: Muscular Feebleness.



FIG. 2.—General Paralysis (Syphilitic), occurring in Man and Wife.

[*Face page* 412.





that the patient with typical general paralysis has exalted ideas; he believes he is making an enormous fortune, that he is going to set the Thames on fire in various ways, and he comes to you boastful and optimistic in a ridiculous degree. Now, even in general paralysis, remember "the child is father to the man," and if you have known the patient before, you may sometimes be in doubt, as I have been in doubt, whether it is the natural optimism and self-conceit a little worse than usual, or whether there is wasting of the neurones and the man is on the downward slope which leads to dusty death. General paralysis is a disease of the brain and spinal cord combined. Sometimes there are more cerebral symptoms than cord symptoms, sometimes the reverse; you have to examine the conditions of the muscles, of the pupils, the conditions of the limbs as to power, and so forth, to look for which the motor troubles are the indications which will help you. Remember to examine the condition of the patient's body as well as the workings of his mind; that is to say, you must look at the physical symptoms as well as the intellectual. The intellectual phenomena are things which may be assumed. But bodily disease, a little inequality of pupil, a pupil which will not react, a little tremor of the hand, a little albumin in the urine, a little sign of gout; all these things you should look for in a person whom you are examining to see whether he is insane or not. If a person hears voices, at all events you look to see if there is any wax in his ears, and you do not know what you may be doing for the patient by relieving certain physical disabilities. I am able to give four illustrations of different conditions of general paralysis (Plates IX., Figs. 1 and 2; X., Figs. 1 and 2).

Plate X., Fig. 1 is a patient in one of the last stages of general paralysis. In him you see the physical weakness. If he has had mental exaltation, that has long passed. He has degeneration of the neurones of his brain. His hands are hanging helpless, and you can see how feeble his back

and neck muscles are. So weak have they become that one wonders he does not fall. These patients go from bad to worse, become somnolent, have repeated fits. Dr Mott insists strongly on the bad effect of repeated fits in checking circulation through the brain, and hastening to that wasting of the neurones which is at the bottom of this disease.

Plate X., Fig. 2 is interesting; photographs of a man and his wife, both suffering from general paralysis. The man has definite trouble in the shape of ptosis of one eye, and you see in the woman what is not uncommon in the general paralytic, a flabby face and general expressionless condition.

Symptomatic Insanity.—Having said so much, I will allude very briefly indeed to the residuum of insanity, that is to say the insanity concerning the pathology of which at present we know nothing. We progress every day, and I have very little doubt we shall some day be able to assign an anatomical and pathological cause for every symptom in the insane; but that day has not yet arrived. Taking this group, which is still in a very chaotic state, those who have had the care of the insane have tried to classify them and to group them until one gets weary of the varieties of classification and grouping. In Bethlem Hospital in the old days, there were two pictures, one of raving madness and the other of melancholic madness. Mania and melancholia are the two chief divisions, and I think I will not waste time over this great group; it is very, very important, but having no pathological substratum one can say very little that is profitable.

I will now proceed to explain the illustrations.

The first (Plate XI., Fig. 1) is a boy aged fifteen in a condition of stupor; he did not answer when spoken to, refused his food, could not give any account of himself. He improved after being under treatment for a few months, and after nine months was discharged recovered.

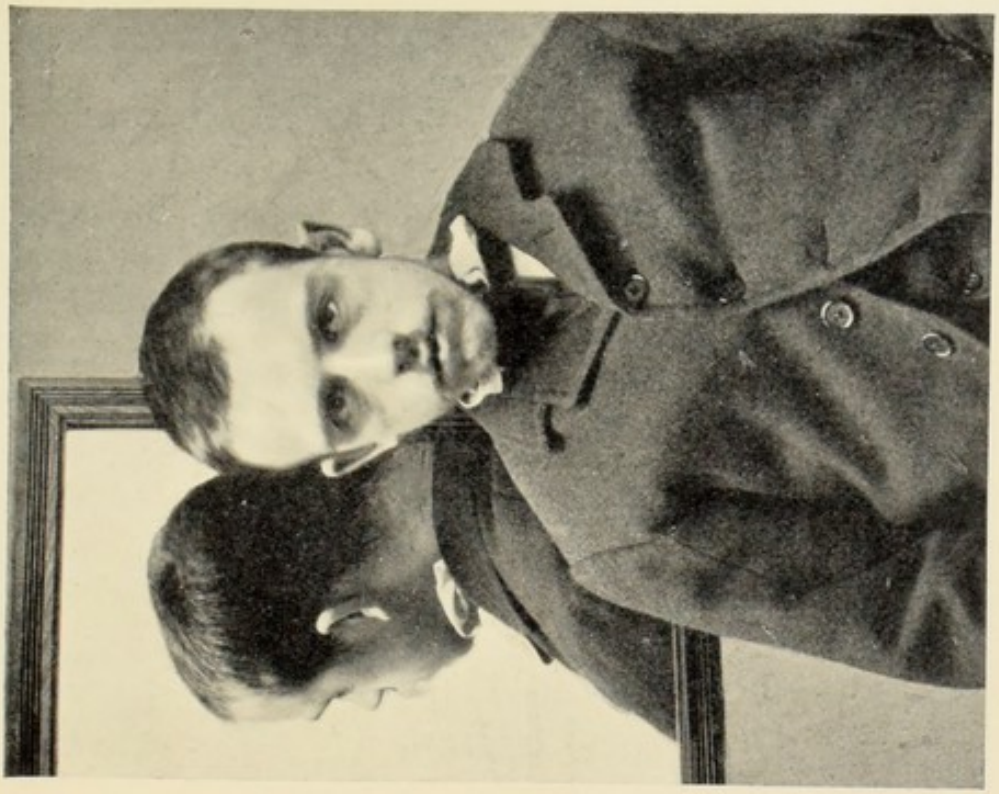


FIG. 2.—Acute Melancholia in a Youth.

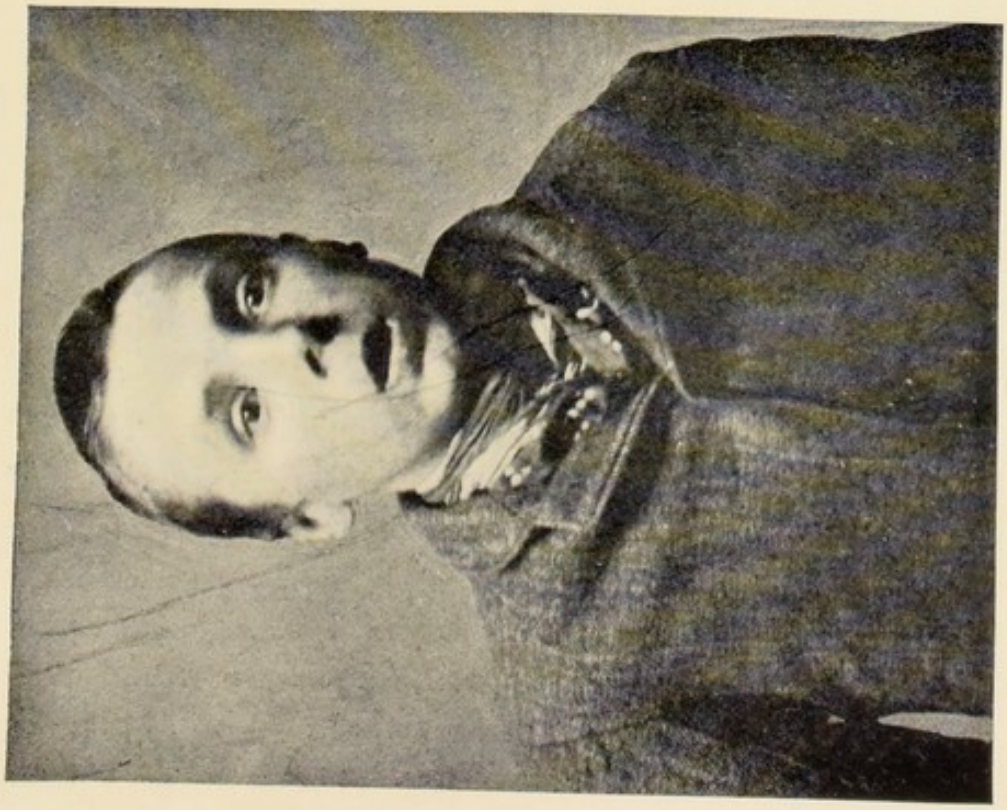


FIG. 1.—Stupor.

[*Face page* 414.



FIG. 2.—Religious Monomania.

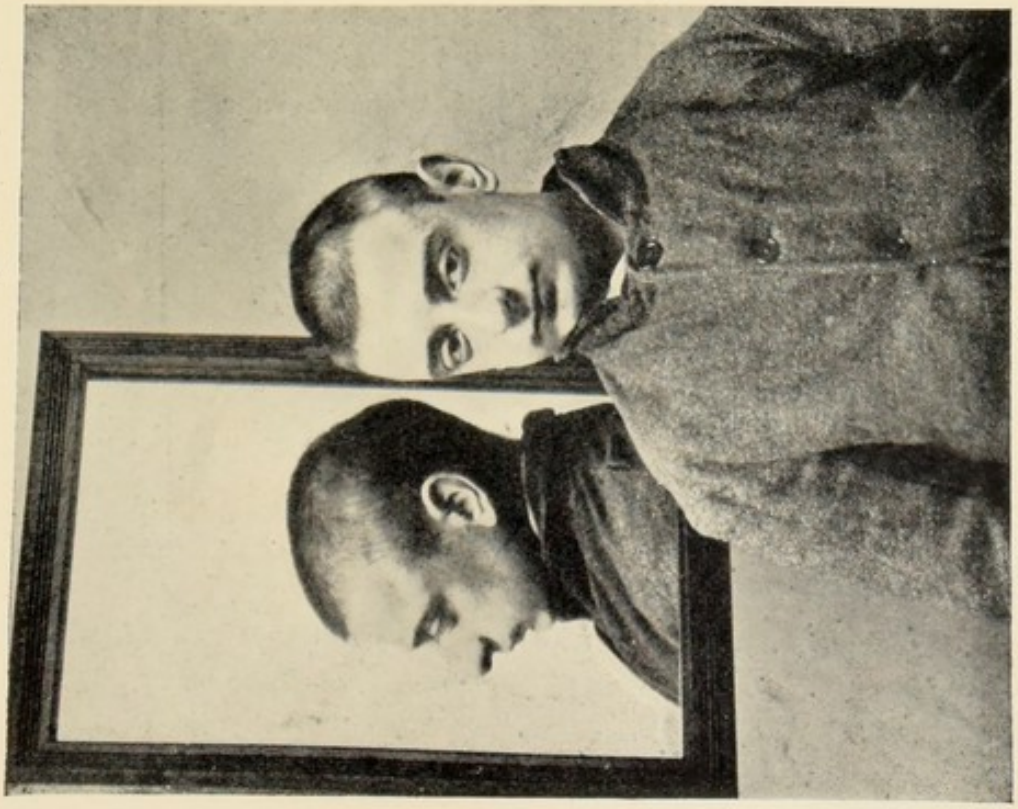


FIG. 1.—Imbecile.

[*Face page* 414.

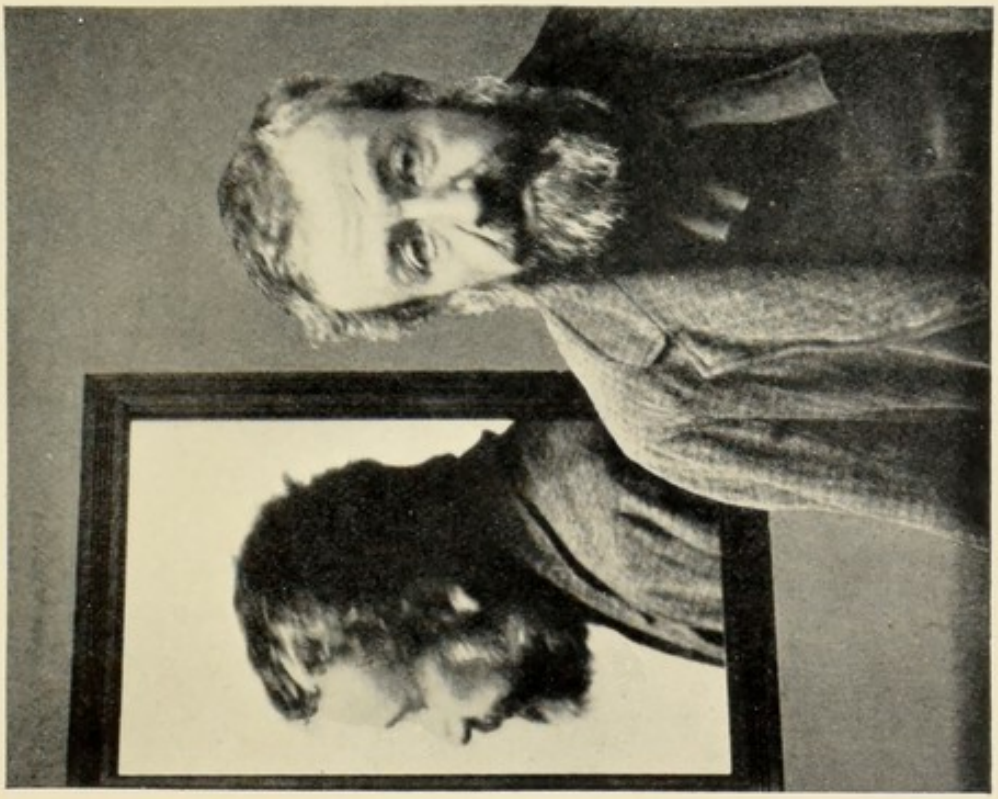


FIG. 2.—Senile Dementia.

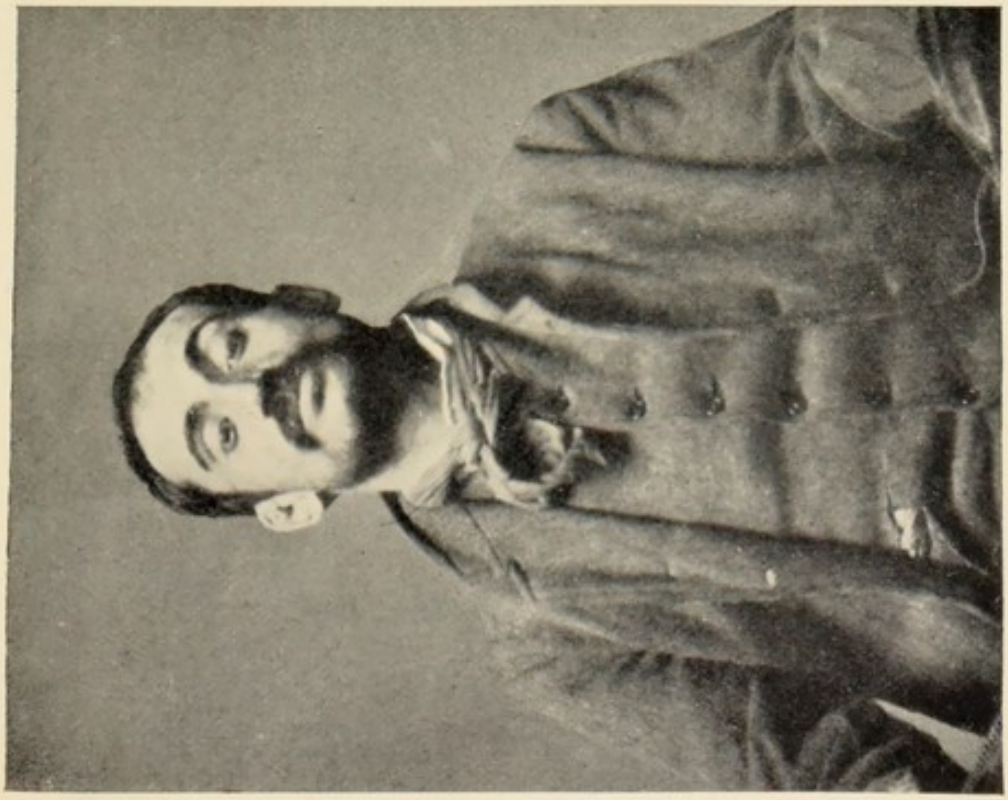


FIG. 1.—Chronic Mania.

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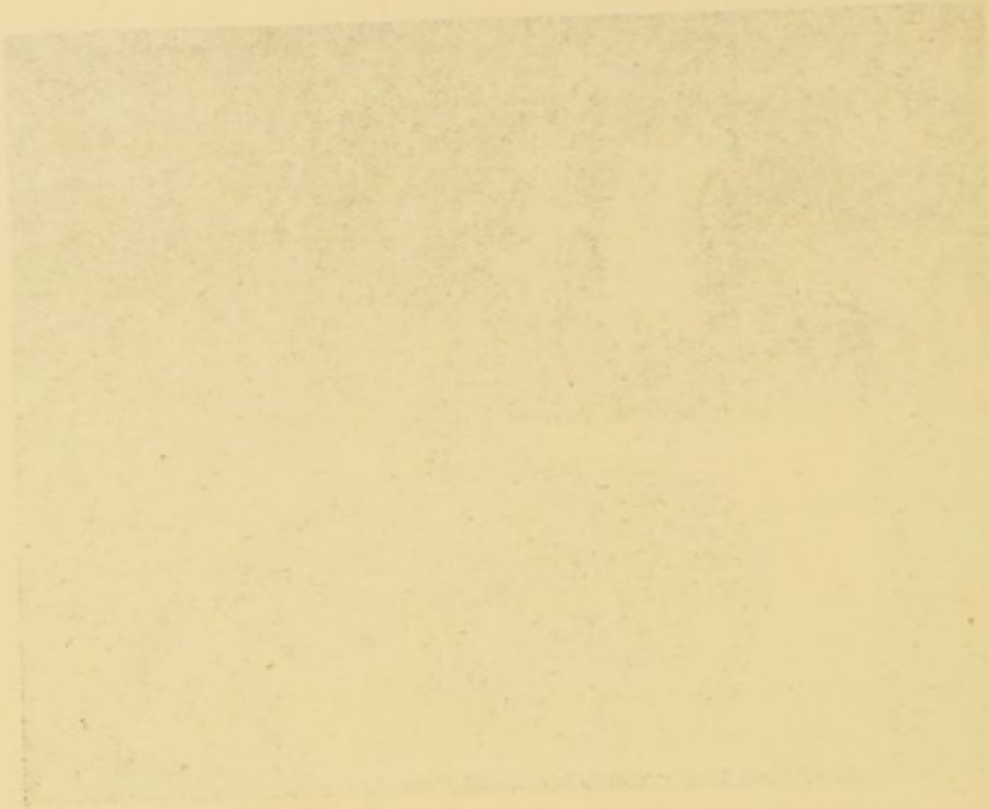




Plate XI., Fig. 2 is a clever picture; the use of the mirror showing the profile as well as the front of the face is very happy. It is a case of acute melancholia in an adolescent. He refuses his food, will not answer questions, is very miserable, has twice attempted to commit suicide. Previous to admission he had been regularly employed and able to keep himself. He has recovered gradually, and has begun to take food and to show interest in his surroundings. He will probably be well enough to be discharged in a few months. You will remember what I have said as to the muscles being linked with the emotions, alluding to Sir Charles Bell's and Duchenne's work. You see the melancholy in that boy's face, and when you are told that he is suicidal you will accept the statement.

Plate XII., Fig. 1 shows a boy nineteen years of age, who can give no account of himself and cannot carry on any conversation. Asked about his parents he says "four of them died."

Plate XII., Fig. 2 is a religious monomaniac. There I think I see a type; I think I have seen people of this type among the processions which haunt the streets of London on Sunday, and there seems something in the coiffure which belongs to that genus. These things are very inscrutable.

Plate XIII. Fig. 1 is an interesting photograph of a patient with chronic mania, aged thirty-seven. He is excited, restless at times, passes into a state of frenzy, during which he shouts, gesticulates, and jumps about. He is a very violent patient, a confirmed window-breaker, and a frequent occupier of the padded room. It is a case of subacute mania passing into chronic.

Plate XIII., Fig. 2 is a senile case. There is a want of expression; he looks dull, and he is wet and dirty; he does not pay any attention to the calls of nature, and wants looking after.

Plate XIV., Fig. 1 shows a case of chronic mania, of

which a happy snap-shot has been taken. His one pursuit in life is flying imaginary pigeons; he has let an imaginary bird loose, and is watching it with intense interest.

Plate XIV., Fig. 2 shows a woman, a case of adolescent insanity with pronounced sexual delusions. She accuses men of taking liberties with her and believes herself to be pregnant. She is happy and contented.

Plate XV., Fig. 1 is a case of chronic mania; noisy, talkative, and at times violent. She is very fond of making grimaces, and an instantaneous photograph has been taken of her engaged in her favourite pursuit.

Plate XV., Fig. 2 shows a female chronic melancholiac, forty-seven years of age. She says she is tired of life and wants to die. Gazes vacantly at one when addressed, and after a considerable time gives a monosyllabic answer. She does not take the slightest interest in her surroundings. There is marked asymmetry of the face. She does not appear to have any delusions.

Plate XVI., Fig. 1 is a case of senile dementia with some melancholia. She has aural hallucinations; does not know when or where she was born, and does not know where she is now.

In Plate XVI., Fig. 2 you get undoubtedly the expression of the face as a key to the mental condition. She has delusions of persecution. If she were an actress of note she would have a very favourable criticism for her facial expression.

Plate XVII., Fig. 1 is a case of chronic mania with delusions. She believes she is very young and beautiful, evidently a delusion.

Plate XVII., Fig. 2 shows a case of chronic mania; she is noisy, almost always at the railings, scolding imaginary people outside.

Plate XVIII. is from a photograph of a patient in two moods. (Folie Circulaire.) At one time she is acutely melancholic, and at another time violently mania-



FIG. 2.—Adolescent Insanity: Sexual Delusions,

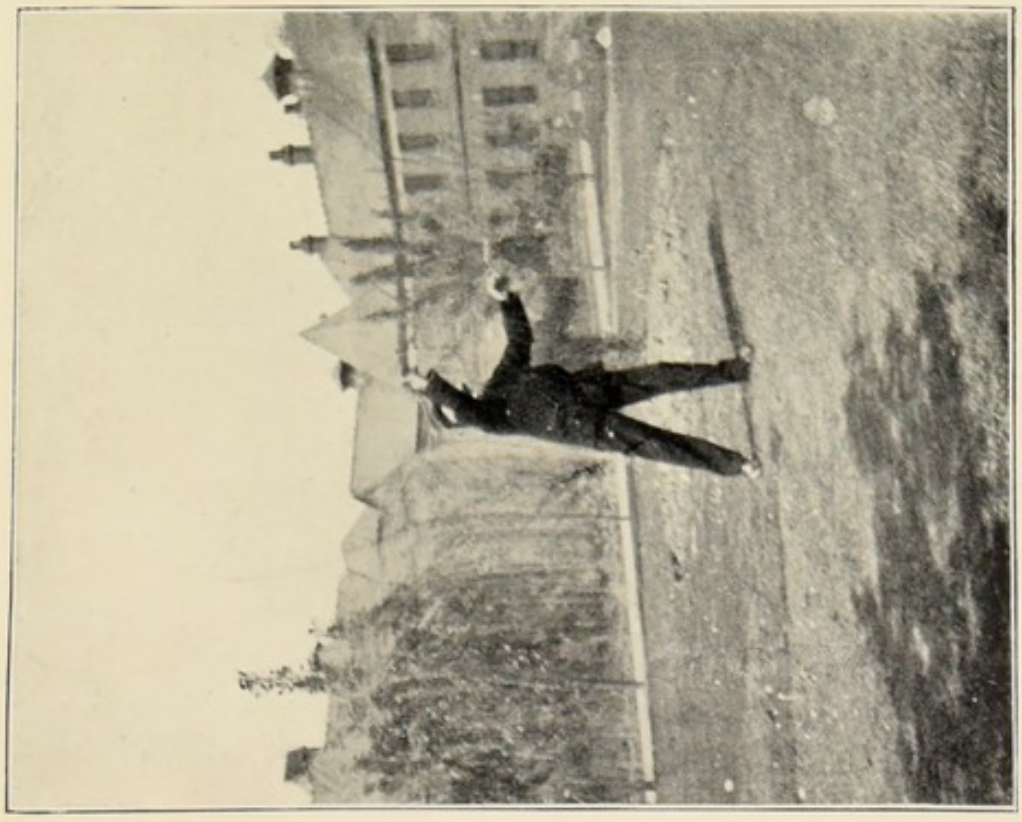


FIG. 1.—Man Flying Pigeons,

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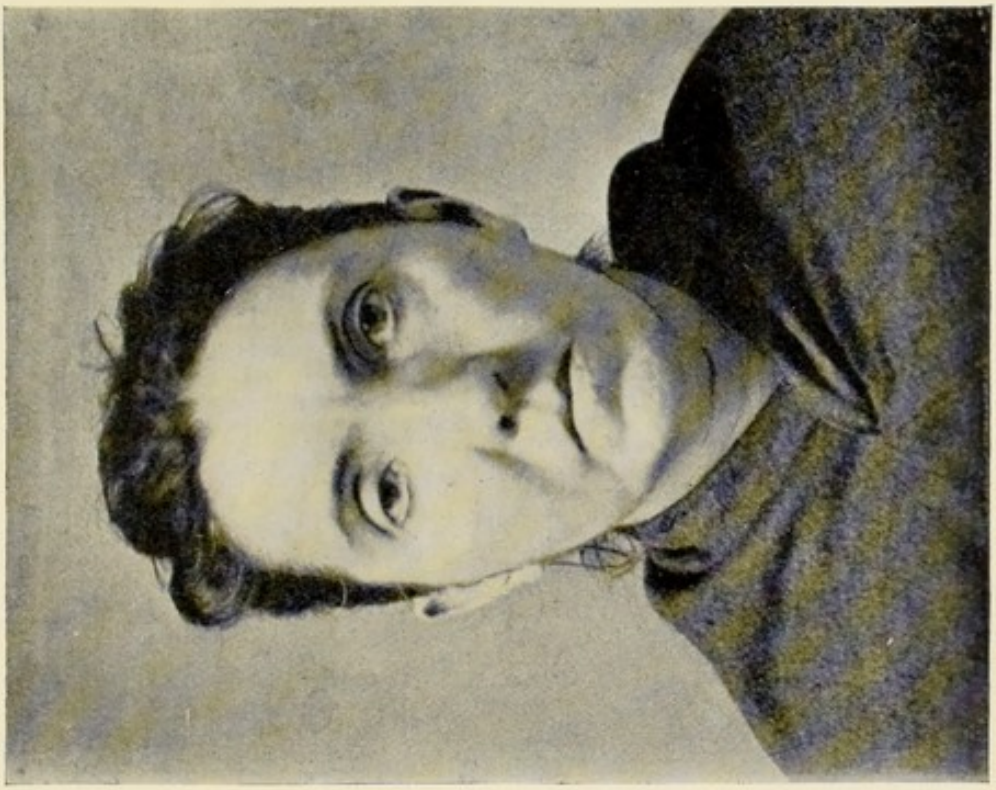


FIG. 2.—Chronic Melancholia.

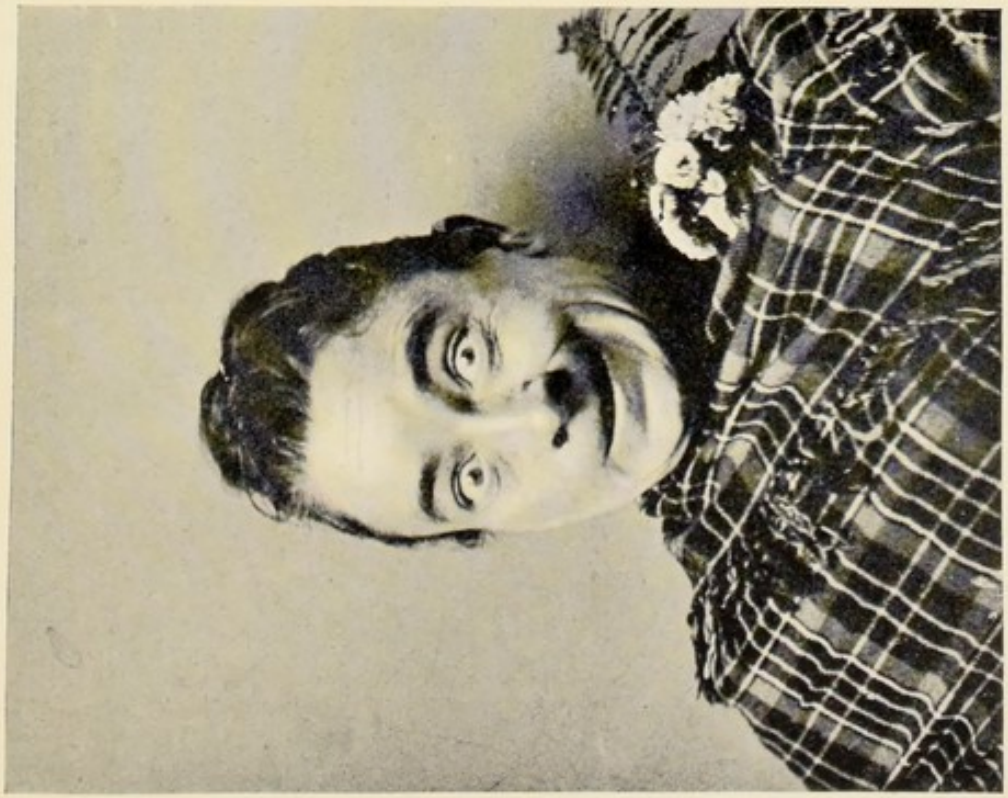


FIG. 1.—Chronic Mania.

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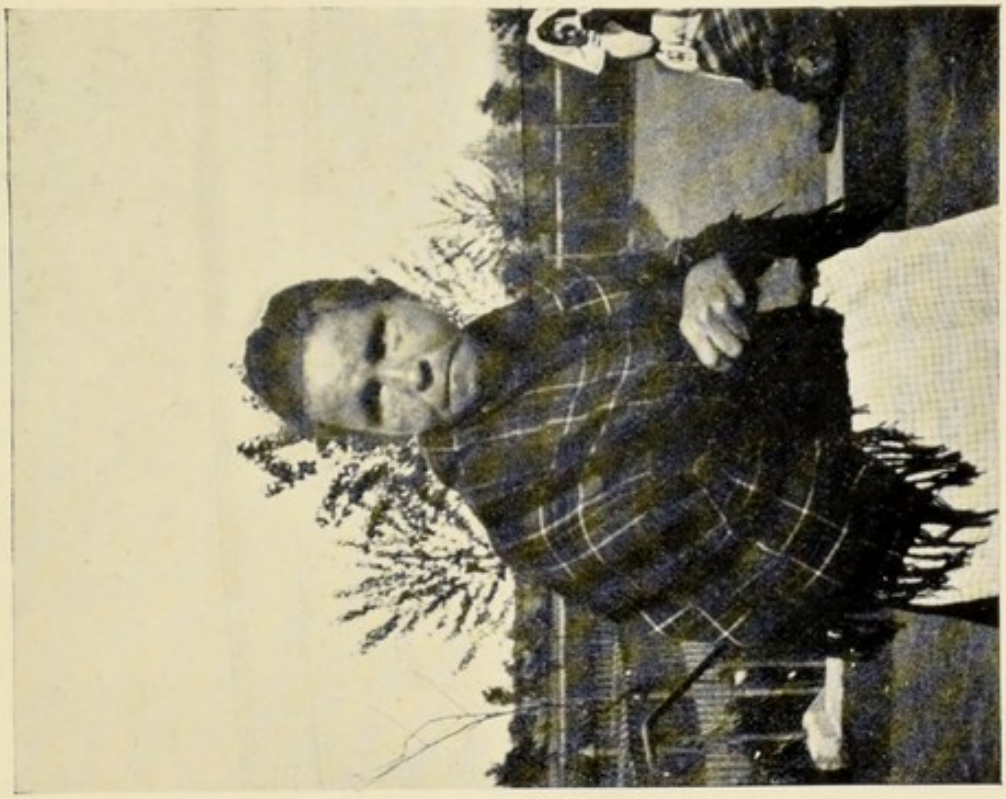


FIG. 2.—Delusions of Persecution.



FIG. 1.—Senile Dementia.

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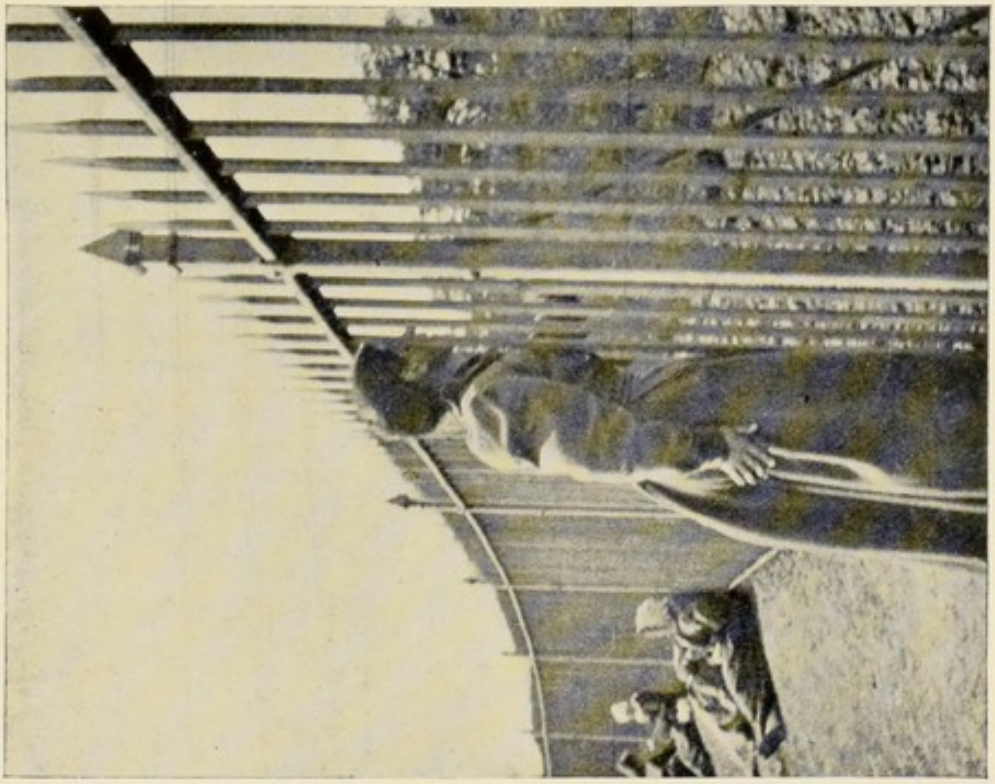


FIG. 2.—Chronic Mania.

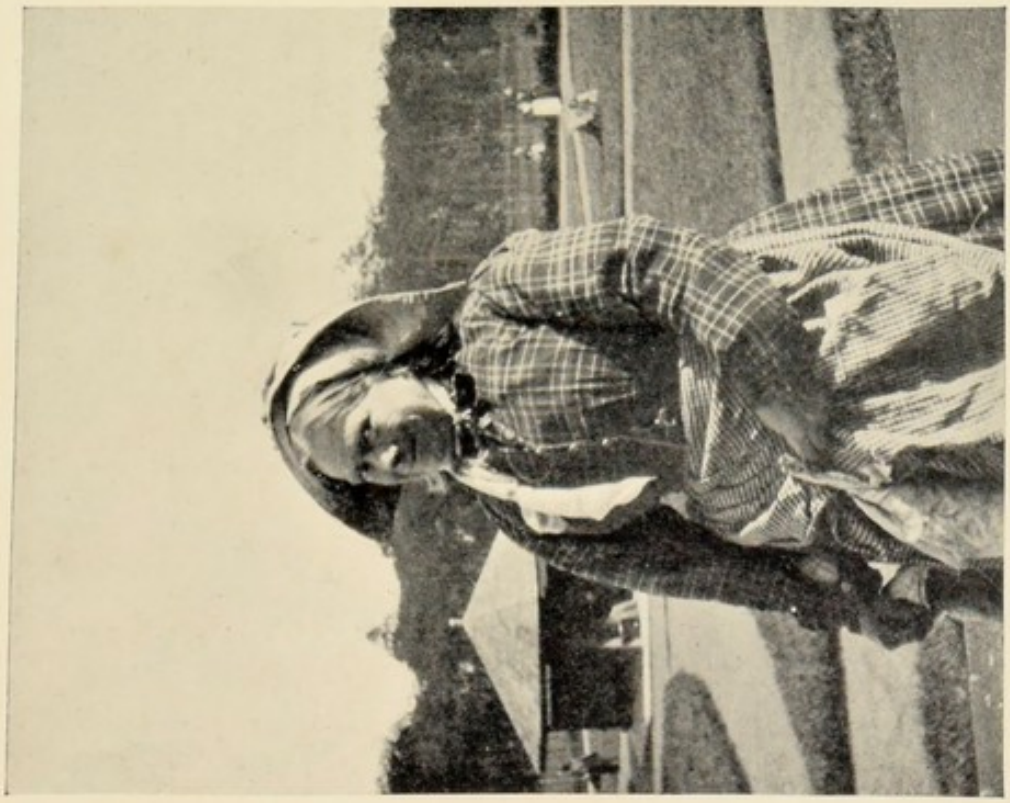


FIG. 1.—Chronic Mania, with Delusions.

[*Face page* 416.



Folie Circulaire.

[*Face page* 416.

cal. The photographs of this woman in both states are most interesting.

You have another lecturer who deals with insanity more at length, but I hope I have succeeded in giving you a general idea, apart from those which are dependent upon definite diagnosis of brain disease. I thought the best method was to show you pictures without much comment of my own.

CHAPTER XXXIII

LEGAL RELATIONS OF THE INSANE

Historical—Shakespeare's Definition of Madness—Edward II. and Control of the Property of the Insane—Bethlem Hospital—The Lunacy Acts of 1846-1890 — Pinel — The Lord Chancellor — Chancery Lunatics—The Private Patient—The Documents—The Medical Certificate — Medical Facts — Brillat-Savarin — Urgency Order—*Scott* v. *Wakem*—Restraint—The Writings of the Insane—The Pauper Lunatic—Chancery Lunatics — Committee of the Person and Committee of the Estate—The Single Patient—The Commissioners in Lunacy—The Lunatic in the Asylum.

NEXT as to the legal relations of the insane, and the Lunacy Laws.

Lunatics have existed in all ages of the world, and as civilisation advanced it must soon have been found that some of them wanted controlling. At one period lunatics were regarded with a certain amount of superstitious awe, and people who were lunatics were supposed by the vulgar to have some definite relations, more intimate than the rest of us, with the other world, and they were accordingly regarded with veneration. I may mention as a notable instance of that, that the founder of St Bartholomew's Hospital, Rahere, who was a Prebendary in St Paul's, is said to have obtained subscriptions and material for his

building by pretending to be "a natural." It was seen that this insane man seemed intent upon building a hospital, and that being the case, people helped him. In the East, still, you will find that epileptics and the insane generally are regarded with veneration. I would remind you that in the second, third, and fourth centuries many of the insane people were canonised. We read of monks, some of whom turned themselves out to grass like Nebuchadnezzar and fed in the fields. And we read of monks who lived upon pillars. One notable instance was St Simeon Stylites, who lived on a column forty feet high. He was canonised. If he came amongst us now and set up a column in the Strand, a policeman would say, "Simeon, move on." He might get a paragraph in some of the papers, but nothing more. It is important to recollect that what passes for insanity to-day, may not pass for insanity to-morrow; and what passes for insanity in one position in life is not insanity in another position in life. That makes it difficult to give any true definition of insanity, and, after all, Shakespeare's definition is perhaps as good as any, "for to define true madness what is it but to be nothing else but mad." The madman is to be judged by his fellows, and if the case comes into court it is submitted to a jury, and the average judgment of a jury of our fellowmen is a tolerably safe guide.

As early as the reign of Edward II. in this country, it was found necessary to make regulations for controlling the property of insane people. The law directed that the king should take the property of "fools natural" and keep it for them and husband their estates, so that when they recovered, it should be restored to them or to their heirs when they died. In the sixteenth century, when the abolition of monasteries took place, it was found necessary to establish a hospital for the insane, and they took the old Priory of St Mary of Bethlem, which was not far from where Moorgate Street Station now stands, and devoted that to the uses of the insane. Bethlem

Hospital was rebuilt in that position, and it was then moved to St George's, Southwark, on the south of the Thames, early in the present century. The word "Bedlamite" is due to the fact that the original home of the lunatics was in the suppressed monastery of St Mary of Bethlem. In 1763, a law was passed that no one could be confined as a lunatic who had not been examined by certain Fellows of the College of Physicians who were designated for the purpose, and in 1846, Lord Ashley, afterwards Lord Shaftesbury, whose name is so well known in connection with many great philanthropic works, introduced the Lunacy Act into the House of Commons; so that Lord Ashley may be rightly regarded as the most important of the modern men who tried to make the lot of the insane less miserable.

In former days, lunatics were treated with great cruelty, often treated much worse than are criminals at the present day. They were kept in filthy cells, often chained up, often subjected to all kinds of corporal punishment, and their lot was a very hard one indeed. It is due to two members of our profession, Tuke and Conolly, that what may be called the *non-restraint* and humane treatment of lunatics was first brought into vogue in this country, a practice previously introduced in France by Pinel.

The Lunacy Act of 1846 went on fairly well, and was not subjected to any alteration until a few years ago. We now work under the Act of 1890. What the main provisions of that Act are, I shall tell you presently. In dealing with the Act to regulate lunatics I shall have regard to the fact that I am addressing, and am myself, so to speak, a general practitioner in this matter, and shall show you only how the lunacy laws affect all of us. If any of you should adopt lunacy as your special branch you will find you will have to be very well acquainted with a great many clauses of that Act, which is a very voluminous Act, and that you will be swathed in red tape.

But I shall not deal too minutely with the law; I shall simply show how much of the law we all must know.

At present we work under the Act of Parliament which I show you now; it has over three hundred sections and clauses; it weighs half a pound, and it costs 1s. 8½d. That is the Lunacy Act of 1890. Before alluding to the terms of the Lunacy Act, I will mention shortly the different lunatics which the law recognises. The Lord Chancellor is the person who, at the present day, stands, as it were, *in loco parentis* to the insane population of these Islands. He has the charge of them, they are under the Court of Chancery, and the Chancellor himself takes personal interest in them. The first class of lunatics to which I shall allude are those who are known as "Chancery lunatics." Those are the lunatics under the direct control of the Court of Chancery. They are persons having property of at least one thousand pounds. Many of them are persons of very large property, and they are found lunatic by inquisition. The process of finding a person lunatic by inquisition is, shortly, this. The Lord Chancellor appoints certain legal persons of eminence to act as masters in lunacy, and if a person of property is a lunatic and unable to take care of his estate, or of his person, or if he is dangerous to himself and others, the next-of-kin or those having interest in him, may petition the Lord Chancellor to direct an inquiry. That petition must be supported by affidavits made on oath by two or more medical men as to the mental condition of the person. The Lord Chancellor, acting on his behalf, may direct one of the masters in lunacy to hold an inquiry, with or without a jury. The notice is sent to the lunatic, and, if he is able, he may, in legal phrase, traverse that statement and employ counsel to defend him, the defence being that he is not a lunatic and that he is able to take care of his property. If the alleged lunatic, therefore, is able to traverse the statement, an

inquiry results in a regular trial. If the lunatic is demented and unable to instruct counsel, then the person becomes a Chancery lunatic without formal trial. If the lunatic is defended, there is a regular trial. There is a jury, counsel are usually employed on both sides; and it has not infrequently happened that the property of the lunatic which it was the object of the inquiry to keep, has all been used up by the lawyers. In one notable case this inquiry is said to have cost £15,000 a side. That was an inquiry in the case of a young man named Wyndham, who wasted his substance in riotous living, and the next-of-kin tried to stop him but failed. Sometimes when the alleged lunatic is a person of large property the length of these proceedings has been little short of scandalous. However, I hope I have made it clear what a Chancery lunatic is. He is a lunatic made so by inquisition and by the direct intervention of the Lord Chancellor. To look after these lunatics there are officials, who are called Lord Chancellor's visitors. The Lord Chancellor's visitor holds to the Chancery lunatics a position precisely analogous to that held to other classes of lunatics by the Commissioners in Lunacy.

The next form of lunatic with which one has to deal is the ordinary lunatic, not a pauper, usually designated a "private patient."

The great object of the Lunacy laws is to safeguard the liberty of the subject, and there can be no doubt that occasionally the Lunacy laws have been abused, and that a person has been certified as insane on unsatisfactory evidence, and has been put away in an Asylum. Of course when that has happened a great wrong has been done, and in order to prevent any wrong of that kind the present Lunacy Act has been passed.

In order to preserve the liberty of the subject it is now necessary that the case of every lunatic be submitted to a Judge of County Courts, Stipendiary Magistrate, or

Magistrate specially appointed by the Justices of a County at the Michaelmas Quarter Session. Each of these "Judicial Authorities" must respectively have jurisdiction in the place where the lunatic is.

In order that a person may be confined in an Asylum, a reception order has to be made by one of these legal authorities. This *order* by a legal authority is obtained by a private *petition*, accompanied by a "*statement*" and by *two* medical *certificates*. Remember that for an ordinary private lunatic five documents are wanted. I have the forms of the five here. I will just take them in order. The first is the petition. If you want a person confined in an Asylum you must get somebody to petition the judicial authority to make an order. Of course the proper person to make that petition is the nearest relative, such as the son, the father, the mother, the brother, or the uncle. Sometimes, however, the nearest relative is not accessible; and then it is somebody having legitimate relations with the lunatic. For example, I remember an instance in which one of the masters at a school, a Hungarian gentleman, went mad. We could not get at his parents or relatives, as they were in Hungary; and the headmaster of the school, therefore, signed the petition. Of course that would be quite right, the reason for this being given on the face of the petition.

Here are the forms of the petition and the accompanying statement. These two documents, be it observed, are printed on one sheet of paper.

PETITION FOR AN ORDER FOR RECEPTION OF A PRIVATE PATIENT.

IN THE MATTER OF _____

a person alleged to be of unsound mind.

(a) —— a Justice of the Peace for ——, *or* His Honour the Judge of the County Court of ——, *or* —— Stipendiary Magistrate for ——.

To [a] _____

_____

_____

The Petition of _____

(b) Full postal address and rank, profession, or occupation.

of [b] _____

in the County of _____

(c) At least twenty-one.

1. I am _____ [c] years of age.

2. I desire to obtain an Order for the Reception of _____

(d) A lunatic, *or* an idiot, *or* person of unsound mind.

_____ as [d] _____

(e) Asylum, *or* hospital, *or* house, *as the case may be.*

in the [e] _____ of _____

(f) *Insert a full description of the name and locality of the asylum, hospital, or licensed house, or the full name, address, and description of the person who is to take charge of the*

situate at [f] _____

3. I last saw the said _____

at _____

(g) Some day within 14 days before the date of the presentation of the petition.

on the (g) _____ day of _____ 190 .

(h) *Here state the connection or relationship with the patient.*

4. I am the (h) _____ of the said _____

[*or if the petitioner is not connected with or related to the patient, state as follows :*]

I am not related to or connected with the said _____

_____

The reasons why this Petition is not presented by a relation or connection are as follows :—

The circumstances under which this Petition is presented by me are as follows :—

5. I am not related to or connected with either of the persons signing the certificates which accompany this Petition as (*where the petitioner is a man*) husband, father, father-in-law, son, son-in-law, brother, brother-in-law, partner, or assistant (*or where the petitioner is a woman*), wife, mother, mother-in-law, daughter, daughter-in-law, sister, sister-in-law, partner, or assistant.

6. I undertake to visit the said _____ _____ personally or by some one specially appointed by me at least once in every six months while under care and treatment under the order to be made on this Petition.

7. A statement of particulars relating to the said _____ _____ accompanies this Petition.

If it is the fact, add: 8. The said _____

has been received in the _____ Asylum, *or* Hospital, *or* House, *as the case may be*, under an Urgency Order dated the _____

_____

The petitioner therefore prays that an order may be made in accordance with the foregoing statement.

(i) Full Christian and surname.

(Signed) (i) _____

_____

_____

Dated this _____ day of _____ 190 .

Form 2.

STATEMENT of Particulars referred to in the annexed Petition.

If any Particulars are not known, the Fact is to be so stated.

[Where the patient is in the Petition described as an idiot, omit the particulars marked *.]

The following is a Statement of Particulars relating to the said _____

Name of Patient, with Christian Name at Length .. .. .. _____

Sex and Age .. .. _____

* Married, Single, or Widowed .. .. _____

* Rank, Profession, or previous Occupation (if any) .. .. .. _____

* Religious Persuasion .. .. _____

Residence at or immediately previous to the date hereof .. .. _____

* Whether First Attack .. .. _____

Age on First Attack .. .. _____

When and where previously under Care and Treatment as a Lunatic, Idiot, or Person of Unsound Mind .. .. .. _____ _____

* Duration of existing Attack .. .. _____

Supposed Cause .. .. _____

Whether subject to Epilepsy .. .. _____

Whether Suicidal .. .. _____

Whether Dangerous to Others, and in what way .. .. .. _____

Whether any near Relative has been afflicted with Insanity .. .. _____

Names, Christian Names, and full Postal Addresses of one or more Relatives of the Patient .. .. _____ _____

Name of the Person to whom Notice of Death to be sent, and full Postal Address, if not already given .. .. .. _____ _____

Name and full Postal Address of the usual Medical Attendant of the Patient .. .. _____ _____

(Signed) (a)

Name with Christian Name at length - _____

Rank, Profession, or Occupation (if any) - _____

How related to or otherwise Connected with the Patient - - _____

(a) *When the petitioner or person signing an urgency order is not the person who signs the statement, add the following particulars concerning the person who signs the statement.*

53 Vict. c. 5, s. 31.

When neither Certificate is signed by the usual Medical Attendant.

I, the undersigned, hereby state that it is not practicable to obtain a Certificate from the usual Medical Attendant of (*a*)_____ for the following reasons, viz. :—

(*a*) Name of patient.

(*b*) To be signed by the petitioner.

(Signed) (*b*)_____

_____ 190 .

53 Vict. c. 5, s. 7 (4).

When a previous Petition has been dismissed.

I, the undersigned, hereby state that a former Petition for the reception of (*a*)_____ into (*b*)_____ was presented to_____

(*a*) Name of patient.

(*b*) Name of asylum, hospital, licensed house, or single charge.

(c) Justice of the Peace for ——, *or* Judge of County Court of ——, *or* Stipendiary Magistrate for ——.

(c)_____

in the month of_____ 190 , and dismissed.

Herewith is a copy (furnished by the Commissioners in Lunacy) of the Statement sent to them of the reasons for its dismissal.

(Signed)_____

_____ 190 .

NOTE.—This Copy is to be obtained from the Commissioners in Lunacy by the Petitioner at his own expense.

[An Order for Reception of a Private Patient is to be obtained upon a private application by Petition to a Judge of County Courts, or Stipendiary Magistrate, or Metropolitan Police Magistrate, or specially appointed Justice of the Peace. The Petition is to be presented, if possible, by the husband or wife, or by a relative (*i.e.*, a lineal ancestor or lineal descendant, or lineal descendant of an ancestor not more remote than great grandfather or great grandmother) of the Lunatic, and is to be accompanied by a Statement of Particulars and two Medical Certificates on separate sheets of paper. One of the Medical Certificates accompanying the Petition must, if practicable, be by the usual Medical Attendant of the Lunatic; if not by him the reason must be stated (see Form above). If a previous Petition has at any time been dismissed, the facts relating to its dismissal are to be stated in the fresh Petition (see Form above); and the Petitioner must obtain from the Commissioners in Lunacy a copy of the Statement sent to them of the reasons for its dismissal, and present this copy with his Petition. The Reception Order (which will not remain in force for more than seven days after its date), the Petition, the Statement of Particulars, and the Medical Certificates must be sent to the Superintendent or Proprietor of the Asylum, Hospital, or House where the patient is to be received.]

Whoever touches a lunatic in an official manner must not be connected either with him, or the Asylum keeper, either by blood, by marriage, or by ties of business. You must be quite independent of him, and your action must be free from every taint of self-interest.

The object of the "statement" which accompanies the "petition" is plain, namely, that the magistrate and the Asylum keeper, if the man be moved to an Asylum, shall be in possession of all the necessary particulars. Those are two of the five documents. These have to be accompanied by two medical certificates, and the signing of a medical certificate of lunacy is one of the most serious duties which you will ever have to perform, and therefore you must pay the greatest possible attention to it. The two certificates have to be quite independent documents. Formerly, before the law was altered, the two certificates were printed upon the same sheet of paper, and the form of proceeding was sometimes as follows:—A gentleman who was an Asylum keeper had, very likely, two professional friends living in the same street, in whom he had every confidence, and he would occasionally call upon these professional friends—I am quoting from my own experience—and say, "Do you mind going to the ——— Hotel and certifying or otherwise a lunatic who has been brought up to be under my care." These two gentlemen, perhaps, went arm in arm down the street, went to a room in an hotel or lodging-house, and then first one went in to see the alleged lunatic and then the other and examined him. They did not see the patient together: that would have been illegal. They then signed the certificates and the man was removed to the Asylum of the gentleman who called the other two in. I do not think it is at all probable that any gross or flagrant acts of injustice were done in that way, but it was quite right that that kind of thing should be stopped. Now under the new Act the certificates are quite independent, and printed on separate sheets, and if you are going to sign a certificate, do not

have any conversation about the case with the other medical man until your certificate is signed. Do not let it be said that you have put your heads together. All these points in the hands of a clever lawyer can be made to assume an ugly look. The certificate must be an independent document issuing from yourself, and the opinion given must be your own opinion. The form of the certificate is as follows:—

53 Vict. c. 5—Sched. 2, Form 8.

CERTIFICATE OF MEDICAL PRACTITIONER.

In the matter of _____

(a) *Insert residence of patient.* of (a) _____

(b) County, city, *or* borough, *as the case may be.* in the (b) _____ of _____

(c) *Insert profession or occupation, if any.* (c) _____

an alleged lunatic.

I, the undersigned _____

do hereby certify as follows :—

1. I am a person registered under the Medical Act, 1858, and I am in the actual practice of the medical profession.

2. On the _____ day of _____ 190____

(d) *Insert the place of examination, giving the name of the street, with number or name of house, or should there be no number, the Christian and surname of occupier.* at (d) _____

(e) County, city, *or* borough, *as the case may be.* in the (e) _____ of _____

(f) *Omit this where only one certificate is required.* _____ (separately from any other practitioner) (f)

I personally examined the said _____

(*g*) A lunatic, an idiot, *or* a person of unsound mind.

and came to the conclusion that he is (*g*) _____

and a proper person to be taken charge of and detained under care and treatment.

3. I formed this conclusion on the following grounds, viz. :—

(*h*) *If the same or other facts were observed previous to the time of the examination, the certifier is at liberty to subjoin them in a separate paragraph.*

(*a*) Facts indicating Insanity observed by myself at the time of examination (*h*), viz. :—

_____

_____

_____

_____

(*i*) *The names and Christian names (if known) of informants to be given, with their addresses and descriptions.*

(*b*) Facts communicated by others (*i*), viz. :—

_____

_____

_____

_____

4. The said _____

appeared to me to be [*or* not to be] in a fit condition of bodily health to be removed to an asylum, hospital, or licensed house (*k*).

(*k*) *Strike out this clause in case of a patient whose removal is not proposed.*

5. I give this certificate having first read the section of the Act of Parliament printed below.

(Signed) _____

of (*l*) _____

(*l*) *Insert full postal address.*

Dated this _____ day of _____ 190____

Extract from section 317 *of the Lunacy Act*, 1890.

Any person who makes a wilful misstatement of any material fact in any medical or other certificate, or in any statement or report of bodily or mental condition under this Act, shall be guilty of a misdemeanour.

Two Medical Certificates on separate sheets of paper are required in support of a Petition for an order for the Reception of a Private Patient. One of these Certificates should, whenever practicable, be under the hand of the usual Medical Attendant (if any) of the alleged lunatic.

Each of the Medical Practitioners who signs a Certificate must personally examine the alleged lunatic separately from the other, and not more than seven days before the presentation of the Petition.

Neither of the certifying Medical Practitioners may be the father or father-in-law, mother or mother-in-law, son or son-in-law, daughter or daughter-in-law, brother or brother-in-law, sister or sister-in-law, partner or assistant of the other of them.

One Medical Certificate is sufficient in the case of an Urgency Order. In such case the certifying Medical Practitioner must personally examine the alleged lunatic not more than two days before reception. The certificate may be signed either before or after the Order.

The following persons are disqualified from signing Certificates:—The Petitioner; the person signing the Urgency Order; the Superintendent, Proprietor, or Medical Attendant of the Asylum, Hospital, or House; any person interested in the payments on account of the Lunatic; or the husband or wife, father or father-in-law, mother or mother-in-law, son or son-in-law, daughter or daughter-in-law, brother or brother-in-law, sister or sister-in-law, partner or assistant of any of the foregoing persons.

Persons signing Medical Certificates will not be liable to any civil or criminal proceedings if they act in good faith and with reasonable care.

You will notice the certificate says "actual practice of the medical profession." The Lunacy Act does not contemplate the interference of the retired medical practitioner. After the words, "I form this conclusion on the following grounds" you have to put in the facts which enable you to come to that conclusion. These facts, occasionally, are not easy to get. You may go into a room and see a person whose demeanour and manner and mode of talking may leave upon you the impression that he is crazy. But when you go out of the room and think what you have to put on the paper which will convince the parties who have not seen this lunatic that you are right in your conclusion, the task is not always an easy one. Absurd things have sometimes been tendered as testimonies of lunacy, and when the facts have been brought out in court they have appeared ridiculous, and have been made more ridiculous by the opposing counsel. For instance, there is a case on record where it was stated that the person was alleged to be lunatic because he revoked at whist. If that is the case, many of us, I am afraid, are mad. Another evidence of lunacy given in court was that the alleged lunatic sat upon a wall to watch people coming from the Derby. Well, in former days the return from the Derby was a sight one would not miss for a good deal, even if one had to sit upon a wall to see it. Another statement was that a lady kept a cockatoo. If a person had been a whist player all his life, and especially if he had been a good whist player all his life and then began to revoke, that, I think, would be an indication of a failing brain. Memory is a very curious thing, and it is curious how the memory for acts which have become almost automatic persists. On that particular point I might mention an old lady over eighty whom I knew. She played her game of whist every night with her companions and friends. She had no memory for ordinary facts; she would tell one the same thing five times in an hour. But when play-

ing whist she never revoked, and she always knew what cards were out. I mention this to show that under peculiar circumstances the revoking at whist or something of that kind might be really a legitimate fact to draw some conclusion from. But to put it upon paper for other people to draw conclusions from, people who have not seen the patient, is not desirable. As an example of a good fact I may instance the following:—"While I was in the room he rushed to the window with the intent to throw himself out, which he would have done if he had not been restrained." Or, "He attempted to make an assault upon myself when I came to examine him." Those would be good facts. If you find a person of good education using filthy and obscene language, that would be a good fact. If you found him muscularly feeble and evidence of general paralysis, that would be a good fact. If you found evidence of a delusion as to his wealth, if he is stating that he has got ten million pounds in the bank, that would be a good fact. But sometimes it is very difficult to get good facts. I remember once going to see a lunatic who was very violent. He did not need physical restraint, but he had a keeper sitting with him. He opened up a tirade of abuse first of all directed to myself for coming into a gentleman's room when he was at luncheon, which was a great breach of good manners; and of course so it was. He told me how he had been persecuted, how his people had followed him about Paris; and so they had because he was insane. He told me what was true. His relatives had dogged him because of their fears of what would happen to him. Facts of this kind which are true are dangerous facts to put down as testimony of lunacy. He was very excitable in his demeanour, and I drew my own conclusions from his restlessness, his demeanour, and his incessant talking. I had to rely for my other information upon facts communicated to me by others. One of those facts was that he had spent

three times his annual income in the last month, and that was accepted. There was no delusion, but he was very violent and suddenly became exceedingly extravagant. He was at the beginning of acute mania. He went into an Asylum. In filling up a certificate you must be exceedingly careful to state in the second order of facts *by whom* these facts were communicated to you, and you must give the name, address, and occupation, so that the person may be identified with absolute certainty hereafter if there should be any necessity. The first lunacy certificate I ever signed, when I was house-physician at the hospital, was returned to me on those particular grounds. I described the person who communicated facts to me as "the nurse in attendance." Of course that was not enough, and I tell you of it so that you shall not do such a thing. I ought to have put the name of the nurse and her address. In filling up a lunacy certificate you must be exceedingly careful to read all the notes and make no mistakes. It is very annoying to have certificates returned, but it is very common on account of something having been omitted. Again, in examining a lunatic you should always, if it is possible, go into the physical condition as well as the mental condition. You must remember that very often delusions arise from a physical condition, and that all lunacy is want of control. Dr Guy, who wrote upon *The Factors of the Unsound Mind*, drew attention to the relationship which there appeared to be between insane delusions and dreaming. There is something in that. We know that dreams and nightmares will sometimes arise from physical conditions, which make an impression upon the senses, and these impressions may be misinterpreted in a dream. I believe it is a fact that impressions made upon any of the sensory organs of sight, hearing, touch, and so forth, are capable of determining a dream. Brillat-Savarin, the author of *La Physiologie du Goût*, alleged with regret that taste and smell, which constituted the chief joys of his life, never gave

rise to dreams, and that, as far as he knew, he had never in a dream tasted or smelt anything. Lind, on the other hand, states that patients suffering from scurvy dream of the joys of green vegetables. Sounds undoubtedly do determine dreams. It has been said, for instance, that a little flatus in the small intestine might be interpreted in a dream as a "concord of sweet sounds." We have to bear these points in mind, and that the lunatic's physical condition may give some justification for a delusion. If a woman suddenly gets a delusion that she is pregnant, you will sometimes find ovarian disease. You should be alive to this possibility, and you will do nothing but right in putting the facts of organic bodily disease in a lunacy certificate. Of the two medical certificates, "one of these should, where practicable, be under the hand of the usual medical attendant of the alleged lunatic." I think that is wise and very important, and you will always do well to inquire who the medical attendant is. It will also be prudent to communicate with him. The practitioners who sign the certificates must not be connected. There is the relationship clause to be borne in mind. One medical certificate is sufficient in the case of an urgency order. In such a case the medical practitioner must have personally examined the alleged lunatic not more than two days previously.

Having presented those four documents, the magistrate makes an order. Here is the fifth document:—

[ORDER FOR RECEPTION.

Order for Reception of a Private Patient to be made by a Justice appointed under the Lunacy Act, 1890, Judge of County Courts or Stipendiary Magistrate.

I, the undersigned _____

being (*a*) _____

upon the petition of _____

of (*b*) _____

in the Matter of _____

a Lunatic (*c*) _____ accompanied by the

Medical Certificates of _____

and _____

hereto annexed, and upon the undertaking of the said (*d*) _____

_____ to visit the said

(*a*) A Justice for ——— specially appointed under the Lunacy Act, 1890; *or* the Judge of the County Court of ———, *or* the Stipendiary Magistrate for ———.

(*b*) Address and description.

(*c*) *Or* an idiot *or* person of unsound mind.

(*d*) Name of petitioner.

personally or by some one specially appointed by the said (*d*)_____

_____ once at least in every six months while under care and treatment under this Order, hereby authorise you to receive the said _____ as a Patient into your Asylum (*e*)_____

(*e*) *Or* hospital, *or* house, *or* a single patient.

And I declare that I have [*or* have not] personally seen the said _____

_____

before making this Order.

Dated this _____ day of _____ 190 .

(*Signed*) (*a*)_____

A Justice for the above-mentioned Act [or *the Judge of the County Court of Magistrate*]. *appointed under* or *a Stipendiary*

(*f*) To be addressed to the medical superintendent of the asylum *or* hospital, *or* to the resident licensee of the house in which the patient is to be placed.

To (*f*)_____

Now, very often these cases are matters of great urgency. A lunatic is suddenly seized with acute mania, he becomes very dangerous to himself and others, and has to be confined in an Asylum instantly. Last summer I was taking my holiday, and was called to see a young man, the son of a small farmer, who had suddenly plunged into an attack of acute mania. It was clear that he must go to an Asylum. Now let me just tell you the difficulties that arose, because they were very interesting. Of course I told the practitioner what the condition of the law was, and I think if I had not told him he would not have known anything about it. Then the practitioner had not got any blank forms of certificates. But blank forms of certificates are not necessary. You might write out a certificate, and the form in which they should be written may be found in Churchill's *Medical Directory*, and in most books on Medical Jurisprudence. But it is one of those things which you should always have by you. That leads me to say that the Commissioners in Lunacy are amongst the most polite and obliging of individuals, and that if you are ever in any difficulty about the Lunacy Acts, go to the fountain-head at once and find out what you ought to do under certain circumstances. It is very disagreeable to go wrong, and if you are in doubt as to your legal position, get into the train and go to Victoria Street, tell them your difficulty, and they will put you right. When the case is urgent such a step is impossible. Here was a man going to die; he was very bad indeed. There were no blank forms. The father was ready to write the petition, and then arose the question, Where was the magistrate? Who were the magistrates in the neighbourhood who were appointed under the Act to see lunatics? Which side of a certain boundary were we? Were we in the county or in the borough? Was Mr Jones, the ex-Mayor, the proper person, or was Colonel Smith? If it was Colonel Smith, he was away yachting. The difficulties were very great. The next point was one which I could not answer. The

patient was in a lone farmhouse in Hampshire. It was comparatively easy to get the patient to an Asylum in Wiltshire, which was in another county, and it was very difficult to get him to Fareham in Hampshire, and it would be too far to drive him there. Which ought he to be removed to? To cut a long story short, the father signed an order, the doctor wrote an urgency certificate, and the man was driven to the Asylum at Salisbury and admitted there under an urgency order. Under an urgency order one medical certificate and an order by the nearest relative is enough for a stop-gap. You must then make the petition in the usual way, stating that the lunatic is already confined in an Asylum. The forms of "urgency order," "statement," and "certificate," are as follows:—

[URGENCY ORDER.

Form of Urgency Order for the Reception of a Private Patient, with Medical Certificate and Statement accompanying Urgency Order.

Forms 4, 2, 8 and 9.

I, the undersigned, being a Person Twenty-one years of age, hereby authorise you to receive as a Patient into your (*a*)_____

(*a*) House, *or* hospital, *or* asylum, *or* as a single patient.

(*b*) Name of patient. (*b*)_____

(*c*) Lunatic, *or* an idiot, *or* a person of unsound mind. as a (*c*)_____ whom I last saw at

_____

(*d*) Some day within two days before the date of the order. on the (*d*)_____ day of_____ 190 .

(*e*) Husband, wife, father, father-in-law, mother, mother-in-law, son, son-in-law, daughter, daughter-in-law, brother, brother-in-law, sister, sister-in-law, partner, *or* assistant.

I am not related to or connected with the person signing the Certificate which accompanies this Order in any of the ways mentioned in the Margin. (*e*) Subjoined [*or* annexed] hereto is a Statement of Particulars relating to the said_____

Signed

Name and Christian Name at length . . . . . } _____

Rank, Profession, or Occupation (if any) . . . . . } _____

Full Postal Address . . _____

How related to or connected with the Patient . . . } _____

[*If not the husband or wife, or a relative of the patient, the person signing to state as briefly as possible:*—1. Why the order is not signed by the husband *or* wife, *or* a relative of the patient. 2. His *or* her connection with the patient, and the circumstances under which he *or* she signs.]

Dated this _____ day of _____ 190 .

(*f*) Superintendent of —— the —— asylum,——hospital, *or* resident licensee of the —— house [describing the asylum, hospital, *or* house by situation and name].

To (*f*) _____

_____

STATEMENT OF PARTICULARS REFERRED TO IN THE ANNEXED ORDER.

If any Particulars are not known, the Fact is to be so stated.

[Where the patient is in the petition or order described as an idiot, omit the particulars marked *.]

The following is a Statement of Particulars relating to the said _____

Name of Patient, with Christian Name at length .. .. .. _____

Sex and Age .. .. _____

* Married, Single, or Widowed .. .. _____

* Rank, Profession, or previous Occupation (if any) .. .. _____

* Religious Persuasion .. .. _____

Residence at or immediately previous to the date hereof .. .. _____

* Whether First Attack .. .. _____

Age on First Attack .. .. _____

When and where previously under Care and Treatment as a Lunatic, Idiot, or Person of Unsound Mind .. .. _____

* Duration of existing Attack .. .. _____

Supposed Cause .. .. _____

Whether subject to Epilepsy .. .. _____

Whether Suicidal .. .. _____

Whether Dangerous to Others, and in what way .. .. .. _____

Whether any near Relative has been afflicted with Insanity .. _____

Names, Christian Names, and full Postal Addresses of one or more Relatives of the Patient .. .. _____ _____ _____

Name of the Person to whom Notice of Death to be sent, and full Postal Address, if not already given .. .. _____ _____

Name and full Postal Address of the usual Medical Attendant of the Patient .. .. _____ _____

(g) *When the petitioner or person signing an urgency order is not the person who signs the statement, add the following particulars concerning the person who signs the statement.*

(Signed) (g)

Name with Christian Name at length . . . . _____

Rank, Profession, or Occupation (if any) . . . . _____

How related to or otherwise Connected with the Patient _____

F 2

53 Victi. c. 5—Sched. 2, Form 8.

CERTIFICATE OF MEDICAL PRACTITIONER.

In the matter of _____

(a) *Insert residence of patient.* of (a) _____

(b) County, city, *or* borough, *as the case may be.* in the (b) _____ of _____

(c) *Insert profession or occupation (if any).* (c) _____

an alleged lunatic.

I, the undersigned _____

do hereby certify as follows :—

1. I am a person registered under the Medical Act, 1858, and I am in the actual practice of the medical profession.

2. On the _____ day of _____ 190 ____

(d) *Insert the place of examination, giving the name of the street, with number or name of house, or should there be no number, the Christian and surname of occupier.* at (d) _____

(e) County, city, *or* borough, *as the case may be.* in the (e) _____ of _____ I personally examined the said _____

(f) A lunatic, an idiot, *or* a person of unsound mind. and came to the conclusion that he is (f) _____

and a proper Person to be taken charge of and detained under care and treatment.

3. I formed this conclusion on the following grounds, viz. :—

(*g*) *If the same or other facts were observed previous to the time of the examination, the certifier is at liberty to subjoin them in a separate paragraph.*

(*a.*) Facts indicating Insanity observed by myself at the time of examination (*g*), viz. :—

(*h*) *The names and Christian names (if known) of informants to be given, with their addresses and descriptions.*

(*b.*) Facts communicated by others (*h*), viz. :

53 Vict. c. 5—Form 9.

[(*i*) STATEMENT ACCOMPANYING URGENCY ORDER.]

(*i*) *If an urgency certificate is required, it must be added here. Form No. 9.*

I certify that it is expedient for the welfare of the said _____

_____ [*or* for the public safety, *as the case may be*] that the said _____

should be forthwith placed under care and treatment.

My reasons for this conclusion are as follows :_____

_____

_____

_____

_____

_____

4. The said _____

appeared to me to be [*or* not to be] in a fit condition of bodily health to be removed to an asylum, hospital, or licensed house (*k*).

(*k*) *Strike out this clause in case of a private patient whose removal is not proposed.*

5. I give this certificate, having first read the section of the Act of Parliament printed below.

Dated this _____ day of _____

One Thousand Nine Hundred and _____

(Signed) _____

of (*l*) _____

_____

(*l*) *Insert full postal address.*

Extract from section 317 *of the Lunacy Act*, 1890.

Any person who makes a wilful misstatement of any material fact in any medical or other certificate, or in any statement or report of bodily or mental condition under this Act, shall be guilty of a misdemeanour.

You must not impose restraint upon a patient. Supposing you have the care of a person who is delirious, or fractious and unmanageable, and that you have got him as a patient in your private house, you may say, "You must not get up and you must not go out," and the nurse may say so to him. Of course if he obeys the orders, well and good. If he does not, and you lock him in his room, that is technically, I take it, an assault, and you are treating him as a lunatic without a certificate. It is done every day, and by it we save many lives, but when we do that we take the law into our own hands. There is a case which I quote from Taylor. In *Scott* v. *Wakem* (Guildford Summer Assizes, 1862), the defendant, a medical practitioner, was sued for damages in placing under restraint, and without necessity or authority, a man labouring under *delirium tremens*. The plaintiff had been subject to attacks of this disease, and on the day in question the defendant was called to see him. He found him in an excited state, with loaded pistols in his hands, threatening to shoot his wife—and two men were holding him. He was then in a fit of *delirium tremens*, and in a dangerous state. The defendant placed a man in the house to watch him during the night. The usual medical attendant of the family saw the plaintiff on the following day, and then he found him quite sane and sensible, and complaining that he had been kept a prisoner in his own house by order of the defendant. Up to that time he had not seen the plaintiff for several months, and was therefore unable to speak to his condition on the previous night, when he was placed under restraint. It was denied that any authority for interference had been given to defendant by the wife, although the evidence that she had authorised the proceedings was very strong. The plaintiff, who recovered next day, brought an action for damages. The charge of the learned judge (Bramwell, B.) in reference to the responsibility of the defendant, was to this effect:—As to the law, if the defendant had made out that the plaintiff was, at the

time of the original restraint, a *dangerous lunatic*, in such a state that it was likely *he might do mischief to any one*, he would be justified in putting a restraint upon him, not merely at the moment of the original danger, but until there was reasonable ground to believe that the danger was over; and this would sustain one of the pleas. Or, again, if the jury were satisfied that the wife of the plaintiff had called in the defendant to cure her husband under a fit of *delirium tremens*, and that he came in to cure him, and left him when he believed he had recovered, then the defendant would be justified in what he had done, supposing that in either case he had done nothing that was not necessary or reasonably proper under the circumstances. Again, if the defendant had been called in on behalf of and for the benefit of the plaintiff, and to cure him under a fit of *delirium tremens*, and when the plaintiff recovered, he himself approved what had been done, that would likewise afford a defence, supposing that nothing more than proper treatment had been adopted. A verdict with a farthing damages was returned, but the medical man was necessarily put to great expense in defending the action. He had acted *bona fide*, as medical men ought to do on these occasions, under the belief that there was some imminent danger; but the learned judge observed, if he had done wrong in imposing restraint, he would not be justified on account of the sincerity of his belief. Had he declined to interfere, and the husband had shot the wife with one of the loaded pistols, he would have been severely censured for not having acted as he did. On one point this case suggests a caution to practitioners. The wife denied that she had given any authority for interference, and thus her evidence conflicted with that of the surgeon. Fortunately the facts were adverse to her statement; but in future cases of this kind, it would be desirable for the medical man to have a written authority for such proceedings, bearing in mind that he does not exceed what is necessary, proper, or usual for the treatment of the

person; and on this he must always exercise his own judgment, irrespective of the opinions or suggestions of others.

That is a most instructive case. The medical man acted, from our point of view, quite justifiably, and very likely saved the patient's life. He was cast in a farthing damages and had to pay costs. It serves to show how strict the law is.

In signing certificates you must remember that you are sometimes called into a family quarrel. The man and his wife may have been leading a cat and dog life, and the wife thinks she can get her husband put into a lunatic asylum. That kind of thing is not at all uncommon. You have to come to your conclusion on your own judgment, and when you examine a man you must be satisfied that he is insane by something he says, or something you observe in him yourself. You must be very careful not to pay too much attention to the statements of the wife, and you will be quite right to get all the information you can as to the state of connubial bliss, or otherwise, which exists.

Sometimes you may get evidence of insanity by asking a patient to write. I must call to your recollection that there are people who are very mad but harmless, both to themselves and to others, and though they may be very eccentric you would be very wrong—and it would be dangerous to try—to certify them. Some years ago I was consulted by an eccentric gentleman of this kind—a Don Quixote, but a perfect gentleman—who dressed well, and looked like an English country gentleman. He had gone very insane indeed, and when he left my house, as my servant told me—and I verified it myself one day—he was accustomed to stand on the top step, wave his umbrella, and jump into the street. I will read to you the document he sent to me, which will show the curious condition of his mind. It is full of erasures, and he had the idea that his experiences in life had been of a very interesting kind.

"An effort to awaken to grandee at Rome, was where Viscount Stratford de Redcliffe rode on horseback. I therefore called upon him. Sir Moses Montefiore was on the staircase, to whom I gave precedence, as Lord Stratford was engaged in the important duty of endeavouring to reclaim the Jew Mortara, who had been converted to Christianity, against which Lord S. was indignant with the Pope, and to whose remonstrances Cardinal Antonelli only replied that His Lordship was 'a very gentlemanlike man.' Lord St. received me and my dog, the most beautiful creature ever seen, whom he introduced to his daughters, leaving me in the drawing-room.

"I said, 'My object is to communicate to you some very important documents about Mahomet.' His answer was '*Damn Mahomet.*' I was much disappointed, as I had a great deal more to say. But how could I advance on further sacred subjects? It was too tender ground. Had I said, 'The Eunuchs will rejoice,' he might have said, 'Damn the Eunuchs.' If I had replied: 'That is hard upon the Harems.' he might have said, '*Damn the Harems.*' I could not venture to moot a subject so novel to both sexes. Thus the mighty one lost the opportunity of knowing all about the night journey of the Prophet from Mecca to Jerusalem, and the singular science whereby his coffin is suspended in the air."

Now, I should not have thought of certifying that man. I had reason to know that he could take uncommon good care of himself and of his property. He was perfectly gentlemanly in his demeanour, and his own family looked after him sufficiently well.

We have been dealing with two classes of lunatics recognised by law, viz., Chancery lunatics, so found by inquisition, and ordinary private lunatics. And now we come to the pauper lunatic. The Relieving Officer has power, if knowledge comes to him of a lunatic in his parish, to make sworn information before a magistrate and the magistrate has power to write the reception order for such lunatic to be received in an asylum.

Somebody, perhaps a policeman, goes to the Relieving Officer and says, "There is a lunatic in such and such a house." The Relieving Officer informs himself of the circumstances, makes sworn information to the magistrate, the magistrate orders a medical man of his own selection to visit him and write a certificate if

necessary, and then the person is taken to an asylum. And although every order at the present day for admission has to be signed by a magistrate, the magistrate is not bound personally to visit the lunatic. If he is quite satisfied—if he is living in the district he may have common knowledge of the facts—he is not bound to visit the lunatic himself. But *he may* do so, and every lunatic, who has not been seen by a magistrate, must, when he is committed to an asylum, have a document handed to him, which makes the sixth document in relation to the lunatic, worded as follows:—

NOTICE OF RIGHT TO PERSONAL INTERVIEW.

Take Notice that you have the right, if you desire it, to be taken before or visited by a Justice, Judge of County Courts, or Magistrate. If you desire to exercise such right, you must give me notice thereof by signing the enclosed Form (*a*) on or before the day of

(*a*) Form 7—Notice of desire to have a personal interview.

Dated this day of 190 .

(*Signed*)

*

* Superintendent of the —— Asylum *or* Hospital, *or* Resident Licensee of —— (*or as the case may be*).

NOTE.—This Notice to be given to the Patient within 24 Hours after Reception, unless Certificate in Form 5 has been signed and sent to the Commissioners.

So that supposing the lunatic is a sane man, that he is the victim of a conspiracy—and the lunacy laws are to prevent such a thing—that document informs him of his legal right. The taking of insane persons before a magistrate is an application of the Habeas Corpus Act to the sick.

Chancery lunatics may be, and often are, taken care of by their friends. When a man is found lunatic by Commission, there are two people appointed to take care of him and his property; one is called the committee of the person, and the other the committee of the estate. Supposing a Chancery lunatic is a person of high position or great property, it is very common for him to be taken care of in his own house, and the committee of the person sees that a proper staff of nurses, keepers, doctors, and so forth, is provided for him. Or the committee of the person may place him in a private asylum. In addition to the committee of the person there is the committee of the estate, who acts as a trustee during the lunatic's confinement so long as his disability lasts and his civil rights are in abeyance. A lunatic, of course, loses his civil rights; and his signature is no good to a document. If an inmate of a workhouse goes mad the medical officer of the workhouse is bound to give notice to the Relieving Officer and see that the patient is moved to an asylum, but a pauper lunatic, under conditions which I need not specify, may be retained in a workhouse.

Now we come to something still more important, to some of you, perhaps, and that is what is known as the "single patient." By the Lunacy Act of 1890 it was enacted that no more private asylums should be permitted. There was a prejudice against private asylums when this act was passed. Like other forms of hotel, some are well managed, some are badly managed. There are to be no more of them. But the law provides for single patients, and it is not at all uncommon for a medical

man to take a single patient into his house as a lunatic. If you take a patient into your house, he is an ordinary patient until you turn the key upon him. Directly you imprison that man by turning the key upon him, you must see that he is properly certified as a lunatic. There have been a great many actions, and some convictions because medical men have kept in their houses single patients who have not been properly certified. And if you keep more than one patient of that kind, of course the Lunacy Commissioners will be looking after you very sharply. Now if you keep a certified single patient in your house, that single patient has to be visited at intervals, say once a fortnight, by a medical man other than the one who keeps the house. It is very important to remember that, and the medical man who visits the patient must have no part in the profits of the house, he must have no connection by blood, or business, or matrimony, or anything else with the person who keeps the private house. The medical man who visits the single patient must be perfectly independent. It is very important to remember this.

Now, every lunatic in the country is visited by the commissioners. The paid commissioners in lunacy are six in number. Three are medical men, and three are barristers of a certain standing. And they usually work in couples and go about visiting the lunatics throughout the country. If you have charge of a patient, either in an asylum or in your private house as a single patient, you must be ready to receive unexpected visits from the commissioners, or from a commissioner, who will satisfy himself that all is going right. If you take a single patient into your house you have to remember that the eye of the law is upon you, and you have to be very circumspect in your conduct in every way. But I have said that the commissioners are most accessible, and are always glad to give you any information you may want. People who are not in the habit of going to public offices

do not know how accessible the public servants are. It is right that if we want information we should be able to go to the fountain-head for it.

So much as to the different kinds of lunatics. As Professor of Medical Jurisprudence I take the lunatic to the asylum door and leave him there. I do not propose to follow him inside the asylum walls; that would take us too far. I will simply say that when he is inside the asylum walls he is controlled according to law. The Act of Parliament has many clauses dealing with the treatment of lunatics in asylums, and if you should become connected with lunacy in a special way, you will have to be acquainted with a great deal more law than I have troubled you with. I have given you in these lectures the mere outline.

CHAPTER XXXIV

THE PLEA OF INSANITY IN COURTS OF LAW

The Plea of Insanity in Criminal Cases.—Historical from 1723—The Consciousness of Right and Wrong—*Regina* v. *Sweetland*—Intoxication no Excuse—Temperance Legislation.

The Plea of Insanity for Divorce or Nullity of Marriage.—Heredity—The Neurotic Subject—A Case of Nullity Sought.

Testamentary Capacity.—Case of *Boughton* v. *Knight*—The reasonableness of a Will—Aphasia and Will-making—Dr Edmunds's Case.

Affective Insanity.—James I.—Dr Johnson—Unnatural Sexual Acts—Shakespeare.

NOW I come to the third part of this discourse upon lunacy. That is the *plea* of insanity in certain cases. A medical man may be called upon to say whether a certain individual shall be confined in an asylum. We have been dealing with that. You may be called upon to say whether he should be liberated from an asylum. The friends of the lunatics have a right to go to the commissioners and ask that he may be visited by a medical man of their own selection. Permission is given for this.

It is sometimes sought to decide whether a criminal act arose from insanity; whether a will made by an individual shall be set aside on the ground of insanity; and whether a marriage contract or a debt may be annulled on the ground of insanity. Perhaps I may deal with these matters in the order of their importance.

The plea of insanity in criminal cases is generally made in cases of murder. We have to determine the degree of insanity which shall excuse a man for such an act. The law has undergone many changes in this respect, and what I am going to say as to the legal test of insanity in criminal cases is taken from Dr Guy's *Factors of the Unsound Mind.* Guy has set forth in that work the rulings of the judges on those very important points. He begins in the year 1723. At the trial of Arnold for shooting Lord Onslow, Judge Tracey said it was "not sufficient to prove a *frantic humour* or *something unaccountable in man's actions; he must be a man totally deprived of his understanding and memory, not knowing what he is doing more than an infant, than a brute, than a wild beast.*"

That was the degree of insanity which was deemed by the judges in 1723 as necessary to excuse a man from a criminal act; that is to say he had to be a raving lunatic. Of course it was very soon found that there were many people who did not rave; who were not like wild beasts, but who were yet not accountable for their actions. The next notable case was the trial of Hadfield for shooting at George III. in Drury Lane Theatre.

Erskine, the celebrated counsel, urged that madness as defined by Tracey did not exist except in imbeciles, but that such persons "not only had the most perfect knowledge and recollection of all the relations they stood in towards others, and of the acts and circumstances of their lives, but have in general been remarkable for subtlety and acuteness. Defects in their reasoning have seldom been traceable—the disease consisting in the delusive sources of thought; all their deductions within the scope of their malady being formed on the *immovable* assumption of matters as *realities* without any foundation whatever, or so distorted and disfigured by fancy, as to be nearly the same thing as their creation." Erskine having thus instituted *delusion* as a test of insanity, went on to urge that

the act, in order to escape punishment, must be proved to have been actually *bred of the delusion.*

Thus the idea was put forward that if a man was found to have a fixed delusion, and that the criminal act arose out of that delusion, he should not be held liable for it. At the trial of Bellingham for killing Mr Percival all this was forgotten, and notwithstanding that it was proved that Bellingham's act was the outcome of a delusion, he was condemned and executed, "and the body was on the dissecting-room table within eight days of the commission of the offence." This was due to Lord Mansfield, who said that, "If such a person were capable *in other respects* of distinguishing right from wrong, there was no excuse for any act of atrocity which he might commit under this description of derangement." Therefore the judge did not admit the excuse of delusion in the case of Bellingham, and the reasonable attitude of the law seems to have fallen back. In 1843 came the trial of Macnaughten, who shot Mr Drummond, at which the plea of insanity was brought forward. This case excited so much attention that it was referred by Parliament to the consideration of the judges, and accordingly all of them met in committee, to consider what degree of insanity would excuse a man for a criminal act. These judges laid down, amongst other things, "that delusion was not necessarily a valid excuse for crime even though the two were immediately connected." That is a little hard, I think. They decided as follows, and this decision of the judges has been acted upon ever since:—"Before a plea of insanity should be allowed undoubted evidence ought to be adduced that the accused was of diseased mind, and that at the time he committed the act he was not conscious of right and wrong." You see there we make a sudden plunge into metaphysics, and it is so deep that I should be drowned if I attempted to follow. The judge of whether a man knew right from wrong is, happily, the jury. You there get the common sense of twelve common men

brought to bear, and I do not think there are many miscarriages of justice. It is interesting to know that the Psychological Society—I mean the Society consisting of alienists — referred this judgment to a committee, and these alienists, so lately as a few years ago, were of opinion that although that dictum of the judges was not altogether satisfactory, they were unable to suggest any alteration. That is very interesting. And that is how the law stands now: that if a man was unable at the time of the act to distinguish right from wrong, and had a diseased mind, his action is excused.

At the trial of Sir A. G. Kinlock for the murder of his brother, at Edinburgh, in 1795, a medical witness was asked by the judge "whether his patient was, previous to the act, in such a situation as not to distinguish moral good from evil, and not to know that murder was a crime."

A. "I cannot say. I do not know what he could distinguish."

Q. "Is it your opinion?"

A. "I considered him mad."

Q. (By counsel) "Was he mad in such a degree as not to be able to distinguish good from evil?"

A. "I cannot answer the questions in any other way than that I thought him perfectly mad."

Q. (By counsel) "If you were carried from this room to Bedlam, and there shown a lunatic in his cell; if this lunatic on being asked, 'if murder is a crime,' should answer, 'yes,' would you, on the faith of that answer, think it safe to put yourself in his power, or venture within his reach?"

A. "I would not."

I have simply given you the record of these to indicate the change of opinion. Dr Guy, to show how opinions have altered, gives the case of John Barclay. Barclay was executed at Glasgow in 1833 for the murder of Samuel Neilson. He had shown some affection for Neilson, but killed him for the sake of getting three £1 notes. The

evidence went to show that he had been known in the parish as "daft Jock Barclay." He *thought a watch was alive*, and the only regret he expressed for his victim was that "*he should never hear him fiddle again.*" Though Barclay's weakness of mind was recognised by the judge, and the jury recommended him to mercy, he was condemned and executed. Much stress was laid on the fact of Barclay "knowing right from wrong."

Here is another case which I think is worth reading to you, namely, "*The Queen* versus *Sweetland.*"

Reg. v. *Sweetland*, C.C.C., July 1880. Before Sir H. Hawkins.—Sweetland, a master baker, aged 33, killed his opposite neighbour Buckler, a cheesemonger, by shooting him with a fowling-piece and No. 2 shot, on the morning of May 22. He fired at the deceased from his own shop door, and fired 4 barrels from 2 guns, the first 2 failing to take effect. The prisoner was of intemperate habits, and on the morning of the murder, between 6 and 8, when the shots were fired, he consumed nearly a pint of gin (17½ oz.). The shots were fired from the parlour door at the back of the shop, and over his wife's head.

The prisoner was a sporting racing man and of intemperate habits. In April, and again in October 1879, he was injured in the head and was of an irritable temper. He had lost £300 in a Flour Speculation. He was a good pigeon shot.

Deceased and prisoner were on good terms, but deceased seems to have offended the prisoner by putting up his shutters for him on an occasion when he was too drunk to do it himself. The prisoner was distinctly under the delusion that the deceased was in the habit of watching him for the purpose of injuring him. He used to hang things before his window to prevent deceased seeing through, and when he fired the shots he stated that he was under the impression that deceased was going to stab him with a knife. In the prisoner's pocket were 2 bags of flour, which he stated he intended to throw at deceased for the purpose of aggravating him. After his committal the prisoner was calm, and had not the manner of a drunken or an insane man. No motive for the murder was brought forward in evidence. Prisoner was convicted of wilful murder, Sir H. Hawkins stating the law to be as follows: 1. That a state of intoxication was no excuse. 2. For the defence of insanity the prisoner must either not be aware of the nature of the act (a state of idiocy or dementia), or not know that it was a wrong act (*e.g.*, if there were a delusion that the

man was going to kill and he shot him in self-defence). 3. A delusion which would excuse a man from the consequences of his crime must be a delusion connected with the act.

You will notice that Sir H. Hawkins said that drunkenness is no excuse, and in that I entirely agree with him. In "temperance" legislation that is the first step we have to take; to give up making a sober man walk in fetters, but to take care that the drunkard is adequately punished. It is because a drunkard's condition is regarded as an excuse for doing disgraceful things that we make so little advance in this matter. To legislate against natural appetites is ridiculous. The case I have just read you is a very interesting one, and it is a borderland case. He was a drunkard and was undoubtedly on the verge of chronic mania, and he had degeneration of his cortex cerebri; and it is sometimes exceedingly difficult to judge between chronic degeneration of the brain and some of the cases of *delirium tremens*. In *delirium tremens* the idea of being watched is very common, and the patient with *delirium tremens* "doth fear each bush an officer." When I was dealing with syphilitic insanity and general paralysis of the insane I pointed out the relationship of the vessels of the brain to intellectual action. I reminded you that anything which interferes with the due nutrition of the cortex cerebri—such as atheromatous arteries caused by drink or old age—will produce a mental condition sometimes indistinguishable from the condition of general paralysis. So we look upon senile dementia, in which the faculties begin to fail, and in which there are often delusions and so forth, as due to the thrombosis or partial blocking of the small vessels of the cortex cerebri. We must look upon senile dementia as one of the legitimate penalties of living too long, and it can hardly be regarded as insanity. The person with senile dementia often gets beyond control, has ungovernable outbursts of temper, and does absurd things.

The plea of insanity for divorce or nullity of marriage

is an important matter. Insanity, as you all know, is very often hereditary, and it does seem a very important thing to check the marriage of people who are insane. But in order that insanity shall be a plea for divorce or nullity, the law lays it down as a rule that the insanity must have existed prior to the marriage. There was a notable case in a noble family some few years ago. The holder of the title married a young lady who, if not mad, was on the borderland of insanity. It was proved, for instance, that although the girl was declared to be going to make what was called a brilliant match, it was from her point of view a *mariage de convenance.* It was proved that the young woman did not care for the bridegroom ; it was proved that as the marriage day approached and the excitement of this great crisis in the life of the girl increased, her affections cooled, and that she could hardly be brought to put on her marriage gown and face the ceremony. But on the whole the evidence was inadequate, and although she was declared insane after marriage and had to be put under care, it was decided she was not insane at the time of her marriage, and the marriage stands, and of course the owner of the title is debarred from marrying anybody else, or having a legitimate successor of his own procreation. That is a serious condition of things. But the law recognises, and quite rightly, that the marriage contract is, as the words used by the Church of England say, "for richer, for poorer, for better, for worse, in sickness and in health, till death us do part." As I sometimes tell ladies who nag at their semi-insane husbands, "You have taken him for better or worse, and you have to put up with him, and if you worry him he will be worse than he is now." If there is deception about the mental state before marriage, of course that might constitute a cause for separation. Marriage is one of those crises involving both mental and physical exhaustion, which may start a neurotic on

his or her downward path. When this trial to which I have alluded was before the public, it was shown that the girl was of the neurotic class with which doctors are very well acquainted. Dr Savage, who reports the case, says that during this trial, which lasted a long time, he heard one lawyer, after the evidence had been given as to the mental state, say to another, "I dreamt about this case last night, and I dreamt that the decree of nullity was granted, not in consequence of the insanity of the defendant, but in consequence of the insanity of the applicant in marrying her." That puts the matter rather well. The law is very unwilling to set aside a marriage contract. One must admit that the very foundation of society rests on the family and the sacredness of the family, and I think the difficulties put in the way of nullity are quite proper.

We now come to another matter, and that is the *testamentary capacity* of people, that is to say as to what degree of insanity debars a man from making a will. Putting it very shortly, I should say that no degree of insanity debars a man from making a will. There are cases of wills being made in Asylums during a lucid interval. Before a will is set aside, the reasonableness of it is the chief thing to take into account. If the will is fairly reasonable it will undoubtedly be allowed to stand. You often find wills disputed on the ground that the person was insane when he made the will, and that there was undue influence used by interested parties to get the will made in a particular way. One interesting case of a will being set aside was the case of *Boughton* v. *Knight*. The testator in this case was a gentleman of large property. He was wayward and eccentric, and there was evidence to show that he had been very harsh and impulsive with his sons and daughters. He wanted his wishes, even in small things, to be absolutely complied with. The result was that he scratched his family almost completely out of his

will, and left the bulk of his property to a person who was very distantly related indeed to him, but whose estates happened to join his own. And then it was brought to light by the evidence that after the gardener had "bedded out," the testator wilfully had a pack of hounds into the garden, and hunted over the newly bedded garden, not after a fox but simply for the mischief of the thing. He was very fond of having a barrel organ on his lawn, and it was shown that he was very arbitrary, that he was sometimes cruel, a man of ungovernable passion, that his language was not always fit to be recorded. The result was that the will was set aside. The will was grossly unjust. It was proved that the family had behaved properly. It was not as if a son behaved disgracefully and had not shown himself worthy of inheriting. A jury will always look at the reasonableness of a will. A man with acute mania, who was raving mad, could not be got to make a will.

There is another point, and that is the relationship of *aphasia* to a will. In some cases of aphasia we may assume that it is purely motor, and that the intellect may be sound, while the power of writing or of expressing thoughts in words may be defective. It is a nice point as to how far the aphasic person can make a will. There again the jury would be guided more by looking at the will than by the aphasia. If the will was an unreasonable will it would be set aside. When a person has lost the use of speech it is hazardous to argue that because he nods and shakes his head in an intelligent manner in reply to leading questions, that he is all right intellectually. You cannot cross-examine these patients. A very interesting case was lately recorded in the medical papers by Dr Edmunds. It was that of a lady, a personal friend, who was suddenly stricken with motor aphasia and apparently nothing else. She did all the work of her life, but she was absolutely aphasic. Dr Edmunds and the lawyer to the lady consulted together, and said in effect, "It is a

great pity she should not make a will; she has got relatives, and you and I know about it. Cannot we manage it?" They managed it in a very ingenious way. They got a pack of plain cards, and upon one set of cards they wrote the different items of her property—of which, of course, the lawyer had intimate knowledge—and on the other set of cards the names of her immediate relatives. The lawyer took a card and said, for example, "This represents such and such a house, who shall have that?" Then the testatrix took a card with perhaps "John" upon it, and this was fixed to the card which represented the property. Of course another card with John upon it was then provided among the name cards, so that he might have a chance of inheriting other items of property. In that way the whole of her property was bequeathed, and the probate court allowed it. But be careful how you try to repeat this experiment. Of course this will would not have stood if there had been any self-interest, if any of the doctor's or lawyer's relatives had benefited under it. It was necessary to get the lady to dispose of her property, and they managed it by the artifice described.

There is one other thing I want to say, and to which I have previously alluded. In dealing with insanity we are concerned mainly with intellectual insanity. But all writers seem agreed that there is such a thing as insanity of feeling, otherwise *affective insanity*. The causes of our affections for this person or for that are often not arguable. You can understand a man being fond of his relatives; but taking the affection of a particular man for a particular woman, it is not arguable; it is not because they have both got light hair or both have got blue eyes; it is something we do not know; it is a natural affection. And if there are natural affections, are there unnatural affections, and is it possible that a man may be affected by his surroundings in an insane way? I saw only yesterday a strong man who had fainted because some one had talked of and described a surgical operation. We

know that in October, at the beginning of the medical session, one or two gentlemen faint at the sight of blood. I will not say that is affective insanity; but it is an affective eccentricity. It is said that James I. could not bear the sight of a drawn sword; that Dr Johnson was not happy unless when he walked down Fleet Street he trod upon every division of the pavement, and counted the handrails as he went by them. That is a form of affective insanity, and there are people having affective insanity who have very high intellectual powers. This whole doctrine of affective insanity, I think, comes into play in relation to unnatural sexual acts; and I think the kindest and most efficient way of looking at such sexual acts is that they are forms of affective insanity. At assizes these things come up again and again. Insanity of feeling is a thing which has been talked of comparatively recently, but in the year 1602, Shakespeare summed up the whole thing and reduced it to a nutshell and showed his wonderful powers as a psychologist (see p. 322). There is affective insanity. Affective insanity is interesting, but undoubtedly it would be dangerous to recognise it too readily as an excuse for crime. But although it may not be advisable to recognise it too readily, that it is a fact, I think no reasonable man can doubt.

APPENDICES

IT has been thought advisable to supplement the text by a series of Appendices in which certain facts, necessary for the medical jurist, are stated with conciseness and in a form convenient for ready reference.

For some of the facts given in these Appendices the author desires to express his indebtedness to Churchill's *Medical Directory*, to Dr Murrell's work on *Poisoning*, to Dr Kenwood, of the Public Health Laboratory, University College, and especially to Dr Garson, the Adviser on Identification to the Home Office, who has kindly furnished full data for the notes of the methods pursued in the identification of habitual criminals.

ATTESTATION CLAUSE OF A WILL

Signed *by the testator [or testatrix, as the case may be] in the presence of us both present at the same time who at his request in his presence and in the presence of each other have hereunto set our names as Witnesess.*

THOMAS SMITH,
[*Signature of Testator.*]

JOHN JONES, of 200 Gower Street, London, Stockbroker.
HENRY ROBINSON, of 300 Harley Street, London, W., Doctor of Medicine.

Note.—The attestation clause should be written opposite to or under testator's signature.

The witnesses should be fully described.

If the testator should be too ill to sign, even by a mark, another person may sign the testator's name to the will for him in his presence and by his direction, and in this case it should be shown the testator knew the contents of the document. The attestation clause should in that case be worded : —

Signed by HENRY ROBINSON by the direction and in the presence of the testator THOMAS SMITH in the joint presence of us who thereupon signed our names in his presence and the presence of each other the will having been first read over to the testator who appeared fully to understand the same.

Should the testator be blind, the will should be read aloud to him in the presence of the witnesses, and the fact mentioned in the attestation clause.

If by inadvertence the testator should have signed his will without the witnesses being present, then the attestation clause should be :—

The testator acknowledged his signature already made as his signature to his last will and testament in the joint presence of, etc. [as above].

APPENDIX B.—LEGAL RELATIONS OF THE MEDICAL PROFESSION.

Medical Referees under the Workmen's Compensation Act, 1897.

These are appointed by the Home Secretary, and must be "men of independent position and high standing in their profession." Preference is given to those holding important hospital appointments, or with other special experience of accidents. Special regard is also paid to the fact that their duties are of a surgical character. They act as advisers in medical matters of the Committees, Arbitrators, and County Court Judges empowered to decide in proceedings under the Act, and the appointments are made according to the County Court Circuits. The fees approved by the Treasury are 2 guineas for a first reference, with examination and written report, 1 guinea for a further written statement or a second or subsequent reference, and 3 guineas for attendance at the proceedings.

The Inebriates Acts.

By virtue of these Acts, a Borough Council, or County Council, or a Committee thereof appointed for the purpose, may grant a licence for any period not exceeding two years to any person, or to two or more persons jointly, to keep a retreat for habitual drunkards. One of the licensees must reside on the premises and be responsible for its management, and a duly qualified medical man must be employed as attendant, unless the licensee is himself on the medical register. A deputy may be appointed for not more than six weeks in any year. No such licence can be granted to any person licensed to keep a lunatic asylum. Power is given to transfer the licence, and to remove the drunkards from a retreat which becomes unfit for their habitation. An habitual drunkard who wishes to be admitted into a retreat must apply in writing to the licensee, and state the time during which he undertakes to remain. The application must be accompanied by the statutory declaration of two persons that the applicant is an habitual drunkard, and his signature must be attested by any Justice, who must state that he understood the effect of his application, which must have been explained to him. The applicant may then be detained for the whole of the specified term, which must not exceed two years. The licensee must within two clear days, after

the reception of an applicant, send a copy of his application to the clerk to the local authority, and to the Secretary of State. A Justice may discharge a drunkard from a retreat on the written application of the licensee. The term may be extended or re-admission obtained without a fresh statutory declaration.

An inspector and assistant-inspector of retreats are appointed by the Secretary of State, and they must inspect every retreat at least twice a year, and make an annual return to the Secretary of State, who may discharge a drunkard at any time in his own discretion, or on a report from the inspector. Any Judge of the High Court, or a County Court Judge in his district, may make an order to visit and examine any person detained in a retreat, and on receiving a report as to such person may order his discharge. A Justice may, by order, at the request of a licensee, permit a drunkard to reside out of the retreat for not more than two months, with a person named in the order, and such absence is to be reckoned in the period of detention. A drunkard may forfeit his leave of absence by escaping or refusing to be restrained from drinking, and the permit may be revoked by the Secretary of State or by the authority who granted it. On the death of a patient absent under licence a statement as to the cause of death must be drawn up and signed by a medical man, certified by the person who had the care of the patient, and forwarded to the Coroner, the Registrar of Deaths, the Clerk to the local authority, and the person by whom the last payment was made, or one at least of the persons who signed the declaration. The time of absence on an escape will not reckon as part of the period of detention. The penalty for an offence against the Act is a fine not exceeding £20, or imprisonment for a term not exceeding three months. It is an offence against the Act for a licensee not to comply with its provisions, or to neglect a drunkard in his retreat, or for any person to ill-treat or neglect such a drunkard, or to help him to escape or to bring into the retreat, or give to a drunkard, any intoxicating drink or sedative or stimulant drug, without the authority of the licensee or medical attendant. A drunkard who does not conform to the rules of a retreat may be fined £5, or imprisoned for seven days, and a drunkard who escapes may be apprehended on a warrant. On the death of a drunkard in a retreat, a statement of the cause of death, with the names of those present at the death, must be drawn up by the medical attendant, and sent by the licensee to the Coroner, the Registrar of Deaths, the Clerk to the local authority, and to the person who made the last payment for the drunkard. There is an appeal from a conviction under the Act. Actions against any person for anything done or intended to be done under the Acts must be brought within two years, and a month's notice of action must be

given. The application for a licence must be accompanied by a plan, on a scale of not less than one-eighth of an inch to a foot, of the proposed retreat, and a description of the dimensions of every room, of the arrangements for separation of sexes, of the land available for exercise, and of the applicant's interest in the house. The application must be made not less than ten days before the meeting at which it is to be considered. A fee of 10s. is to be paid for the licence, which must bear a stamp of £5, and 10s. for every patient above ten intended to be admitted. Each renewal must bear a similar stamp. The Secretary for State may make regulations as to inspection of retreats, as to procedure, as to the medical and other curative treatment of patients, and generally to carry the Act into effect.

Criminal Inebriates.

Inebriate reformatories may be established by the Secretary of State subject to his regulations. He may also grant certificates to the Council of a County, or Borough, or to private individuals for establishment of the same, subject to such regulations and to the imposition of a fine or imprisonment for the breach thereof. Inspectors of certified reformatories may be appointed. The police authorities defray the expenses of conveying a person to a certified reformatory. The officers of certified reformatories have all the powers, protections, and privileges of a constable whilst engaged in their duties. A person ordered to be detained who escapes may be apprehended without a warrant and brought back. Persons convicted of crimes and found by a jury to be habitual drunkards, or who admit that they are, may, if the Court consider that drunkenness contributed to the offence, be ordered to be detained in one of these reformatories for a term not exceeding three years. The same rule applies in the case of habitual drunkards convicted of drunkenness four times within the year. Where an habitual drunkard is so detained, the expenses may be recovered against his estate through the County Court, where he is possessed of property more than sufficient to maintain his family, if any.

Notification of Diseases.

Every medical practitioner attending on or called in to visit a patient in any building, except an infectious hospital, or in any vessel, tent, or shed, must forthwith, on becoming aware that such patient is suffering from an infectious disease, send to the medical officer of health for the district a certificate stating the name of the patient, the situation of the building, and the infectious disease, and is liable to a penalty of 40s. in case of default. The local authority

supply forms of certificate gratuitously, and pay to every practitioner, for each certificate duly sent, a fee of 2s. 6d. if the case occurs in his private practice, and 1s. if in his practice as medical officer of any public body or institution. Where there are two or more medical officers of health, the certificate must be sent to the one in whose area the patient is. The term "infectious disease" includes small-pox, cholera, diphtheria, membranous croup, erysipelas, scarlatina, scarlet fever, typhus, typhoid, enteric, relapsing, continued, or puerperal fever; but the local authority may extend the definition temporarily or permanently. The certificate may be left or sent by post. The payment for these certificates does not disqualify the recipient for service as member of a council or sanitary authority, or as a guardian, or in any municipal or parochial office. A medical officer of health attending a private patient is entitled to the fee.

Form of Certificate.

" district (of local authority). To the Medical Officer of Health. I hereby certify and declare, that in my opinion, A. B., an inmate of (house, street, and parish) is suffering from

" Dated this day of .

(Signed) "C. D., Medical Practitioner."

LEAD, PHOSPHORUS, ARSENIC, ANTHRAX.

A medical man attending on, or called in to visit, a patient whom he believes to be suffering from lead, phosphorus, or arsenical poisoning, or anthrax, contracted in any factory or workshop must—unless written notice has already been sent to the Inspector and Certifying Surgeon for the district—forthwith send to the Chief Inspector of Factories at the Home Office a notice stating the name, full postal address of the patient, and the disease from which, in his opinion, the patient is suffering. For every such notice he will be entitled to a fee of 2s. 6d., and if he fails to send the same forthwith, a fine not exceeding 40s. may be imposed upon him.

APPENDIX C.—DEATH CERTIFICATES.

MEDICAL CERTIFICATE OF THE CAUSE OF DEATH.

By Section 20 of the Births and Deaths Registration Act, 1874 (37 and 38 Vict., c. 88), it is enacted that :—

"In case of the death of any person who has been attended during his last illness by a registered medical practitioner, that practitioner shall sign and give to some person required by this Act to give information concerning the death a certificate stating to the best of his knowledge and belief the cause of death, and such person shall upon giving information concerning the death, or giving notice of the death, deliver that certificate to the registrar, and the cause of death as stated in that certificate shall be entered in the register together with the name of the certifying medical practitioner ;"

"Where an inquest is held on the body of any deceased person a medical certificate of the cause of death need not be given to the registrar, but the certificate of the finding of the jury, furnished by the coroner, shall be sufficient ;"

"If any person to whom a medical certificate is given by a registered medical practitioner in pursuance of this section fails to deliver that certificate to the registrar, he shall be liable to a penalty not exceeding forty shillings."

And under Section 39 of the same Act, *every person who refuses or fails without reasonable excuse to give or send any Certificate in accordance with the provisions of the Act is liable to a penalty not exceeding Forty Shillings.*

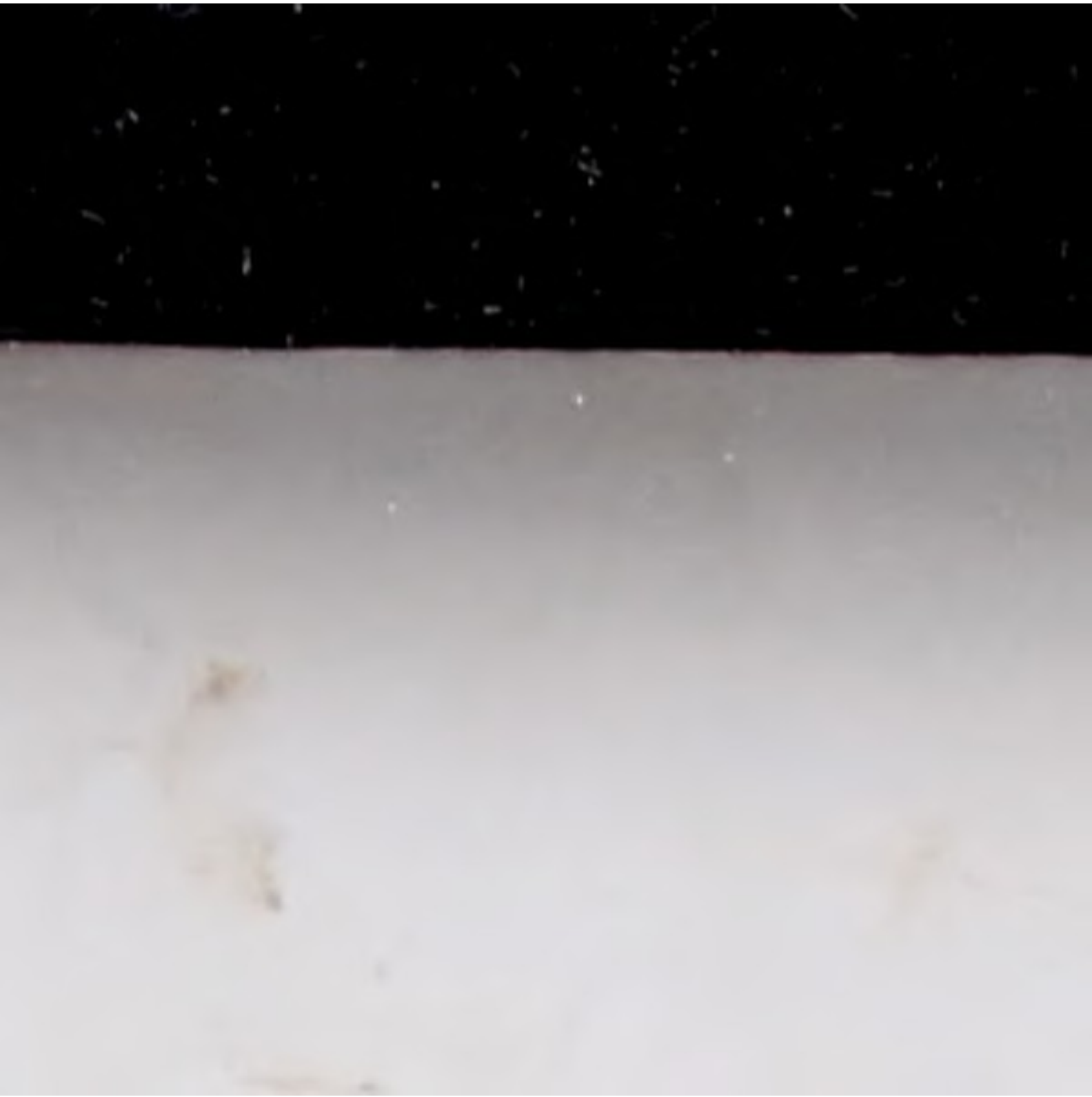
It will be observed that in every case in which a Registered Medical Practitioner has been in attendance *during the last illness* of the Deceased, such Practitioner is required to give a Certificate of the cause of Death. The Certificate must be *under the hand* of such Practitioner ; and no other person is authorised by law to sign the Certificate in his behalf.

It is requested that the persons to whom the Medical Certificates are given may be informed that they are to be delivered *TO THE REGISTRAR* when the Death is registered, *AND TO NO OTHER PERSON.* These Certificates, from which the Causes of Death and their Durations, together with the Name of the Certifying Practitioner, are copied *verbatim* into the Death Register, are used for no other purpose, and are preserved as official documents by the local Registrars.

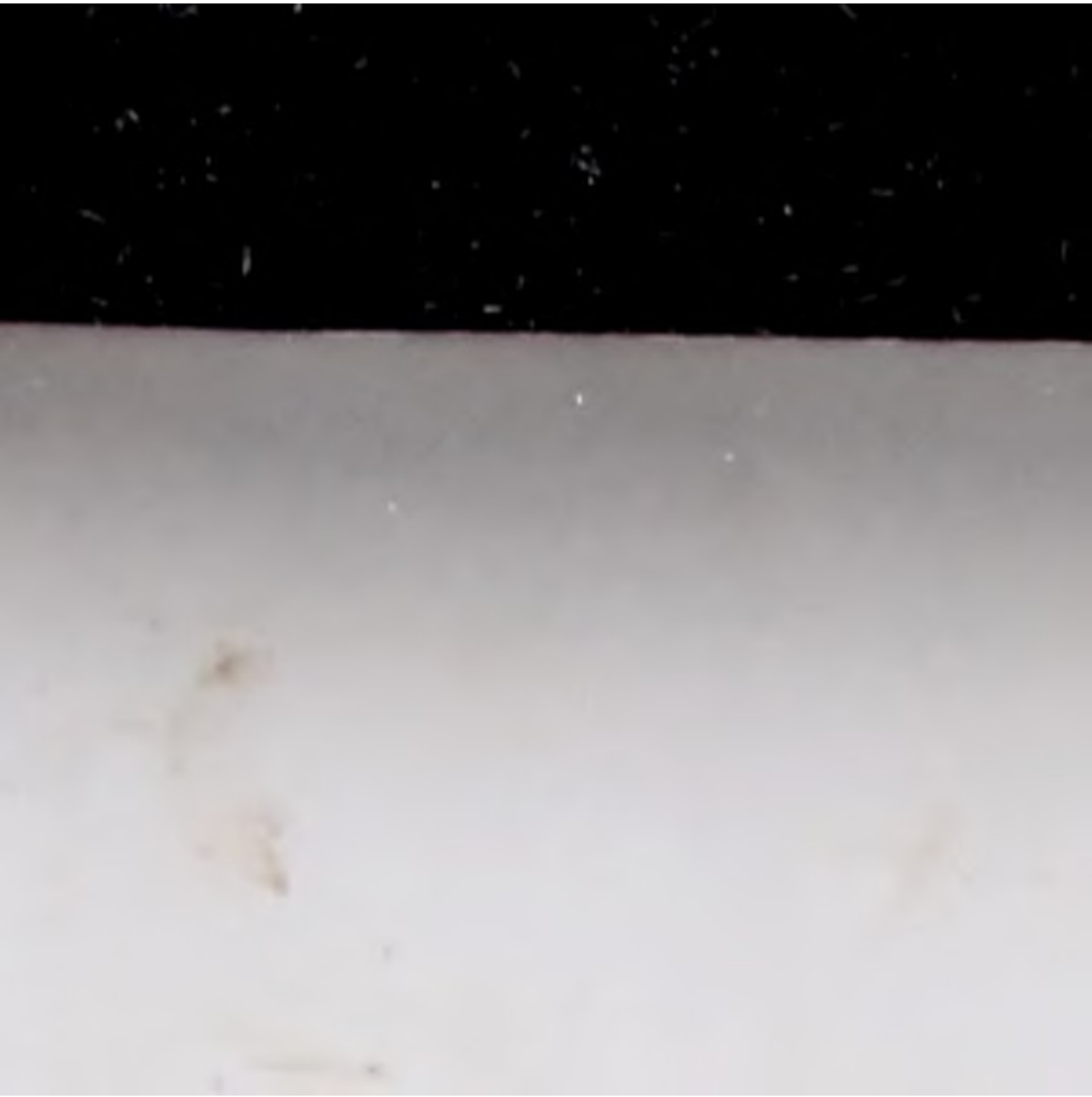
In order that the Causes of Death as certified by Registered Medical Practitioners may be satisfactorily classified in the Statistical Department of the General Register Office, for publication in his Weekly, Quarterly, and Annual Reports, the Registrar-General requests :—

1. That Registered Medical Practitioners in filling up their Certificates will adopt as far as possible the suggestions printed on the following page ; and

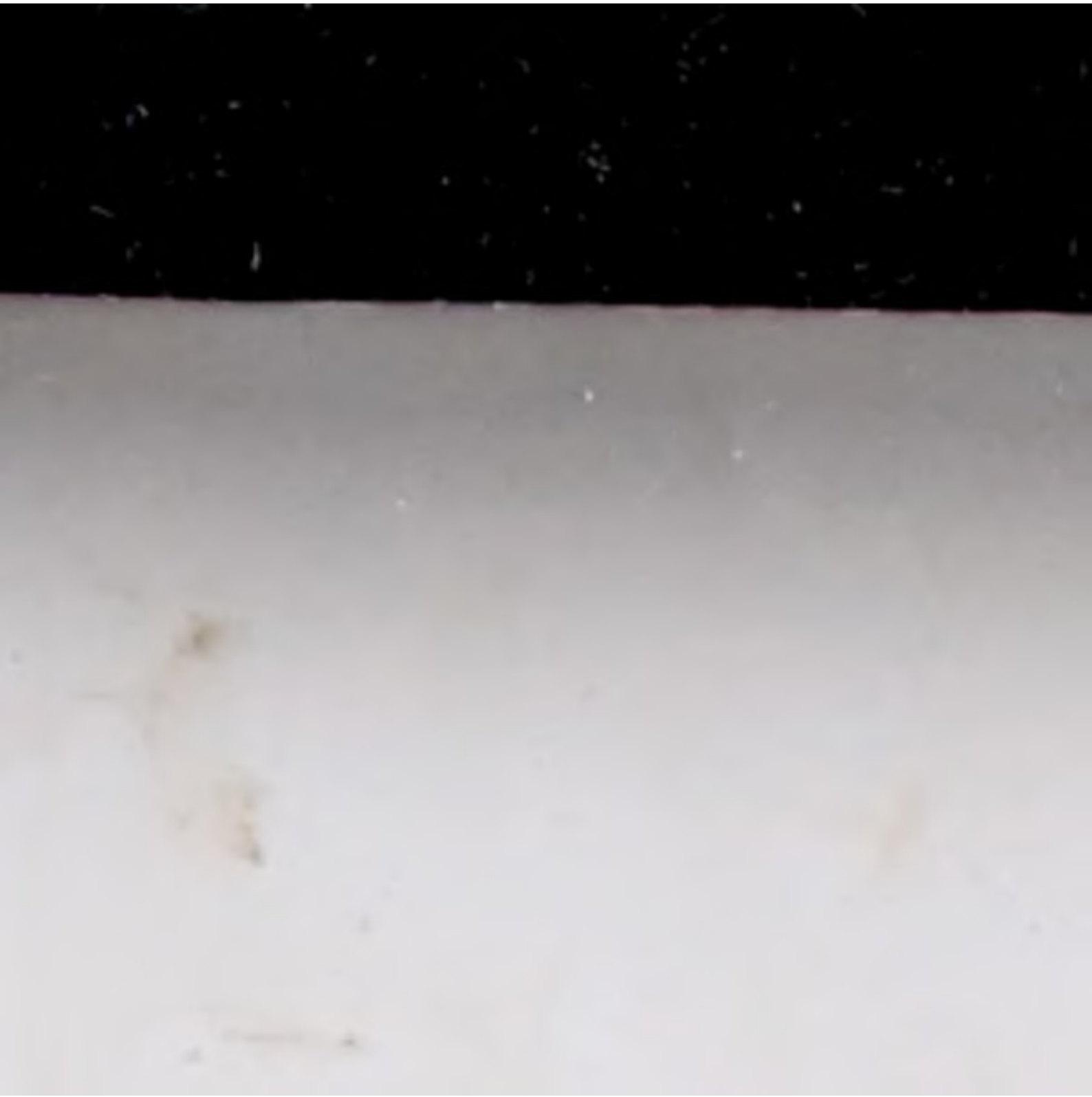
2. That the Names of Diseases in the Certificates be WRITTEN AS LEGIBLY AS POSSIBLE in order that Registrars may be enabled to copy them accurately into the Death Register.

















Poisons.	Treatment and Antidotes.
Carbolic Acid (Phenol)	1. Epsom salts (magnesium sulphate) or Glauber salts (sodium sulphate), ½ ounce in a tumbler of warm water. 2. Stomach tube (carefully) or emetic (apomorphine, mustard, zinc sulphate, ipecacuanha). 3. Wash out stomach freely with Epsom or Glauber salts, or soda, or saccharated lime in large quantities of warm water. Leave stomach full of solution employed.
Hydrocyanic Acid (Prussic Acid) and Cyanides	1. If seen *at once* stomach pump or emetic. 2. Stimulants: brandy, ether, sal volatile. If necessary, brandy and hot water enema, or hypodermic of brandy (or ether). 3. Artificial respiration. Keep it up steadily. 4. Dash alternately hot and cold water over patient, or pour over head and chest from a height. 5. Atropine, gr. $\frac{1}{60}$ (=2 minims of 1 in 100 solution) hypodermically, or 30 drops of tinct. belladonnæ by mouth. Repeat if necessary.
Alkalies— Ammonia Potash (Caustic) Soda (Caustic)	1. *No* stomach pump, *no* emetics. 2. Vinegar, acetic acid, lemon juice, freely diluted with water. 3. Followed by milk, white of egg and water, barley water, freely, or olive oil. 4. Morphine hypodermically to relieve pain and shock.
Aconite (Aconitine)	1. Stomach tube or emetic. 2. Stimulants freely, by rectum as an enema, or subcutaneously if necessary. 3. Recumbent position *essential.* 4. If no improvement, gr. $\frac{1}{100}$ of digitalin or 20 minims of tinct. digitalis. Repeated in twenty minutes if pulse improves. 5. Artificial respiration for two hours if necessary.
Alcohol	1. Stomach tube or emetic. 2. Try to rouse by flapping with wet towel, etc.

Poisons.	Treatment and Antidotes.
Alcohol—*Continued*	3. Coffee: strong, hot, a pint, mouth or rectum. 4. Cold douche to head from a height, or alternately hot and cold. If collapse, cold douche not too freely.
Almonds Essential Oil of Bitter Almonds	*See* Acids, Hydrocyanic Acid.
Ammonia	*See* Alkalies.
Aniline (Antifebrin, Exalgin, and so forth)	1. Removal of cause. 2. Fresh air. 3. Artificial respiration. 4. Oxygen inhalation. 5. Bleeding or transfusion.
Antimony (Tartar Emetic) (The Vinum)	1. Where no vomiting give an emetic, or use tube. 2. Tannic or gallic acid, ½ drachm in water, repeating as often as rejected. Decoction of oak bark. 3. Tea or coffee, large doses, strong. 4. White of egg, barley water, milk, arrowroot, etc. 5. Stimulants, if collapse. 6. Warmth: blankets, hot water bottles to feet.
Arsenic (Acute Poisoning) (Arsenious Acid) (White Arsenic) (Cacodylic Compounds = Organic Arsenical Compounds)	1. Stomach tube or emetic. 2. Freshly prepared sesquioxide of iron, by precipitating tincture of perchloride of iron with carbonate of soda, and filtering through a handkerchief, given in large quantities in hot water. Or *dialysed iron* in ounce doses repeatedly. 3. *Or* magnesia in large quantities. 4. Castor oil or common oil, or equal parts common oil and lime water, in large doses frequently. 5. Stimulants. 6. Mucilaginous drinks (white of egg, barley water, etc.). 7. Warmth: hot blankets, hot bottles to feet, friction.
Belladonna (Atropine) (Deadly Nightshade)	1. Stomach tube or emetic. 2. Stimulants. 3. Coffee as an enema.

Poisons.	Treatment and Antidotes.
Belladonna—*Continued*	4. Pilocarpine nitrate, gr. $\frac{1}{2}$ (or 10 minims of 1 in 20 solution), repeated if necessary, or 2 drachms of tinct. jaborandi, mouth or rectum. 5. Artificial respiration for two hours if necessary. Relieve bladder by catheter.
Carbolic Acid	*See* Acids.
Carbonic Oxide Gas Also Carbonic Acid Gas Also Coal Gas (Water Gas) Also Charcoal Fumes (Patent Stoves)	1. Fresh air. 2. Oxygen inhalation. 3. Artificial respiration. 4. Ammonia to nostrils, warmth and friction, interrupted current to limbs. 5. Stimulants in moderate quantities. A pint hot, strong coffee in enema. 6. Cold douche. 7. Bleeding or transfusion. 8. Attention to bladder.
Chloral	1. Stomach tube or emetic. 2. Warmth (in every way). 3. Rousing (wet towel, etc.), ammonia to nostrils. 4. Enema of hot strong coffee. 5. Strychnine nitrate, gr. $\frac{1}{25}$ hypodermically (=2 minims of 1 in 50 solution) or 15 minims of tinct. of nux vomica (mouth or rectum). Repeated if doing good and necessary. 6. Nitrite of amyl inhalations. 7. Artificial respiration if failure signs.
Chlorine Gas	1. Fresh air. 2. Steam inhalations. 3. Inhalations of very dilute ammonia or sulphuretted hydrogen. 4. Chloroform or ether inhalations to ease cough.
Chlorodyne	*See* Opium.
Chloroform (swallowed)	1. Stomach tube or emetic. 2. Artificial respiration. 3. Injection of hot strong coffee per rectum. 4. Do not leave the patient for some hours.

Poisons.	Treatment and Antidotes.
Coal Gas	*See* Carbonic Oxide.
Cocaine	1. Stimulants. Ether in 5 minim doses hypodermically. 2. Inhalation of nitrite of amyl.
Colchicum	1. Stomach tube or emetic. 2. Tannic or gallic acids in ½ drachm doses, or strong tea. 3. Demulcent drinks. 4. Stimulants if collapse signs.
Conium (Hemlock) (Spotted Hemlock)	1. Stomach tube or emetic. 2. Tannic or gallic acid, or strong tea. 3. Stimulants. 4. Warmth. 5. Artificial respiration.
Copper	1. Milk, eggs freely. 2. Stomach pump or emetic. 3. Demulcent mucilaginous drinks.
Corrosive Sublimate (Perchloride of Mercury)	1. White of egg (unboiled, of course) mixed with water, in quantities; arrowroot, flour and water, barley water. 2. Then stomach tube or emetic. 3. Stimulants if depression.
Cyanide of Potassium	*See* Acids, Hydrocyanic Acid.
Digitalis (Foxglove)	1. Stomach tube or emetic. 2. Tannic or gallic acid, gr. 20 in hot water; or hot strong tea, coffee. 3. Stimulants: mouth, rectum. 4. Aconitine, gr. $\frac{1}{120}$ hypodermically (=2 minims of a 1 in 240 solution), or 6 minims of tinct. of aconite by mouth or rectum. Repeat in half hour if heart improves. 5. Recumbent position *essential.*
Henbane	*See* Belladonna.
Hydrochloric Acid	*See* Acids.
Hydrocyanic Acid	*See* Acids.
Laurel Water	*See* Acids, Hydrocyanic Acid.

Poisons.	Treatment and Antidotes.
Lead (Acute Poisoning)	1. Stomach tube or emetic. 2. Dilute sulphuric acid solution; or Epsom salts or Glauber salts, ½ an ounce in water. 3. Milk, white of egg, etc.; poultices to abdomen. 4. If much pain, morphine, gr. ⅓ subcutaneously. 5. Then a course of iodide of potassium.
Lunar Caustic (Nitrate of Silver) (Accidental swallowing of Solid Stick)	1. Common salt dissolved in water or milk, freely. 2. Emetic. 3. White of egg and water, barley water, etc.
Morphia (Acute Poisoning by Mouth or hypodermically)	1. Stomach tube or emetic. Wash out stomach thoroughly with Condy's fluid in warm water until the solution ceases to be discoloured; this also when morphine subcutaneously injected, as it is eliminated by mucous membrane of stomach. 2. Rousing; walk patient about; flick with wet towel; battery to limbs; ammonia (carefully) to nose. 3. Hot strong coffee, 1 pint into rectum. 4. Alternate hot and cold douching of head from a height. Cold to be carefully used if collapsed. 5. If signs of respiratory failure, artificial respiration and oxygen inhalations, and atropine sulphate, gr. $\frac{1}{100}$ subcutaneously. Repeat in a quarter of an hour if necessary.
Nightshade (Woody Nightshade or Bitter Sweet, or Dulcamara—*Solanum dulcamara*) (Black or Garden Nightshade—*Solanum nigrum*)	1. Emetic: Ipecacuanha or mustard and water. 2. Castor oil purge. 3. Stimulants freely. 4. Tea or coffee.
Nightshade, Deadly (Atropa Belladonna)	*See* Belladonna.
Nitrate of Silver	*See* Lunar Caustic.
Nitric Acid	*See* Acids.

Poisons.	Treatment and Antidotes.
Nitro-Benzin (Nitro-Benzol) (Artificial Oil of Bitter Almonds)	1. Stomach tube or emetic (mustard, zinc sulphate, or ipecacuanha). 2. Stimulants. 3. Douche: alternate hot and cold. 4. Artificial respiration. Oxygen inhalation.
Nux Vomica	1. Stomach tube if available *at once*, for after tetanic symptoms set in, the introduction of the tube would bring on a paroxysm. 2. Emetic. If difficulty in opening jaws, put under chloroform or ether, and empty stomach with tube and wash out with solution of Condy. 3. Keep under influence of chloroform, and give chloral hydrate by mouth or hypodermically, gr. 20 to 30. 4. Bromide of potassium ($\frac{1}{2}$ ounce in water) in bad cases, with chloral (30 grs.), to be followed by bromide (in 2 drachm doses) with or without chloral (10 grs.) every 15 or 20 minutes, as long as necessary. 5. Nitrite of amyl inhalation. 6. Chloroform or ether, to produce muscular relaxation. 7. Curara, gr. $\frac{1}{3}$ hypodermically may be given. 8. Artificial respiration if possible.
Opium	*See* Morphine.
Oxalic Acid	*See* Acids.
Phosphorus	1. Emetic of zinc sulphate or ipecacuanha powder. 2. Unrectified French turpentine in half drachm doses every hour. 3. Copper sulphate in 3 grain doses in water every five minutes until vomiting induced. Continue in 1 grain doses every quarter hour, with 10 minims of morphia acetate if rejected.





APPENDIX F.—AN ANALYTICAL FORM FOR DEALING WITH A SIMPLE SOLUTION.

To some of the solution add :—

A. A few drops of **hydrochloric acid**, until the maximum precipitate —if any—is created.

(*a*) *A white precipitate* = silver, mercury (*-ous* salt), or lead ; *add ammonia*, if the precipitate dissolves = silver ; if it blackens = mercury ; if unchanged = lead.

Add a solution of *potassium chromate* to some of the original liquid ; a reddish-brown precipitate = silver ; a red precipitate = mercury ; a yellow precipitate = lead.

B. If *no* precipitate add **strong sulphuretted hydrogen water.**

(*a*) *A yellow precipitate* = arsenic, tin (*-ic* salt). If arsenic or tin (*-ic*), the precipitate is soluble in ammonium sulphide and in potassic hydrate solution. Distinguish by Reinsch's test.

(*b*) *An orange-red precipitate* = antimony.

Add potassic hydrate solution to original liquid, and a white precipitate forms, soluble in excess.

(*c*) *A brown precipitate* = bismuth, copper, or tin (*-ous*). If bismuth or copper, the precipitate is insoluble in ammonia and potassic hydrate solution.

If tin (*-ous*), the precipitate is soluble in ammonia and potassic hydrate solution.

Copper will give a bronze colour and precipitate with potassium ferrocyanide.

(*d*) *An orange or black precipitate* = mercury (*-ic* salt).

A solution of potassium iodide will give a scarlet red colour to the original liquid.

C. To a fresh portion of the solution add a solution of the **chloride of ammonium, and ammonia.**

(*a*) *A brownish-black precipitate* = **iron** ; ferrocyanide of potassium will yield a blue colour ; ferricyanide of potassium a red with ferr*ic* and blue with ferr*ous* salts.

(*b*) *A greenish-white precipitate* = aluminium.

(*c*) *A dark green precipitate* = chromium.

D. If no precipitate, further add some **ammonium sulphide** solution.

(*a*) *A white precipitate* = **zinc.**

(*b*) *A salmon-colour precipitate* = manganese.

(*c*) *A black precipitate* = nickel or cobalt.

If nickel, ammonia yields a blue; if cobalt, ammonia yields a green.

E. If no precipitate, add **ammonium carbonate** solution.

(*a*) *A white precipitate* = **barium,** strontium, or calcium.

If barium—burns with a green flame; if strontium and calcium—burns with a red flame; potassium chromate creates a yellow colour with strontium and none with calcium.

F. If no precipitate is obtained by this stage, only magnesium, ammonium, potassium, sodium, and lithium can be present.

Add ammonia and sodium phosphate.

(*a*) *A white precipitate* = magnesium.

If *no precipitate*, but ammonia is evolved on boiling the original solution with sodic hydrate = ammonium.

If potassium, the original solution on platinum burns with a lilac flame; if sodium, it burns with a yellow flame; if lithium, a crimson.

Potassium will furnish a yellow precipitate with platinum chloride solution.

For acids. To original solution :—

A. Add **barium chloride solution** (or if silver, mercury, or lead be present, use barium nitrate).

(*a*) *A white precipitate* = sulphates, carbonates, phosphates, oxalates, or borates.

Add *hydrochloric acid.*

If sulphates, the precipitate is insoluble even on boiling; if carbonates the precipitate is soluble (also in acetic acid) with *effervescence;* if phosphates or borates the precipitate is soluble (also in acetic acid); if oxalates the precipitate is soluble (but not in acetic acid).

B. If no precipitate, to some of the original solution add *silver nitrate.*

(*a*) *A white precipitate* = chlorides or cyanides; add *nitric acid.*

If chlorides the precipitate is insoluble (and it *fuses* on heating); if cyanide the precipitate is soluble on boiling.

(*b*) *A pale yellow precipitate* = bromides or iodides; add a drop of strong *sulphuric acid.*

If bromides, starch paper is coloured orange; if iodides, starch paper is coloured blue.

C. **Test especially for**—Nitrates :—Add strong brucine solution and then pour sulphuric acid down the side of the test-tube—a pink zone, changing to a yellow, forms where the fluids meet.

APPENDIX G.—GROWTH OF FŒTUS—OSSIFICATION TABLES—ERUPTION OF TEETH.

GROWTH OF FŒTUS.

Age. Months.	Length about. Inches.	Weight about. Grains.
1	.75	35
2	1.00	60
3	2.75-3.50	300-450
4	4.00-6.50	2-4 ounces.
5	7.00-10.50	10 „
6	9.00-13.00	24-32 „
7	12.00-15.00	48-64 „
8	15.00-17.00	64-80 „
9	18.00-20.00	80-112 „

OSSIFICATION TABLE.

Fœtal Life.

6th week.—Ossific centres in clavicle.—Infr. maxilla. Supr. maxilla.

7th-8th „ —Ossific centres in vertebræ—tabular part of occipital bone, frontal, parietal, squamo-zygomatic of temporal; in sphenoid (ali- and basi-sphenoids); body of scapula; shafts of humerus, radius, ulna, femur, tibia, and fibula.

8th-10th „ —Centres in sacral vertebræ, ribs, occipital bone (ex- and basi-occipital), sphenoid (small wings), metacarpals, metatarsals and phalanges, ilium.

3rd month.—Tympanic ring of temporal, ischium.

4th-5th „ —Petro-mastoid of temporal (towards end of 5th month), internal pterygoid plates, sphenoidal spongy bones, pubic bone.

6th „ —Laminæ of sacrum, manubrium, os calcis.

7th „ —Astragalus, upper segment of sternum.

8th-9th „ —Next two segments of sternum, cuboid.

9th „ —Upper epiphysis of tibia. Lower epiphysis of femur.

At Birth—Occipital	bone is separable into	4	parts.
Frontal	,,	,,	2	,,
Temporal	,,	,,	3	,,
Inferior Maxilla	,,	,,	2	,,
Sternum	,,	,,	5	,,
Os innominatum	,,	,,	3	,,

OSSIFICATION AND JUNCTION OF EPIPHYSES.

Year of Life.		
1st	Ossific centres appear in .	Lowest sternal segment. Coracoid process. Head of humerus. Os magnum. Unciform. Head of femur. Ext. cuneiform bone.
	Temporal, sphenoidal, and inferior maxilla each become converted into a single bone.	
2nd	Two halves of frontal unite.	
	Ossific centres appear in .	Carpal epiphysis of radius. Tarsal ,, tibia. Tarsal ,, fibula.
3rd	Ossific centres appear in .	Great tuberosity of humerus. Capitellum ,, Pyramidal bone. Patella. Upper epiphysis of fibula. Internal cuneiform bone.
4th	Ossific centres appear in .	Carpal epiphysis of ulna. Great trochantes of femur. Middle cuneiform bone. Navicular bone.
5th-6th	Divisions of occipital bone are now lost.	
	Ossific centres appear in .	Xiphisternum (6th year). Lesser tuberosity of humerus, and at same time head and greater tuberosity unite with it to form single epiphysis. Internal condyle of humerus. Head of radius. Trapezium and semilunar bones.
6th-7th	Ossific centres appear in .	Scaphoid.
7th-8th	Ossific centres appear in .	Trapezoid. Rami of pubis and ischium unite.
10th	Ossific centres appear in .	Olecranon epiphysis.
11th-12th	Ossific centres appear in .	Trochlear part of humerus. Pisiform bone. Y cartilage of os innominatum.

YEAR OF LIFE.

13th-14th	Ossific centres appear in .	Small trochantes of femur. External condyle of humerus.
14th-16th	Ossific centres appear in .	Acromial process, and in heads and tuberosities of ribs.
	Lower segments of sternum unite from below upwards, commencing at puberty. Upper segment remains free till about 25 years. Manubrium does not unite till old age. Xiphisternum unites at middle age.	
16th-17th	External condyle ossific centre unites with the trochlear centre, and also with shaft of humerus. Epiphysis of olecranon unites with shaft. Ossific centre in epiphysis of scapula at its inferior angle.	
17th-18th	Internal condyle of humerus unites with shaft. Head of radius ,, Smaller trochantes of femur ,, Greater ,, ,, (18th year).	
19th	The epiphysis of clavicle (sternal) develops ossific centre. Inferior epiphysis of tibia joins shaft. Head of femur ,, Ossification of Y cartilage of os innominatum complete.	
20th	Upper epiphysis of humerus unites with shaft. Carpal ,, radius ,, Carpal ,, ulna ,, Lower ,, femur ,, Epiphyses of metacarpal and metatarsal bones unite with shaft.	
21st	Lower epiphysis of fibula unites with shaft. Upper ,, tibia ,, (21-22)	
24th	Upper epiphysis of fibula unites with shaft.	
25th	Acromion unites with spine (22-25). Scapular epiphyses unite with body. Sternal epiphyses of clavicle joins shaft. Epiphyses of os innominatum, vertebræ, ribs, join bones (23-25).	

ERUPTION OF TEETH.

Temporary or Milk Teeth—20 in Number.

7th Month.	8th Month.	9th Month.	10th–12th Month.	14th Month.	17th Month.	24th Month.
Lower Central Incisors	Upper Central Incisors		Lower Lateral Incisors	1st or Anterior Temporary Molars	Canines	Posterior Temporary Molars
Upper Lateral Incisors						

Permanent Teeth—32 in Number.

6th–7th Years.	8th Year.	9th Year.	10th Year.	11th–13th Years.	11th–15th Years.	13th–16th Years.	18th–30th Years.
1st Molars	Central Incisors	Lateral Incisors	Anterior Bicuspids	Canines	Posterior Bicuspids	2nd Molars	3rd Molars (wisdom)

APPENDIX H.—METRIC AND FINGER-PRINT IDENTIFICATION OF CRIMINALS, AS CARRIED OUT AT NEW SCOTLAND YARD BY DR J. G. GARSON.

THE IDENTIFICATION OF HABITUAL CRIMINALS.

The method employed by Dr J. G. Garson at the Habitual Criminals Registry, New Scotland Yard, London, is a modification of the Bertillon Anthropometric Method* combined with the use of finger-prints. It includes: (1) A general description of the individual; (2) certain measurements of the head and limbs, together with the height; (3) a photograph, showing profile and full face; (4) the principal scars and marks (natural and artificial) on the body and limbs; (5) the impressions of all the digits of both hands. The details are entered on a form (8 in. by 8 in.), and a card (8 in. by 4 in.), facsimiles of which are here given.

It will be seen that seven measurements are taken: Head length, head breadth, face breadth (this is an additional measurement—bizygomatic—introduced by Dr Garson), left middle finger length, left cubit, left foot length, and the stature. From these measurements recorded on the form, the measurement formula is deduced, and the corresponding card searched out in the specially-constructed cabinet.

In the Bertillon method the final classification is based on the variations in the colour of the iris. Dr Garson has discarded this feature and in its place devised an ingenious classification by finger-prints. This latter point will be more readily grasped by an examination of the form and card here reproduced.

The form runs on from the bottom of side 1 to the top of side 2. This side 2 is devoted to the finger-prints of the individual. Before taking the impressions of the fingers the form is folded exactly in two, and a metal sheet is placed between the folds to stiffen the

* *Vide* p. 301.

paper. The card corresponds in size to the *folded* form. From the finger-prints (reproduced here) the finger formula is deduced, the circles and strokes corresponding to whorls and directions of loops respectively. The sign V* indicates what is called an invaded loop (in contra-distinction to the normal loop). The cards are arranged in the various drawers of the cabinet in accordance with the finger-prints, and the position of the card looked for in any particular drawer corresponding to the measurement formula is deduced from the finger formula by means of prepared tables.

The finger-prints on the card are so arranged that they may be readily compared with those of the corresponding fingers on the form by placing one above the other. This and other features are to save time.

Of course the measurements and finger-prints are quite sufficient to identify adults, and this without the need of a photograph at all. Photographs are, however, added (profile and full-face, and of same size in all cases, viz., one-seventh of the natural size), as also special marks of scars, tattoo marks, initials, etc., to absolutely clinch the identification, especially to convince a jury. For, from the photograph the form of the ear and so forth can be seen and compared with the prisoner's.

In the case of growing individuals the measurements change, but the finger-prints are specific and remain, the impression obtained from the hand of a young child being identical even in the most minute details (although, of course, somewhat less displayed) with that obtained from the same individual when grown up.—(F. Galton.)†

The above is a mere sketch of the method pursued at New Scotland Yard, but those interested in the matter will find it exhaustively dealt with by Dr J. G. Garson himself in *The Journal of the Anthropological Institute.* (Vol. XXX., 1900, pp. 161-198.)

It may be added, that for purposes of International Criminal Identification, the finger-prints of the right thumb and index are employed. A copy of a form filled up is added, which will give the reader an idea of the method pursued. The measurements are given in centimeters. Abbreviations have been omitted in order to make the system plain.

The Search Cabinet in which the metric cards are kept is first divided into 3 parts by two vertical thick partitions, then into 9 by two horizontal thick partitions. Each of these 9 divisions is again sub-divided in the same way by two vertical and two horizontal thin

---

* There are several signs used to indicate peculiarities of the pattern. V is one of them.

† Quain's *Anatomy*, vol. i., part ii., p. 415, 12th ed., 1898.

partitions. This gives $9 \times 9 = 81$ drawers. Finally, each drawer is divided into 3 compartments by two upright partitions. This gives a total of 243 compartments. A further classification of the cards is obtained by means of the finger-prints.

For full particulars, Dr Garson's paper should be consulted. (*Loc. cit. supra.*)

Prison Register No. 921

H.C. Register No. 9294

Name *John Smith*

Aliases *Red Bob*

Age 40 Year of Birth 1860

PHOTOGRAPH.

Place of Birth *Seven Dials*

Complexion *dark*

Hair *dark brown*

Eyes *brown*

Occupation *Costermonger*

* Sentenced at *North-Western Court*

„ on *19th March* 1900

„ * for *Larceny*

„ to 4 *months h.l.*

* Give offence in full, and if remanded only, substitute "Remanded" for "Sentenced."

H.L.	H.B.	F.B.	L.M.F.	L.C.	L.F.
Measurement Formula.					

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	5	10	15
Finger Formula	O	O	Q	O	\	O	O	/	O	/			
					V			V					

Measurements.	
Head Length	19.5
Head Breadth	14.9
Face Breadth	13.7
Left Mid. Finger	11.9
Left Cubit	44.6
Left Foot	23.4
Height	5 ft. 7⅜ in.
Remarks	

Distinctive Marks, Scars, Initials, Etc.

I.—Left Arm and Hand.

Scar rectilinear of 0.4 *faint slanting inwards front third forefinger.*

Tattoo I . LOVE . POLLY *at* 6. *below elbow front forearm.*

II.—Right Arm and Hand.

Scar rectilinear of 1.7 *slanting externally back elbow joint.*

Scar curved upwards of 0.8 *front third phalanx midfinger.*

III.—Face and Neck.

Scar circular of 0.5 *bridge nose at* 1.2 *below root of nose.*

IV.—Chest.

V.—Back.

VI.—Rest of Body.

Name John Smith

Prison Register No. 921

Prison Hampstead

Date of Measurements 29th June 1900

Signature of Measurer James Jones Wt

Governor's Signature C. H. Mills

RIGHT FINGERS.



1.—Right Thumb.	2.—R. Fore Finger.	3.—R. Middle Finger.	4.—R. Ring Finger.	5.—R. Little Finger.
				

LEFT FINGERS.



Directions:—Before taking the impressions of the fingers, fold this Form exactly in two, and place the metal sheet between the folds

REMARKS.

Finger Formula.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
O	O	Q	O	\	O	O	/	O	/
							V		

10.—L. Little Finger.	9.—L. Ring Finger.	8.—L. Middle Finger.	7.—L. Fore Finger.	6.—L. Thumb.
				

2 K

APPENDIX I.—A LIFE ASSURANCE FORM.*

Confidential.]

All Letters on Official Business should be addressed to the "GENERAL MANAGER."

FEE.—A Cheque for One Guinea will be forwarded on receipt of your Report.

London, ... 19 .....

DEAR SIR,

A Proposal for an Assurance on the Life of .....

.....

having been made to this Company, I am instructed by the Directors to submit the case to you, with a request that you will obtain Answers from the Applicant to the several Questions on this and the following page, and make such an investigation as to his past and present state of health as will enable you to give the Directors your opinion on the third page.

I am, DEAR SIR,
Yours faithfully,

Questions to be put to the Applicant (with any necessary explanation) by the Medical Officer, who will fill in the Applicant's Answers.

---

1. Name (in full). Age next birthday. ( )

Occupation.

2. Has your Life been proposed for Assurance to any and to what Office or Offices? . . . . . .

If accepted, was it at the ordinary Premium? . . . .

Has a Proposal on your Life (*a*) ever been declined, or (*b*) withdrawn? .

3. Have you always been of sober and temperate habits? . . .

4. Are you now free from disease or ailment? . . . . . .

5. What is your Height? Feet, Inches; and Weight? Stones, Pounds (14 pounds to the Stone).

6. State the particulars required in this Table as to the several members of your Family.	IF DEAD.		IF LIVING.	
	Age at Death about	State Cause of Death, and when necessary please explain any ill-defined Cause of Death.	Ages about	And State of Health. Please explain nature of any ill-health.
		(*See footnote*).		
FATHER				
MOTHER				
BROTHERS—Number Born? ( ) .				
Number Dead? ( ) .				
SISTERS—Number Born? ( ) .				
Number Dead? ( ) .				

If "childbirth" is given as a cause of death, the Medical Examiner is requested to endeavour to ascertain (*a*) what was the condition of health before and during the last pregnancy, (*b*) how long after confinement did death take place, and (*c*) what was the **REAL** cause of death.

"Debility," "asthma," "congestion" or "inflammation" of the lungs, demand further inquiry, in order to exclude consumption.

7. What Medical Men have you consulted?	When?	And what for?

8. Have any of your Relations, living or dead, had any signs of Consumption, or been Insane, or had Fits, or had Cancer? . . .

9. Have you at any time had, and if so, when, any of the following ailments, viz.:—

(*a.*) Spitting of Blood, Asthma, Palpitation, Short Breath, Habitual Cough, or other Complaint of the Chest, Throat, Heart, or Lungs? . . . . . .

(*b.*) Apoplexy, Palsy, Fits of any kind, Mental Derangement, Brain Fever, or other disease of the Brain? . . . . .

(*c.*) Bad Digestion? . . . . . .

(*d.*) Any complaint of the Urinary Organs? . . . . .

(*e.*) Jaundice, or any Liver complaint? . . . . . .

(*f.*) Fistula? . . . . . .

(*g.*) Gout? . . . . . .

(*h.*) Rheumatic Fever, or any other kind of Rheumatism? . .

(*i.*) Any eruptions on the Skin? . . . . . .

(*k.*) Any Tumour, Ulcer, or Abscess? . . . .

(*l.*) Rupture?
If so, is it reducible? Is an efficient Truss worn? . .

(*m.*) Any Accidental Injury? Or Surgical Operation? . .

10. What quantity of Malt Liquor, Wine, or Spirits, do you drink daily?
If a Total Abstainer, state for what period you have been so? . .

Queries Applicable to Married Females.

How long has she been married? . . . . . .

Is she at present pregnant? . . . . . .

How often has she been pregnant? . . . . . .

How many children born at full time? . . . . . .

If any miscarriages, give the dates? . . . . . .

Has she enjoyed good health during pregnancy? . . . . .

Has labour been attended by unusual difficulty or danger? . . .

Has any permanent weakness or injury resulted from child-bearing? . .

I, the said ..... do hereby declare, with reference to the proposal for Assurance on my Life, and my Declaration dated ..... that the Answers to the foregoing Questions are all true.

Signature of the Applicant .....

The **MEDICAL OFFICER**, having obtained the Signature of the Applicant at foot of the preceding page, will personally examine him, and answer the following Questions. It is particularly requested that the results of the examination be not made known to the Applicant or Agent.

1. What is the condition of the Heart? . . . . . .

2. What is the condition of the Lungs? . . . . . .

3. What is the condition of the Viscera in the other Cavities? . . . .

4. What is his general Configuration? . . . . . .
   And Physical Development? . . . . . .

5. Has he the appearance of health and vigour? . . . . .
   And of the age stated? ( ) . . . . . .
   And of uniform temperance? . . . . . .

6. Has he good marks of vaccination? . . . . . .
   Or has he had Small-pox? . . . . . .

7. What is the condition of the Urine under ordinary tests? . . .

8. Is his business or occupation in any way likely to injure his health? .

NOTE.—*If there is any special or noteworthy feature in the case not elicited by the printed Questions, please to state it here.*

CERTIFICATE.

I, the undersigned, acting as Medical Examiner for the Company, having regard to the present condition and past health and Family History of the Applicant, and also to the subjoined Table of Classified Lives, recommend that the Applicant be placed in Class . (*If in Class II., state the objectionable features, and the number of years that, in your opinion, ought to be deducted from the average expectation of life* (*see Table on back*). *The age which the Applicant should attain is years.*)

Date ..... 19 ..... *Signature of Medical Officer* .....

TABLE OF CLASSIFIED LIVES.

CLASS I.—*Good Lives*, which may be safely assured at the ordinary rate of Premium.

CLASS II.—*Lives below average*, owing to an unfavourable family history or personal condition, or former illnesses, but which may, nevertheless, be safely assured at an extra rate of Premium.

CLASS III.—*Bad Lives*, not desirable for Assurance, even at an extra rate of Premium.

If Addition made in Years be

	0	3	5	7	10	15
	The Expected Age will be					
20	62	60	58	57	55	51
25	63	61	60	58	56	52
30	65	62	61	60	57	54
35	66	64	62	61	59	55
40	67	65	64	62	60	57
45	69	67	65	64	62	59
50	70	68	67	66	64	61
55	72	70	69	68	66	63
60	74	72	71	70	68	66
65	76	74	73	73	71	70
70	78	77	76	76	75	74

APPENDIX K

CHRONIC ARSENICAL POISONING

WHILE this work has been passing through the press there has occurred an outburst of Peripheral Neuritis among beer drinkers in Liverpool, Manchester, and the adjoining districts. That the neuritis in these cases was arsenical and not alcoholic, and that the source of the arsenic was beer, are facts which we owe to Dr E. S. Reynolds, who had no less than 500 cases under his care at the Manchester Royal Infirmary and the Manchester Workhouse Infirmary in the autumn of 1900 (*Lancet*, January 19, 1901).

The source of the arsenic was traced to commercial sulphuric acid made at Leeds, and used for the manufacture of brewers' glucose and invert sugar by a firm at Liverpool. Beers into the composition of which this particular glucose entered were alone found to contain arsenic. Various beers contained from 0.14 grain to 0.3 grain of white arsenic to the gallon, so that a glass of beer ($\frac{1}{2}$ pint) would contain from about $\frac{1}{100}$ to $\frac{1}{50}$ of a grain of white arsenic, an amount which would be contained in ♏j to ♏ij of Liquor Arsenicalis B.P.

The symptoms observed by Dr Reynolds were very varied, and consisted of lassitude, burning, tingling and numbness of the hands and feet; the face often puffy, dusky red, or almost copper colour, with suffused conjunctivæ; want of power in the flexors of the ankle, which was evident when the patient tried to walk, and a painful erythema of hands and feet, which were often puffy, œdematous, and very sensitive to pressure. Often there resulted epithelial overgrowth (keratosis) and pigmentation. Herpes zoster was frequent, and when combined with other symptoms was the key to the real cause of the trouble. In more advanced cases there were the usual motor and sensory phenomena of peripheral neuritis, with some feebleness of circulation and œdema. Arsenic was detected in the urine of several patients by Reinsch's process.

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PRINTED BY OLIVER AND BOYD, EDINBURGH.

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