Punjab poisons : being a description of the poisons principally used in the Punjab / by T.E.B. Brown.

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PREFACE TO THE THIRD EDITION.

AS the former editions of this book are exhausted, it was thought advisable in preparing the present one to enlarge its scope and to render it useful not only to officers in the Commission and Police, but also to Assistant Surgeons and other Medical Officers, by describing more in detail the *post mortem* appearances, and adding a description of the more common tests for each variety of poison, so that Medical Officers might be able in many cases to examine the nature of any poison used without referring it to the Chemical Examiner. Further, it has been thought advisable to restrict the cases mentioned in this book to those which have occurred in the Punjab. A number of new cases have therefore been added, and those cases which were taken from the records of the North-Western Provinces, have been omitted.

Also, the spelling of the Hindustani words has been changed to that now in use in the Punjab. In preparing this book, I have received very great assistance from DR. CENTER, DR. TARLETON YOUNG and DR. GRANT, successively Chemical Examiners for the Punjab, who have allowed me to incorporate any part of their Annual Reports and Lectures and Notes, and to all of whom my best thanks are due.

INTRODUCTION.

The following description of the symptoms and treatment of Poisons was commenced in accordance with the desire of R. Cust, Esq., then Judicial Commissioner for the Punjab, to serve as a book of reference for Officers, both European and Native, employed in the Commission or the Police, concerning cases of poisoning.

It was thought desirable that a description should be written of the symptoms which occur in cases of poisoning, since these are often of the greatest importance in giving a clue to the nature of the drug which has been administered, and especially since without this knowledge, a poison of a vegetable nature may often escape detection. This is owing in part to the smaller proportion in which the active principle of many poisons derived from the vegetable kingdom may prove fatal, and partly to the readiness with which such principles undergo decomposition into other innocuous substances. As therefore there is often difficulty in ascertaining what poison has been administered by experiments made in the laboratory, it is frequently necessary to have recourse to the experiment shown by Nature in the person of the unhappy sufferer, especially as it is certain that the changes which occur in him will almost always prove, if they are accurately ascertained and properly considered, whether a poison has been administered or not, will usually show what class of poison has been given, and not unfrequently will indicate even the very drug which has occasioned the illness.

But to ascertain the symptoms it is necessary first to know what enquiries ought to be made from the patient, &c., and this requires an acquaintance with the general effects of poisons which can seldom have been acquired by those Officers who have primarily to investigate cases of poisoning, more especially as the standard writers on poisons have drawn up their works principally for the use of medical men, and devoted much space to the considerations of those which are not likely to be used in India, such as Nitric Acid, &c., and also to the mode of analysing them. Hence the description of the symptoms and treatment of such poisons as are chiefly used in India occupies a comparatively small part of these treatises, and has been to a great extent extracted in this paper, with such additions as seemed necessary. As chemical analysis forms no part of the duty of those gentlemen for whose use this description was written no reference was made to it in the following pages when first published.

During the year 1861 the above considerations induced the Judicial Commissioner to have a brief description of the symptoms of the more usual poisons drawn up and circulated among district officers. It was found however that the brevity of this description rendered it of less service than had been expected, and hence it was thought advisable to draw up a longer paper.

An account of the treatment proper for cases of poisoning has been added, principally with respect to using those remedies which are procurable in most households or native shops, and which may be given always without injury and usually with good effect. This is very necessary in the Punjab, since many cases

of poisoning occur in places at a distance from any medical assistance, and in this class of disease it is especially true that.

"Aut cita mors venit aut victoria laeta."

So that unless the officers of Police can apply the proper remedies, no treatment at all or what amounts to the same thing in cases of poisoning at least, only the remedies of native hakims can be administered.

Cases are added illustrating the symptoms of the poisons described, which are limited to those which have either been actually employed, or are likely to be used in India. In the arrangement however of these substances a different plan has been followed from that which is used in most books on the subject, since in those an inaccurate division has been made of poisons into those which produce vomiting and other symptoms of irritation called acrids; those which produce sleep called narcotics; and those which cause both of these effects called acronarcotics. In this way the most common and rarest poisons are grouped together. But in the present account it has been thought to be of more practical use to describe at first the general symptoms of each class of poisoning, and then the particular symptoms of the four most common poisons in India, and subsequently to consider those drugs which are more rarely employed. These four common poisons are: dhatura, arsenic, opium and aconite which form at least four-fifths of the cases of poisoning described in India. Thus of 98 cases in which poisons have been detected during the last two years and half at Lahore, no less than 59 were instances of the presence of arsenic

in various forms; 24 of opium, aconite or dhatura; and only 14 of other poisons.

The purpose for which each of these drugs is ordinarily employed differs, thus dhatura is used to render the victim insensible to what may be done with themselves or their goods; arsenic by persons living near the large bazaars, or aconite near the hills, (since these drugs can principally be obtained in these situations) is the ordinary instrument for domestic treachery and revenge, while opium is employed usually for suicide.

In this account free use has been made of several of the standard works on poisoning; those to whom the author is principally indebted are Taylor on Poisons, Christison on Poisons, Guy's Forensic Medicine, and Pereira on Materia Medica, and especially Dr. Chevers' elaborate treatise on Indian Medical Jurisprudence.

CHAPTER I.

ON THE DEFINITION OF A POISON.

The exact definition of a poison is a rather difficult matter, but in actual practice this is not of great importance. The best explanation of what is exactly meant by the term poison is given by Dr. Guy in his Forensic Medicine, page 294.

"A poison is a substance which when applied to the body externally, or introduced in any way into the body, is capable of destroying life, without acting mechanically but by its own inherent properties."

This definition excludes from poisons all such substances as pins, needles, and other pointed pieces of steel, as well as coarsely powdered glass or jewels, which have been reputed poisons, but in reality are only capable of destroying life by wounding the stomach, and thus causing death similarly to a wound from a sword or other weapon. It also excludes substances such as boiling water or oil, or red hot coals, which may be swallowed with impunity when cold, and only become dangerous when heated.

Again, articles of food may produce death if taken in excessive quantity by mechanical over-distension of the stomach, but these cannot be considered poisons, although the symptoms caused by this over-distension are sometimes very similar to those which are caused by more deadly agents. If a person over-heated swallows quickly a considerable quantity of cold water death will sometimes result, but as this is not a consequence of any property of the water but solely of the condition in which the person is, therefore cold water will be excluded by the above definition. It will be seen that a poison may be applied to the body externally as by pouring over the skin. This way of poisoning is rare, especially in India, but one case, in which Lalchitra and other irritants were so employed is related at a subsequent part. The most common way in which poisoning is effected in India is by mixing it with the food or drink, and thus bringing it into

the stomach. It is necessary however to remember that many poisons will prove fatal if introduced into other parts of the body such as the ears, rectum, &c., and cases illustrating this have occurred in Europe. And lately cases of poisoning by introducing irritant substances under the skin have been described in India.

The term deadly poison should be avoided if possible, it is usually employed to signify those poisons which prove speedily fatal in small doses as arsenic and aconite, and sometimes a poison which quickly produces death in large doses as oxalic acid. The definition of a poison is however seldom necessary, especially as the word is not employed in the clause of the Penal Code under which deaths by poisoning would be classed.

Indian Penal Code, Chapter XVI., *Section* 299.—"Whoever causes death by doing any act with the intention of causing death or with intention of causing such bodily injury as is likely to cause death, or with the knowledge that he is likely by such act to cause death commits the offence of culpable homicide."

The mixing of a substance known to most to be capable of causing death with food which a person is nearly certain to eat is *primâ facie* evidence of a intention of causing death, or of causing such bodily injury as is likely to cause death.

This is further shewn in the note to another Chapter in which the phrase *poison* or drug is used.

Chapter XVI., *Section* 328.—"Whoever administers to, or causes to be taken by any person any poison or any stupefying intoxicating or unwholesome drug or other thing with intent to cause hurt to such person, or with intent to commit, or to facilitate the commission of an offence, or knowing it to be likely that he will thereby cause hurt, shall be punished with imprisonment of either description for a term which may extend to 10 years and shall also be liable to fine."

"*Note.*—The offence is complete, although no hurt is caused to the person to whom the poison or drug is administered. It is sufficient if he is induced to take it by a person who has any such intention as is specified in the Section or who knows that it is likely to cause hurt.

"A person who knowingly causes another to take poison may be presumed without further proof to intend to cause hurt, unless he is able to shew satisfactorily a good intention, *e.g.*, that it was administered in good faith medicinally. Stupefying, intoxicating, or unwholesome drugs or liquors may often be given and taken by those who know their qualities, or who have no intention to cause hurt, or to commit an offence by means of them. Where such things are administered the criminal intention, which is an essential portion of the offence here defined, should be made to appear to the satisfaction of the Court. The sale of intoxicating or unwholesome liquors or drugs by those who know their qualities, and that they are likely to cause hurt, is not it seems an offence falling under this Section."

From the first two of these sections it will be seen that the intent with which the poison was administered is of great importance; inasmuch as if the intent was evidently that of producing death, the offence is that of culpable homicide, while if it was only intended to commit or facilitate the commission of an offence, the punishment is limited to imprisonment.

It must often be difficult to determine the intent, and this is rather a subject for the consideration of a legal inquiry than of this description. It is however desirable to remark that the poison most commonly used in India, dhatura, is frequently given to persons having property, of which they were deprived after its administration. In these cases it is usual to consider that the intention was only to produce insensibility and so facilitate the commission of the robbery and not to produce death. But as the poisoner has often been several hours or days in company with his victims before an opportunity occurs of mixing the drug with their food, and therefore they would in all probability recognise the criminal if they should meet him, it is clear that the chances of his conviction would in many cases be materially diminished by the death of the injured party; and from the known indifference to the life of others, shown by many of the criminals of this country, it is to be feared that the intention of administering dhatura is often that of producing death rather than of

causing only temporary insensibility. This may be proved by the quantity swallowed, but this can only be seldom ascertained.

In the Punjab Manual of Criminal Law, the following remarks are made respecting the above Sections of the Criminal Code :—

Punjab Manual of Criminal Law, Chapter I, Section 1, *para.* 17, *p.* 93.—"The same law procedures (*i.e.*, as in other cases of homicide Chapter 7, Section 1, paragraphs 1—13) apply in cases of administering poison with intent to murder, or the commission of other acts of a tendency destructive to life when done with malicious intention, more especially if the offence occur in the course of committing burglary, robbery, or theft, the amount of punishment to be inflicted will depend on whether the drug administered or the act committed was or was not of such a nature as to cause danger to life. In every case in which the offence is committed with intent to perpetrate any kind of larceny flogging may be awarded."

The first part of Paragraph 18 of the same Section is virtually abrogated by the appointment of a Chemical Examiner at Lahore, as it refers only to the cases which should be sent to the Chemical Examiner at Calcutta. The last part is—

"The report of the Medical Officer will be admitted as a document to be placed on the record of the case without any further proof of attestation than the signature of that Officer. Such a document however is not competent evidence upon which in the absence of the party who made the examination, and without opportunity to the prisoner in the Court of cross-examining him, any party can be condemned, but it will undoubtedly furnish a very useful means of testing the value of evidence directly given before the Courts."

The former paragraph states that the amount of punishment will depend on whether the drug was or was not of such a nature as to cause danger to life. There are scarcely any drugs capable of producing injurious effects which have not when administered in large quantities caused death, hence the quantity in which the drug was given when this can be ascer-

tained will, in most cases, prove whether life was endangered. Under each drug in this paper the smallest quantity that has ever been known to destroy the life of an adult is stated, and any equal or larger quantity than this would of course be dangerous to life. But in many cases it will be impossible to ascertain what was the quantity given, and in these the only means of determining the danger will be by considering the nature of the drug and the severity of the symptoms produced by it.

There is also another clause respecting poisons which ought to be generally known as it is of great importance.

Indian Penal Code, 1861, *Chapter XIV., Section* 284—"Whoever does with any poisonous substance any act rashly or negligently so as to endanger human life, or to be likely to cause hurt or injury to any person, or knowingly or negligently omits to take such order with any poisonous substance in his possession as is sufficient to guard against probable danger to human life from such poisonous substance, shall be punished with imprisonment of either description for a term which may extend to 6 months, or with fine which may extend to 1,000 rupees or with both."

"*Note.*—Suppose a deadly poison is left exposed in a place usually frequented by children. This like other Sections of this Chapter, proceeds on the principle that carelessness when sufficient in degree is to be regarded as criminal, notwithstanding that it may not have occasioned hurt. In this and the following sections the offences defined are not necessarily of the nature of public nuisances. For the offence may be committed in places where persons do not congregate together. It is sufficient that the life of a single person may be put in danger."

Another subject closely related to poisoning which is treated of in the Penal Code, is the production of abortion, which in India is largely done by drugs. The Regulations are contained in Chapter XVI. and Sections 312, 313, 314, 315 and 316, but need not be repeated at length here, as they apply generally to all acts likely to produce abortion, but this will be afterwards described.

CHAPTER II.

THE SYMPTOMS OF POISONING IN GENERAL.

By this phrase is meant the changes which occur in the feelings and appearance of a person to whom poison has been given, and which are believed to have been caused by poison, because similar changes have occurred to others affected by the same drug. Symptoms are usually divided into local, which occur only in the part to which the poison is applied, such as pain, swelling, and change in colour; and general symptoms, which may occur at any part of the body. There are some poisons which do not produce any local symptoms, as opium and usually dhatura, but all necessarily produce general symptoms. A more important division of symptoms is into those which are common to many poisons, such as vomiting or sleepiness, and which do not indicate more than that a particular class of poison has been taken; and those which are termed special or specific symptoms which when they occur in a case of poisoning indicate the exact poison which has been given, such as violent tetanic convulsions, with the limbs firmly fixed, coming on rapidly and as rapidly disappearing which indicate the administration of "kuchla" Strychnos nux vomica. A tingling or numb sensation in the mouth and tongue, afterwards extending to the limbs, indicates the administration of aconite. Deep sleep with the pupil of the eye smaller than usual is the result of opium, and insensibility often with delirium but with the pupil of eye larger than natural is caused by dhatura.

In many cases if the symptoms are given clearly, and in full detail, they will enable an experienced person to declare that a particular poison has been administered, even though none can be detected either in the contents of the stomach or in the food.

The first consideration therefore which it is necessary to decide is to determine whether it is probable that a case of ill-

ness has resulted from the administration of poison or not. To ascertain this the following circumstances should be considered :—

In a case in which poison has really been administered :

1*st.*—*The symptoms appear suddenly.*—A man may be quite well one hour and afterwards be so ill as to be unable to move. This is not so frequently the case in disease, unless caused by some mechanical injury, such as a rupture of some part of the body, or by sun-stroke, or in very severe affections such as cholera, fever, or small-pox—the symptoms of which will afterwards be considered. It usually happens that poison is given to a person who was previously in good health, but of course it may be taken by any one previously ill. So that there is reason to believe that poison may have been administered if a person a short time previously in good health is suddenly seized either with violent vomiting and purging, or with delirium, or with insensibility, and this is increased if it can be shown that he is not suffering from any of the affections above-mentioned.

2*nd.*—*The symptoms appear a short time after taking food or drink.*—This is very important, as it not only indicates that a poison has been given, but will often lead to a well-founded suspicion as to the person who has given it ; and while on the other hand the time between the appearance of the symptoms and the last act of eating or drinking will, in cases of disease, often be so long as to preclude the idea of poisoning at all. The exact interval varies with different poisons, and will be noticed under each. Thus mineral acids act almost immediately, arsenic after about a quarter of an hour, and opium usually after one hour. It must however be remembered that some disease may follow eating food, which does not contain any poison, thus a meal will sometimes produce apoplexy in persons who have a tendency to that disease, and the symptoms of this may easily be mistaken for those which would be caused by a narcotic poison. Rupture of the stomach, which however rarely occurs, is usually a result of eating food when the stomach is diseased; this may be recognised by the examination of the body after death.

Also poison may be administered otherwise than with food thus, a man destroyed three wives in succession by placing arsenic in the vagina of each, and the same drug has destroyed life by being placed in contact with the skin in the rectum and in the ear. And death may be caused by inserting the poison under the skin. A case will be mentioned in which a poisonous fluid was poured over a man's face. Occasionally poisons are substituted for harmless medicines ordered by a medical man.

3*rd.*—*If several persons partake of the substance containing the poison all suffer from the same symptoms.*—This is a most important indication when it occurs. Cholera is the only disease which is likely to affect at the same time several healthy persons shortly after a meal. But this is not always afforded, as the poison is often given to one person only, although several may be eating together. It is always necessary therefore to ascertain whether the person affected ate some of each of the dishes of which the others partook or whether he had any substance especially for himself. This enquiry will often indicate the particular article of food in which poison is likely to be found, and thus show the person who had the opportunity of placing it there.

In cases Nos. 1, 2, 8, respectively the same symptoms were produced at about the same time to several persons who had together partaken of a meal.

4.—The rapid course of the affection to death or recovery has been suggested as a proof of poisoning, but it is a very fallacious one, especially in India, where many diseases, such as cholera. sun-stroke, severe fever, &c., &c., may prove rapidly fatal.

Hence it may be considered that if a person in health soon after taking food is attacked with severe symptoms, especially vomiting and purging, and dies within 24 hours, that there is reason for a strong suspicion that his death was caused by poison. This would be greatly increased if other persons who partook of the same food were similarly affected at that time. While on the other hand if the attack was more than 8 hours after eating, the suspicion would be diminished.

CIRCUMSTANCES WHICH MODIFY THE ACTION OF POISONS.

1. (A)—RELATING TO THE POISON ITSELF (*a*) *Quantity.*—An increased quantity of a poison not only causes increased action and a more rapid effect, but often also changes the nature of the symptoms—thus arsenic in a small dose causes violent vomiting, but sometimes in a large dose it seems to overpower the system, and without necessarily producing vomiting, occasions great weakness, deep sleep, and death. Some substances however prove less injurious when given in an increased quantity, because they produce violent and immediate vomiting, and thus lead to their own expulsion before any further injury could occur.

(*b*) *Solution.*—The fact of the poison being dissolved in water frequently causes it to act more rapidly than if it is in a solid state.

(*c*) *Mixtures.*—If the poison is mixed with food, its rapidity of action would be altered according to the readiness with which the food was digested. Thus arsenic mixed with a chuppatee would act less quickly than if mixed with sugar or a sweetmeat, and this more slowly than if dissolved in water.

2. RELATING TO THE PATIENT.

(*a*) *The part to which the poison is applied.*—Gaseous poisons applied to the lungs act most rapidly, but are rarely a subject of enquiry in India. Here and in other countries, poisons are usually administered by being taken into the stomach, and in this way they act more rapidly than if merely applied to the skin or even if inserted beneath it.

(*b*) *The condition of the person at the time.*—The action of most poisons is delayed sometimes for a considerable interval by sleeping. The presence of a large quantity of food in the stomach also impedes the action of poison, while if it is taken on an empty stomach it acts much more rapidly.

(*c*) *Habit or disease.*—It is well known that a person who is accustomed to take opium can take poisonous doses without their producing any ill effect, and the same tolerance is said to take place in those who eat arsenic, while in some diseases large

doses of this and other poisons may be taken even with advantage. But when the poison tends to produce a similar action to disease, the effect of even a small dose of it is greatly injurious. On the other hand persons are sometimes though rarely found who are peculiarly susceptible to the action of certain poisonous drugs especially mercury, and even of articles of food. Thus mutton has been known to produce in a man who had this peculiar antipathy to it all the symptoms of irritant poison. This state is extremely rare, but might at some time require investigating.

SYMPTOMS OF THE DIFFERENT CLASSES OF POISONS.

Poisons are usually divided into three classes: Acrid poisons, such as arsenic; narcotic poisons, as opium; and neurotic poisons, of which dhatura and aconite are examples. Acrids are distinguished by their causing pain and other indications of disturbance in the part to which they are applied; thus, if they are taken into the stomach they usually cause pain there and vomiting, while narcotics tend to produce sleep and to diminish or prevent pain and vomiting. The neurotics are an intermediate class which include poisons that in their first effect often resemble acrids and produce pain and vomiting while in their subsequent action they produce various nervous affections, but some neurotics such as dhatura, when given in large doses, produce insensibility without any previous vomiting, and without much pain; while others, as aconite, produce symptoms of irritation but very often do not occasion sleep, others as nux vomica cause tetanic spasms.

Acrid poisons.—The symptoms caused by acrid poisons being taken into the stomach are as follows:—

It is only sometimes that pain in the mouth and throat coming on shortly after the poison is swallowed is experienced, since pain is only caused by prolonged contact of the poison with the living membrane of the throat, but it may be absent at first and come on after vomiting, or a sense of constriction in the throat, be caused, but there is usually severe pain in the situation of the stomach with a feeling of sickness and at length vomiting. The

nature of the pain and of the vomited matters varies with different poisons, but the latter often contains blood. Afterwards the pain in the stomach increases, while the vomiting continues, and the whole belly becomes tender on pressure, rendering even breathing painful. Usually, there is painful purging, sometimes of blood. The pulse is at first quick, and the skin hot, afterwards the pulse becomes weaker and the skin covered with a cold, clammy sweat, and the sufferer excessively weak.

Some acrid poisons produce immediate pain in the mouth and throat, and usually change the colour of those parts, these are called corrosive poisons, such as sulphuric acid (gandak ka tezab) corrosive sublimate (raskapur), &c., others produce various affections of other parts of the body, besides the throat and abdomen, and are styled remote acrids such as arsenic (sankhya) while those which only affect the stomach and bowels are termed simple acrids such as croton oil, Jamalgota, and other vegetable poisons.

In addition to the above changes it sometimes happens that there is hoarseness, loss of voice or difficulty of breathing indicating that the affection has extended to the air passages.

The other symptoms which occur vary with different poisons.

Diseases which may produce similar symptoms.—Cholera and inflammation of the stomach or bowels, or of the peritoneum, that is, the lining tissue of the abdomen, also strangulated hernia, dysentery and internal obstruction of the intestines, over distension or rupture of the stomach or rupture of the spleen, liver or intestines.

1.—*With respect to cholera*—This usually attacks several persons in the same place, but ordinarily at different times while poisoning either attacks only one person at a time or if it affects more, the symptoms appear at about the same time with each, because each has at the same time swallowed the poison with his food. Also, the vomited matters and those passed by purging are often mixed with blood in cases of poison, and rarely or never so in cases of cholera. The appearances after death also differ very greatly, and lastly, if poison has been taken it can

usually be found either in the contents of the stomach or in the vomited matters.

2.—Acute inflammation of the stomach and bowels is very rare except when poisons have been given. It is further distinguished by usually not commencing soon after a meal, and by being accompanied with constipation instead of purging as in irritant poisons.

The same remarks apply to peritonitis, although this does more often occur without any poison being given. In addition it is easily recognised after death. Rupture of the stomach can only be distinguished by *post mortem* and chemical examination, so also with rupture of other organs of the abdomen, as the spleen, but this is generally the result of direct violence over a diseased part.

Dysentery in its acute form is common in India, and might be mistaken for poison in some cases. But it differs in not commencing usually shortly after a meal, and in the purging being commonly more frequent than the vomiting; also that the motions are stained with blood while the vomited matters are free from this. The seat of pain in dysentery also is at the lower part of the abdomen, but in poison it is at the upper part in the region of the stomach.

In hernia and obstruction of the bowels there is not usually any correspondence between the occurrence of symptoms and the time of taking food. Purging also does not occur, but the fœces are actually vomited sometimes in these diseases, while in cases of poisoning purging usually is present, likewise the situation of the pain is at the lower part of the abdomen and the obstruction can be recognised after death. Intestinal hœmorrhage may occur from many causes and may give rise to a suspicion of poisoning, but when it depends on the presence of poison it is usually accompanied by vomiting often of blood.

Over distension of the stomach will give rise to some of the symptoms of poisoning, but the history of the patient, and especially a *post mortem* examination, if death takes place, will prove the real state of the case.

Post mortem appearences.—These are chiefly those of inflammation of the stomach to be afterwards described, the lining membrane is often discoloured in various ways which will be described under each poison.

There is seldom inflammation of the intestines unless of the duodenum and rectum. Congestion of the brain or lungs occur rarely.

The corrosive poisons occasionally perforate the stomach and cause intense inflammation of the lining membrane of the abdomen, but these are very rarely used in India.

Symptoms of narcotic poisons.—These do not usually cause any pain in the abdomen or vomiting, but the first symptoms are a feeling of drowsiness with difficulty in walking or standing, so that the patient has great tendency to sit or lie down : sometimes there is unsteadiness in moving, so that he appears to be drunk. Soon after he falls asleep, and at first can be roused by speaking loudly or shaking him, but after a short time he becomes quite insensible, and may even be injured without awaking. The pulse is at first quick, and the skin warm, but after a time the pulse becomes slower, and the skin cold, and frequently the breathing is loud and noisy. The state of the pupils of the eyes varies with different kinds of poisons, sometimes they are larger than usual, as in poisoning by dhatura, while at other times, as in poisoning by opium, they are smaller than natural. Hence it is important to notice this carefully. Sometimes delirium occurs, that is, the person performs strange acts, such as throwing off his clothes, scraping up the earth, &c., or utters absurd expressions ; at other times there are convulsions either of the whole body or of the limbs on one side.

Vomiting rarely happens unless just before death, and pain is not complained of with most of these poisons, though sometimes there is a peculiar sensation in the mouth and throat.

The principal diseases which are likely to be mistaken for narcotic poisons are apoplexy, epilepsy, sun-stroke, very severe fever rapidly ending fatally, inflammation of the brain and spinal

chord, and disease of the kidneys and heart and convulsions in children.

Apoplexy is distinguished first by its usually occurring to old people, while poisoning may occur at any age, by its first symptoms beginning at various times with respect to the meals of the sufferer, while the first symptoms of poisoning by narcotics ordinarily commence from one hour to two hours after a meal has been swallowed. Also, in apoplexy, usually headache, giddiness, or other symptoms of disturbance in the brain have occurred for several days previously, while of course no such symptoms exist in poisoning; the attack of apoplexy is also much more rapid, insensibility coming on shortly after the more severe symptoms appear, and after the patient at once becomes quite insensible, it seldom happens that he can be roused in apoplexy, but in narcotic poison this is frequently possible. Lastly, sometimes apoplexy can be recognised by the *post mortem* appearance if the brain is examined.

The effects of dhatura can usually be distinguished from apoplexy by delirium occurring in the former, the patient being capable of being roused. The effects of opium by the pupils being contracted instead of dilated which usually is the case in apoplexy and by the smell of the breath and vomited matters.

Epilepsy.—This disease seldom proves fatal the first time, hence it is usually possible to ascertain that the sufferer has undergone previous similar attacks. The insensibility occurs ordinarily from the very moment of the seizure, and is so complete, that the patient cannot be roused by any means, this is contrary to what occurs in narcotic poison; convulsions almost always commence at the beginning of the attack, and last for some time in epilepsy.

Sun-stroke.—In this affection there is first a history of exposure either to the sun or to great heat in a confined space, and it may happen that previous to either of the above injurious agents affecting him the sufferer has also taken a full meal or a large quantity of spirit. This affection is especially characterised by the pungent heat of the skin which remains for some

time after death, and which does not occur after narcotic poisoning, and also by the appearances on examining the body, especially in the lungs, which are highly congested in the above disease.

Severe fever leading to death within two days from the attack may be mistaken for narcotic poisoning. In the former case, however, there is generally headache, and complaints of feeling unwell; for some days before the severe symptoms occur, and the commencement of these does not usually date from a short time after something has been eaten. It is seldom also that insensibility is an early symptom of fever.

Convulsions frequently occur to children from a slight cause such as indigestion, difficult dentition or teething ; and as they may also be produced by opium, it is difficult to distinguish death from disease when convulsions occur, from that caused by poison, but opium does not always produce convulsions even in children; and when only insensibility is occasioned, the disease cannot be convulsions. Also opium usually contracts the pupil, and can be detected in the stomach after death, though both these proofs may be wanting.

Inflammation of the brain or the spinal chord.—These resemble fevers in coming on more gradually than narcotic poisoning, and in having no reference to the time when food is taken. They are also distinguished by evident appearances in the affected part after death. In the latter case palsy of the limbs is a frequent symptom and the disease is seldom so rapid as in poisoning.

Disease of the kidney is one of the most common causes of death resembling narcotic poison, but it is distinguished by generally occurring in people past the middle period of life, and who had been ailing for some time previously, and frequently affected with purging. A *post mortem* examination or the analysis of the urine will usually show the true cause of death.

Disease of the heart sometimes causes symptoms similar to those of a very powerful narcotic poison, but death is yet more speedy, and the disease can be recognised by an examination after

death of the body. It also does not usually occur shortly after a meal.

The post mortem appearances in poisoning by narcotics are often little conspicuous. Rarely is there any real inflammation of the stomach or intestines, though sometimes great congestion of the former organ may occur, especially if the insensibility has existed for some time.

The brain is usually full of blood, and its sinuses distended, there is often effusion of serum into the ventricles and at the base and the section of the brain substance presents more numerous bloody spots than usual. Extravasation of blood is very rare, but sometimes occurs and may be mistaken for apoplexy.

The lungs have often a larger quantity of blood than usual in them and the larger veins are often much distended, as are also the liver, spleen, and kidneys. The *post mortem* examination is therefore chiefly valuable by showing that no other disease existed which could account for the death, and only occasionally by indicating the probability that a narcotic poison may have been administered.

Treatment.—In poisoning by narcotics, vomiting seldom occurs till medicine is given, hence emetics are almost always required, and the mustard and water emetic easily obtainable is usually the most efficacious. It may be administered every quarter of an hour till vomiting occurs.

When this has once commenced, it is advisable to omit the mustard, and only administer draughts of warm water till the stomach is emptied. A stomach pump should be used if it is possible to obtain and employ it. The patient should always be prevented sleeping as far as possible by walking him about between two men if he is able to do so, and by talking to him and insisting on his speaking in return. If this fails, various means may be used to give him slight pain so as to rouse him without causing any permanent injury such as pulling the hair, pinching the skin. Strong tea given in full doses has been recommended as an antidote or medicine to remedy the effects of this poison, and may be administered freely after the stomach is thoroughly

emptied by vomiting if it is procurable. A mixture of catechu (*Ap.*) found in all the bazaars under the name of "kuth," with a little warm water will be useful under the above circumstances, and may be given in doses of from one to two mashas.

If the person is already insensible when first seen, the best remedy is to pour cold water on his head and face from a bhisti's mussuck ; it is, however, desirable not to chill him too much, and therefore if the head, after the water is poured on, feels perceptibly cold to the hand, the affusion should cease, and the head and neck be rubbed with cloths till they are dry, and warm blankets should be wrapped round the body ; generally the person will become somewhat sensible after the water has been poured for a short time. It is then possible to get time to administer remedies, and an emetic should be given immediately.

If the patient can be kept awake for twenty-four hours, he may probably recover. To assist him to do so, it may be necessary to give stimulants, as sharab and water, whenever he feels weak, and to allow him to take a little food.

Artificial respiration is often of great service, but requires to be kept up for several hours, and the application of electricity to the heart and chest may be very useful if the proper instrument can be obtained.

After the twenty-four hours are over, it is advisable to give purgatives. If no European medicines are procurable, the seeds of kaladana (*Ipomea cærulea*) may be given ; about 10 of these will be sufficient ordinarily, and the patient should be encouraged to drink largely of warm liquids during the day ; or two or three castor oil seeds (*arend*) may be given.

Neurotics.—These produces both the symptoms of acrids and of narcotics ; they cause usually at first a peculiar taste in the mouth, and more or less pain in the throat and stomach, with great thirst, ordinarily also they excite vomiting and purging, but not always. Afterwards the symptoms vary greatly, and will be described under the head of each poison, but sleepiness ending

in insensibility and death, is usually the termination ; convulsions also not unfrequently occur before death, but some produce tetanic spasms only.

Generally in small doses they act chiefly as acrids, in larger ones as narcotics, but their acrid action is seldom fatal. They vary so much in the particular symptoms which they produce, that no further general rule can be laid down, nor can any list of diseases be drawn up which may be mistaken for the effects of these poisons, but under each the particular diseases which resemble it will be mentioned.

Treatment.—The same as for narcotics as their acrid action is seldom very dangerous.

They, however, more frequently require the use of stimulants than narcotics.

In most cases the administration of tea or of the infusion of catechu already mentioned, will be useful. Further remarks as to the treatment will be given under each.

The *post mortem* appearances vary very much in these classes ; not unfrequently there are no characteristic changes, at other times they act like irritants and produce inflammation or great congestion of the stomach, but ulceration is very rare and perforation never present. At other times there are no traces even of congestion in the stomach, but the brain is remarkably congested as in death from narcotic poison. But the *post mortem* changes are not at all charactertistic of this class of poisons.

Of the numerous poisons which exist in India, there are fortunately only three in common use ; and these it is intended to consider first. They are arsenic, dhatura and opium. Arsenic although not so commonly used as dhatura, is most commonly used for murder : opium for suicide, and dhatura to conceal robbery, but opium is also used for infanticide and dhatura occasionally to produce death.

The number of cases of poisoning that have occured in the Punjab will be seen in the following tables :—

Year.	Total cases.	Poison detected.	Arsenic.	Opium.	Dhatura	Other Poisons.
1861	81	36	26	5	...	5
1862	108	49	22	9	4	14
1863	129	54	40	5	1	8
1864	139	51	32	4	3	12
1865	247	194	69	13	9	13
1866	356	169	117	31	7	14
Statistics not found.						
1879	275	175	96	22	19	38
1880	377	186	90	34	26	36
1881	391	151	109	14	20	8
1882	402	207	118	25	18	46
1883	375	140	95	16	16	13
1884	406	176	99	20	22	35
1885	471	193	101	51	16	25
1886	529	242	133	62	14	33
1887	433	212	139	39	5	29
Total ..	4,719	2,145	1,286	350	180	329

From this the steady increase of the number of cases and the number of convictions will be seen, and also the very great preponderance of the cases in which arsensic was observed; it will also be seen that all other poisons were in less number, that opium and dhatura only formed one-sixth of the total amount found.

The nature of the other poisons is shown in the accompanying table:—

	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.
Metallic Mercury	...	6	1	3	...	3	1	6
Sulphate of Copper ...	5	...	4	7	1	6	1	2
Corrosive Sublimate ...	1	...	...	...	...	2	...	3
Croton Seed ...	1	2	...	1	1	...	...	...
Aconite ...	1	...	...	4	...	1	1	1
Hydrocy. Acid ...	1	...	...	...	...	...	...	2
Alcohol ...	1	...	1	...	...	2	2	2
Cannabis Sativa	1	...	...	...	1	2	...	3
Antimony ...	...	...	...	...	...	...	1	...
Nitric Acid ...	...	...	...	...	...	...	..	3
Acetate of Copper	...	..	...	1	...	...	...	...
Nux Vomica ...	...	...	..	1	...	...	...	...
Cyanide of Potash	...	...	1	...	...	...	...	...
Cantharidies ...	2	...	...	...	...	...	...	...
	13	8	7	17	3	16	6	22

Arsenic is therefore the most important, as being the most deadly, and because it is more frequently the subject of a judicial investigation, since it is discovered with greater certainty than any other. It will therefore be subject of the first description.

XLVII—Post mortem and Medico-Legal Examinations and References to the Chemical Examiner.

From the Chief Court Circular of 1887.

Proocedings anterior to medical examination.

The proceedings that ordinarily precede *post mortem* and other *medico-legal* examinations, namely, the local investigation by the Police and the transmission of the person, body, or article, with a report, to the Medical Officer, who is the Civil Surgeon or other Medical Officer appointed in this behalf by the Local Government under Section 174, Criminal Procedure Code, are provided for by Chapter XXVI of the volume of Police Rules, which, for the sake of easy references is added as Appendix A to this Judicial Circular.

Necessity of medical examination being thorough and complete.

2. The attention of Medical Officers is invited to the extreme importance attaching to *post mortem* and other *medico-legal* examinations, and to the necessity of their being as thorough, searching and complete as possible, and to the desirability of a speedy return being made to all requisitions for examination.

Points to be noted in medical examination.

3. Headings for a medical report after a *post mortem* examination are annexed to this Circular as Appendix B not as necessitating a tabular statement in reply to every question, but as indicating the points which medical examination ought to clear up, and the amount of information as to collateral circumstances which it ought to afford.

The rules issued by the Bombay Government, for the guidance of medical officers in conducting *post mortem* examinations and examining wounded persons, are also annexed, for information, as Appendix C.

Decomposition no excuse for a perfunctory examination.

4. In the case of exhumed bodies or bodies in a state of decomposition, as complete an examination as the circumstances of the case demand must be made, and the distastefulness of the task cannot be accepted as an excuse for the perfunctory discharge of so important a duty.

Many causes of death discoverable in spite of decomposition.

5. The questions to be determined by a *post mortem* examination vary in different cases, and the possibility of determining them effectually is not in every case equally dependent on the stage which the process of putrefaction has reached.

Thus, in death from drowning, strangulation, and various diseases, questions respecting the appearance of fresh tissues and the amount of blood in parts require to be considered, and these can only be determined soon after death, and before putrefaction has made much progress.

But it would be quite possible to determine the existence or absence of a wound or severe bruises of soft parts, even if decomposition were considerably advanced; and injuries of bones, pregnancy, presence of foreign bodies, metallic poisoning, and some profound organic diseases, are ascertainable long after death.

When *post mortem* examinations are obligatory.

6. In each case the circumstances, so far as they are known, respecting the death and the discovery of the body, which are communicated by the Police, will enable the Medical Officer to form an opinion as to whether it would be possible by a *post mortem* examination to throw any light on the cause of death; and wherever such possibility exists, or whenever nothing is known, it is his duty to make as full an examination as possible.

Exhumation of bodies.

7. Similar considerations should guide a Magistrate in determining on the propriety or otherwise of exerting the power given him by law of ordering the exhumation of a body. In cases of doubt the Magistrate should, if possible, consult a Medical Officer before passing the order.

Medical report after examination.

8. The Medical Officer having completed his examination of the person, body, or article sent, should record in full the result arrived at, and, in case of a *post mortem* examination, his opinion as to the cause of death.

He should further state whether he intends to send anything to Chemical Examiner, and if so, what. The report should

be either written on the back of, or attached to, the police letter forwarding the person, or body, or article for examination, and should contain such reference to it as to leave no room for question as to the case to which the remarks apply.

This report will be placed with the police file of the case, and may be used to refresh the memory of the Medical Officer at the time of his giving evidence.

In cases in which the Medical Officer sends anything to the Chemical Examiner, a copy of his statement or *post mortem* report, prescribed in rule 11 or 12, should be sent with his report to the Police.

Transmission of articles to Chemical Examiner rests ordinarily with Medical Officer.

9. The question as to whether any, and if so, what, articles should be sent for chemical analysis, and the transmission of such articles to the Chemical Examiner, will rest ordinarily with the Medical Officer (usually the Civil Surgeon), who should, however, attend to any requisition made by the Magistrate or Police in this matter.

In certain cases Police may correspond direct.

In cases where human subjects are not concerned, the Police may send articles to, and correspond direct with, the Chemical Examiner.

Magistrate at liberty to send.

All Magistrates are at liberty to forward any articles connected with any criminal case before them to the Chemical Examiner, but the desirability of their consulting the Civil Surgeon or other Medical Officer before doing so is obvious.

Everything upon which the Chemical Examiner's opinion is necessary should be forwarded to him with the least possible delay.

General remarks on Chemical Examiner's work given in Appendix D.

10. On the subject of the Chemical Examiner's work in India, the careful attention of Magistrates, Medical Officers and Police is directed to the "Statement of the conditions of *medico-legal* enquiry in India as compared with such enquiry in England," prepared by the Chemical Examiner for the Punjab, and annexed hereto as Appendix D.

11. Whenever any article is sent to the Chemical Examiner, whether by Magistrate, Medical Officer or Police, it should be accompanied by a statement containing all possible information that may serve to guide the Chemical Examiner in his investigation; and the rules as to weighing, packing and sealing, prescribed for Medical Officers in poisoning cases, and contained in rules 15—18 inclusive must, as far as they are applicable, be followed.

Statement or *post-mortem* report to accompany articles to Chemical Examiner.

12. In cases of poisoning, where there has been a *post mortem* examination, and reference is made to the Chemical Examiner, a detailed account of the symptoms, *post mortem* appearances, and treatment (if any), and a summary of any evidence bearing on the mode of administration of poison, and the interval at which the symptoms appeared after the supposed poisonous substance was taken, should be sent by the Medical Officer conducting the *post mortem* examination. For this purpose a form of *post mortem* report is given in Appendix E, which will take the place of the statement referred to in the preceding rule.

Special rules for guidance of Medical Officer in cases of poisoning where there has been a *post mortem* examination.

13. In all such cases the stomach should be tied at both ends and removed from the body, so that its contents may be retained. After removal, it should be opened, the contents received into a perfectly clean bottle, and the mucous surface of the stomach carefully examined, its appearance noted, and any suspicious particles found adherent thereto should be picked off with a forceps and placed in a separate packet for transmission.

What to be transmitted in poisoning cases:—Stomach.

14. A portion of the liver, not less than 16 ounces if possible, should be sent in all cases of death from supposed metallic poisoning; and in cases where it is suspected that dhatura or other vegetable poison has been the cause of death, the contents of the small intestines should likewise be forwarded.

A portion of liver to be sent in cases of metallic poisoning. Also food, &c.

Suspected food, drink and drugs, and any vomited matter, should also be sent.

Mode of packing articles for transmission.

15. All articles should be sent in separate bottles, the stomach in one, its contents in another, the liver in a third, dry articles in small phials ; and when any articles liable to decomposition are sent, they should always, whether the season be hot or cold, be immersed in methylated spirits of wine, which should be used in the proportion of one-third of the bulk of the article.

The cork of each bottle should be tied down and sealed, and each bottle should be numbered. To ascertain that it has been securely closed, the bottle should be placed for some minutes with its mouth down.

Articles to be weighed.

16. The weight of each article sent, and, where the portion of an organ is sent, the weight of the whole organ, as well as of the part sent, and in the case of fluids, the total quantity of the fluid, and the quantity sent should be stated on a ticket to the bottle, and also in the letter of invoice prescribed in rule 20.

Bottles to be packed in box.

17. The several bottles containing the articles sent should be enclosed in a tin or wooden box, which should be large enough to allow of a layer of raw cotton, at least three-fourths of an inch thick, being put between the bottle and the box ; the box should be securely fastened and covered with wax-cloth.

Precaution to be taken in packing offensive articles.

In cases where any of the contents of the bottles might prove offensive, the box must be of tin, and Macdougall's powder or charcoal should be dusted between the box and wax-cloth.

Articles to be packed and sealed in presence of forwarding officer.

18. All articles on being put up by the forwarding officer and sealed and numbered by him, should be packed in his presence and under his immediate supervision, and the package should then be sealed by him, in accordance with the usual rules of the Post Office as to parcels in such a manner that

it cannot be opened without destroying the seal. The seal used should be a private seal, and the same throughout.

Responsibility of forwarding officer.

19. Despatching officers will be held personally responsible that these instructions are carefully followed. The parcel should invariably be sent to the Post Office by the forwarding officer and not by a subordinate. A declaration of contents to the Postal Department is unnecessary, and should not be made. (Government of India, Home Department, Circular No. 3 of 1880.)

Letter of invoice.

20. In all cases of transmission of articles to the Chemical Examiner, whether by Magistrate, Medical Officer or Police, a letter of invoice, giving a full description of the articles sent should be despatched by post together with the statement or *post mortem* report. A duplicate of the invoice should also be placed between the wax-cloth and the box to accompany the package. Both copies of the invoice should be stamped with an impression of the seal referred to in rule 18.

The Chemical Examiner should be requested to return, if possible, any article sent to him for examination which is likely to be required at the trial.

Packages to be prepaid.

21. All packages and letters addressed to the Chemical Examiner should be sent prepaid ; if not, the Chemical Examiner will pay the carriage or postage and recover from the transmitting officer.

Form of Chemical Examiner's report.

22. The report of the Chemical Examiner of the results of his examination, which is admissible as evidence under Section 510 of the Code of Criminal Procedure, should be in the form given in Appendix F. To it should be attached the original letter of invoice mentioned in Rule 20.

It will be despatched to the transmitting officer (a duplicate being retained in the Chemical Examiner's office), and should be placed with the file of the case.

23. If sufficient information has not been supplied to the Chemical Examiner to enable him to certify to the presence or absence of any poison about which judicial questions may arise, he may, before completing his examination, apply to the transmitting officer for any further information bearing on the case that might guide him in his search, and such officer must, after such enquiry as may be necessary, furnish the information called for without delay.

Chemical Examiner may call for further information.

24. In inquiries or trials, where reference has been made to the Chemical Examiner, it will be the duty of the Magistrate to examine the official who despatched the articles for analysis with regard to the identity of the invoice and seal and thereby establish the identity of the subjects reported on with those sent for analysis, and prove that the Chemical Examiner's report refers to the subject connected with the case under enquiry. If the decision of the case turns on the results of the chemical examination, a copy of the judgment, and of the evidence regarding symptoms and *post mortem* appearances, will be supplied to the Chemical Examiner ; such copies being made at the expense of Government as a special charge.

Identity of articles reported on with those sent for analysis to be established.

Copies of documents to be sent to Chemical Examiner in certain cases.

25. In all cases of homicide, where the body is found, the identity of the the body with the person said to be deceased, must be fully established before the Magistrate trying or inquiring into the case.

Identification of body and articles in evidence before Court.

In such cases, where there has been a *post mortem* examination, evidence must be recorded by the Magistrate to prove the custody of the body of the deceased after death, and its delivery for the purpose of *post mortem* examination to the Medical Officer.

26. In all cases in which articles are brought up in evidence, the custody of such articles throughout the various stages of the inquiry must be clearly traced and established. Evidence must be recorded on this point, and the evidence should never leave it

Custody of articles in evidence to be proved.

doubtful as to what person or persons, have had charge of the articles at any stage of the proceedings. All such articles must be distinctively marked, and any reference to them in the record must be so clear as to leave no room for doubt as to the special article referred to.

Evidence of unprofessional witnesses on blood and human hairs to be received with caution.

27. Magistrates are warned that the evidence of non-professional witnesses on the subject of blood and of human hairs must be accepted with the utmost caution, and that, where the case rests materially on the proof of such matters the evidence of a professional witness must be taken, and reference made, if necessary, to the Chemical Examiner. It must be borne in mind that, for the purpose of evidence in criminal cases, there is no test for distinguishing the blood of a human being from that of one of the lower animals.

Treatise on certain *medico-legal* matters annexed.

28. With a view to assisting Magistrates and Police Officers in conducting inquiries into cases of suspected murder, and other cases in which *medico-legal* questions are involved, an Appendix G is annexed, which contains the following:—

(*a*).—Symptoms produced by some of the more common poisons.

(*b*).—Questions that may be put to medical and other witnesses in certain cases.

(*c*).—Points to be inquired into in case of death from rupture of the spleen.

APPENDIX A.*

INVESTIGATION OF THE CAUSE OF UNNATURAL OR SUDDEN DEATH OF HUMAN BEINGS, AND OF DEATH OF ANIMALS SUPPOSED TO HAVE BEEN POISONED.

1. The following rules relate to the investigation by the Police of the cause of the unnatural or sudden death of a human being, and the death of an animal supposed to have been poisoned under circumstances creating a reasonable suspicion that an offence has been committed.

Investigation into cause of death.

Part I.—Unnatural or sudden death of a Human Being.

(*a*).—*Investigation by whom to be made.*

2. Except in the cases hereinafter excepted, the officer in charge of every Police Station, on receiving notice or information of the unnatural or sudden death of any person, when the body of such person is within the local jurisdiction of such Police Station, shall immediately give intimation thereof to the nearest Magistrate duly authorized to hold inquests, and shall proceed to the place where the body of such deceased person is, and hold the inquiry in the manner provided by section one hundred and thirty-three of the Code of Criminal Procedure.

When officer in charge of Police Station to hold investigation.

Cf. Section 8 of Act IV of 1871, and Sec. 1. *Cf.* 6 and 7 Vict. c. 12.

3. The cases mentioned in the last preceding paragraph, as excepted from the ordinary rules, shall be as follows: that is to say,

Exceptional cases.

(1). When notice or information is received by the officer in charge of a Police Station of the unnatural or sudden death of a person in a Military Cantonment, or of a person who has met his death by injuries unlawfully inflicted by a military person or camp follower, the Cantonment Magistrate or the nearest competent Magistrate (in the event of the office of the Cantonment Magistrate being filled by an Assistant Cantonment Magistrate who has not been specially empowered to hold inquests, and in places beyond Cantonments), as the case may be, shall without delay be specially invited to hold an inquest under the provisions of section one hundred and thirty-five of the Code of Criminal Procedure;

* Taken from the Volume of Police Rules, Chapter XXVI.

(2) If, in the cases mentioned in sub-section (1), the Magistrate in question fails to hold such inquest, the District Superintendent of Police, or, in his absence, the Assistant District Superintendent of Police, shall hold an investigation under the combined provisions of section one hundred and thirty-three and one hundred and thirty-seven of the Code of Criminal Procedure;

(3) The rules relating to Military Courts of Inquest, are given as No. I in the appendix, but an inquest under Criminal Procedure Code shall be held whether such Military Courts are held or not. If in the case mentioned in sub-section (2), neither the District Superintendent of Police nor the Assistant District Superintendent of Police is available, the officer in charge of the Police station concerned shall hold the investigation;

(4) On occasion of a death by violence in a military prison, when an inquest has been held by a Magistrate duly authorized to hold inquests, the Police shall not make the investigation into the cause of death;*

(5) In the case of the unnatural or sudden death of a European soldier, Non-Commissioned or Commissioned officer, the Police shall confine their action to an immediate report to the nearest Magistrate duly authorized to hold an inquest,

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* Section 133 (3) (4) of Statute 44 and 45 Vic., Chapter 58 *(The Army Act*, 1881,) provides for an inquest being holden in a military prison by the nearest Magistrate duly authorized to hold inquests in the case stated in the text. It further provides that, where there is no competent civil authority available, the Commanding Officer shall convene a court of inquest. The rule in the text is founded upon convenience. I have assumed that, following the well-known rule in Foster's case (11 Rep. 61), the Statute being in the affirmative does not repeal or abrogate the previous affirmative law. *See* also Dwarris 533. To adapt Dr. Lushington's language in the *India* (33 L. I. Adm. 193,) the provisions of the Code of Criminal Procedure are not wholly incompatible with the Statute: nor do the two Statutes together lead to wholly absurd consequences. *See* the remarks pp. 169-174 in Hardcastle's excellent treatise. That the jurisdiction should remain both in the Magistrate and in the officer in charge of the Police Station, notwithstanding the omission of the latter in the subsequent Act, appears to be according to precedent, though the matter is not without difficulty. Maxwell (p. 136) cites a case where an Act, which authorized the Quarter Sessions to try a certain offence, was construed as not repealing by implication an earlier one which enacted that the offence should be tried by the Queen's Bench or the Assizes, and not elsewhere. It is possible that this case may turn on the presumption in favor of the jurisdiction of the superior Courts, if not, it supplies an argument against repeal by implication in the case in hand. In the question whether part of the Church Discipline Act was or was not repealed by the Public Worship Regulation Act, 1874, Lord Justice Baggallay said "I can see no inconvenience or incongruity in treating both Enactments as in force." The decision of the case turned on another point *(Queen* ver. *Bishop* of *Oxford*, *L. I. R.* 482 *B.* 648). In this case the latter Enactment provided an alternative procedure, and I have so regarded the Enactment under consideration. Where the Magistrate holds an inquest, I have regarded his inquest as in substitution for the Police investigation. There appears to be no evidence in the Army Discipline and Regulation Act of an intention on the part of the Legislature to alter the existing law as to inquests. I conclude that there is no intention to oust the jurisdiction of the Coroner in a presidency town. A Military Court of Inquest has very small powers and is a court only in name. As an independent investigation may be a benefit to the relatives of a military person, see Lord Justice Cotton's, Lord Hatherley's and Lord Blackburn's language in *The Overseers of Walshall* vs. *L. N. W. Railway*, *L. J R.* 48 *M. C.* 166. *See* also the argument and decision in *Queen* vs. *The Justices of Surrey*, *ib.* 188.

and to an entry in the station diary. In such a case the inquest shall be held under the provisions of section one hundred and thirty-five of the Code of Criminal Procedure, and not under those of section one hundred and thirty-three of that Code; *

(6) On occasion of an unnatural or sudden death within the walls of a prison †; and

(7) In cases in which a Magistrate, duly authorized to hold an inquest, has held an inquest in substitution for the Police inquiry.

Deaths in prisons.

4. (1). Officers Commanding prison guards shall, for the purposes of section one hundred and thirty-three of the Code of Criminal Procedure, possess the powers of an officer in charge of a Police Station.

(2). On occasion of an unnatural or sudden death within the walls of a prison, it shall be the duty of the Jailor to report the facts forthwith to the Officer Commanding the prison guard.

(3). On receipt of such report, such officer shall proceed to the spot and place a guard over the body with orders not to allow the body or anything which may have moved to and caused the death of the deceased to be touched until the arrival of a Magistrate; and such officer shall, at the same time, send immediate intimation to the senior Magistrate present at the station, with a view to an inquest being held.‡

Deaths from Railway accidents.

5. (1). On occasion of an unnatural or sudden death, apparently caused by a Railway accident other than an accident arising from an unavoidable mechanical failure, the Police investigation shall ordinarily be held, when the body is within Railway limits, by the Assistant Inspector General of Railway Police, and in his absence by the District Superintendent of Police or Assistant District Superintendent of Police in whose district such body is. Until the arrival of one of such officers, the officer in charge of the Railway Police Station concerned shall take all necessary measures to facilitate such investigation.

(2). If such body is beyond Railway limits, such investigation shall be held by the District Superintendent of Police or Assistant District Superintendent of Police, and, until one of such officers arrives, the officer in charge of the Police Station concerned shall take all necessary measures to facilitate such investigation.

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* This rule has been framed under the orders of the Government of India. It governs sub-sections (3) and (4).

† See Jail Circular Memo. 4 of 1881 forbidding Magistrates in charge of Jails to hold inquests in such cases unless it is unavoidable.

‡ Such inquests are to be held "whenever a prisoner dies from the effects of punishment or within 30 days of receiving such punishment, or with any injuries or marks of such punishment on him, or whenever there is any possibility of any doubt, or complaint or question concerning the cause of death arising, or whenever a prisoner dies from the receipt of any injury, or within 30 days of the receipt of any injury whether inflicted by himself or by any one else, or incurred in the performance of any labor or work, or from the attack of any animal, or in any way whatsoever," Section 245, Jail Manual.

(*b*).—*Investigation how to be made.*

Persons summoned to assist.

6. In summoning respectable inhabitants who are to take part in an investigation, the Police Officer concerned shall, if possible, select fit persons with reference to the nature of the investigation.*

Illustrations.

(*a*) The question is what was the apparent cause of the death of A ? A died of an injury caused by a carpenter's tool whilst working at the trade of carpenter. One of the persons summoned shall, if possible, be a person acquainted with the use of such tools.

(*b*) The question is what was the apparent cause of the death of B B was found dead close to a broken Railway gate which had apparently been broken open by the passage of a train. One of the persons summoned shall, if possible, be a person acquainted with the working of the Railaway.

Invitation to Civil Surgeon.

7. When an important investigation is held, or when an investigation is held at a place near the residence of a Civil Surgeon or other Medical Officer appointed by Government for the examination of bodies, immediate intimation shall be given to such Surgeon or Officer with an invitation to examine the body at the place where it is lying. If possible such intimation shall be sent by the Officer in charge of the Police Station concerned through the District Superintendent of Police who shall add a request in English.

Duty of officer making investigation.

8. On arrival at the place where the body of the deceased is lying, the Police Officer making the investigation shall do the following things ; that is to say,

(1) He shall prevent the destruction of evidence as to the cause of death ;

(2) He shall prevent crowding round the body and the obliteration of footsteps ;

(3) He shall prevent unnecessary access to the body until the investigation is concluded ;

(4) He shall cover up footprints with suitable vessels so long as may be necessary ;

5) He shall draw a correct plan† on the spot of the scene of death ; if not then, if possible, of the scene of death including all features necessary to a right understanding of the case ;

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* *Cf.* 34 and 35 Vict. C—78, Sec. 8.

† The plan should be drawn by the Police Officer himself or by some person who is likely to be available as a witness in event of future criminal proceedings. If the plan is put in at a subsequent judicial proceeding, the maker must depose to its accuracy, *Reg.* versus *Jora Husij*, 11 Bom. H. C. R. 242.

(6) If the Surgeon or other officer or a superior Police Officer is expected to arrive, he shall leave the body for a reasonable time until such arrival; or, if the body is lying in a thoroughfare and cannot be left, he shall cause it to be moved to a suitable place, and the posture shall, as far as possible, not be altered until such arrival or until the investigation is completed;

(7) If no Surgeon or other officer, or superior Police Officer arrives, he shall, together with the other persons conducting the investigation, carefully examine the body and note all abnormal appearances;

(8) He shall remove, mark with a seal, and seal up all clothing not adhering to or required as a covering for the body; all ornaments, anything which may have moved to and caused the death of the deceased, and make an inventory thereof, describing the position in which each thing was found, any blood-stain, mark, rent, injury or other noticeable fact in connexion with such thing, and enter in such inventory a counterpart of the mark and seal attached to such thing or to the parcel in which it has been enclosed: such inventory shall form part of the report hereinafter prescribed.

Rules for the disinterment of bodies.

9. If at the time of receiving information of an unnatural or sudden death, or if, at any time before or after he arrives at the place where the body of the deceased person is said to be, the officer in charge of a Police Station or Police Officer concerned learns that such body has been buried, such officer shall be guided by the following rules; that is to say,

(1) An officer in charge of a Police Station, and any superior officer of Police lawfully making an investigation into the unnatural or sudden death of any person, may cause the body of such person to be disinterred for the purposes of such investigation;

(2) No such disinterment shall be caused or effected until the respectable inhabitants required to take part in the investigation under the provisions of section one hundred and thirty-three of the Code of Criminal Procedure, are present; and unless and until the Police Officer, lawfully making the investigation, shall have recorded in writing the information which has reached him and the grounds on which he considers it necessary to proceed to such investigation;

(3) When such investigations are made by an enrolled Police Officer and there is a Magistrate authorized to hold inquests in the immediate neighbourhood, either of the grave or the Police Station in which such grave is situate, it shall be the duty of such Police Officer to guard the grave and ascertain whether such Magistrate will attend at once

at the disinterment. The disinterment of the body shall be postponed pending such Magistrate's reply: if such Magistrate is unable to attend the disinterment at once, such Police Officer shall proceed, in manner hereinbefore prescribed, to disinter the body;

(4) In all cases Police Officers shall examine witnesses to prove the identity of disinterred bodies with the persons supposed to have died unnatural or sudden deaths, before commencing their investigation on such bodies;

(5) In every case in which a body has lain in the grave for a period exceeding three weeks, no disinterment shall be caused or effected by any Police Officer until the opinion of the Civil Surgeon has been obtained, and then only with the concurrence of the Magistrate of the District.

Procedure after disinterment.

10. When a competent Police Officer has disinterred a body under the last preceding paragraph, he shall proceed to hold the investigation in the manner provided in paragraph eight.*

Disposal of body on conclusion of investigation.

11. When the investigation is concluded and it is unnecessary to send the body for medical examination or to keep it for identification, the Police Officer conducting the investigation, shall make over the body to the deceased's relatives or, if, there are no relatives or friends to receive the body, shall have it decently buried or burned, as may be proper, under such rules as may be made by the Magistrate of the District in this behalf.

OPINION.

In my opinion no alteration has been made in the new Criminal Procedure Code (Act X of 1882) in reference to the power of the Police to exhume bodies when making investigations under Section 174. I am not prepared to say that, under the rule of *expressio unius est exclusio alterius*, the last paragraph of Section 76 would preclude the Police acting under Section 174 from disinterring a body, and the former section, it is to be observed, refers exclusively to cases where person die *while in the custody of the Police*. On the whole, I am of opinion, that no amendment of the law was intended or has been made.

Letter No. 140, *dated* 16*th July* 1883 *from the Officiating Under-Secretary to Government, Punjab, to the Inspector-General of Police, Punjab.*

Copy forwarded to the Inspector-General of Police, Punjab, for information, with reference to his No. 182 of 2nd June 1883.

2. The Hon'ble the Lieutenant-Governor concurs in the opinion expressed by the Government Advocate (*Circular No.* 16 *of* 1883).

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* *Letter No.* 1228 *A. D. of* 2*nd July* 1883, *from the Officiating Government Advocate, Punjab, to the Secretary to Government, Punjab.*

In reply to his endorsement No. 115 of 14th ultimo, has the honor to submit an opinion as to the power of the Police to exhume bodies under the new Criminal Procedure Code.

Preservation of body for identification.

12. (1). When it is necessary to keep a body for the purposes of identification it shall be placed in the coolest room available, and the doors and windows shall be closed and watched. Carbolic acid powder shall (if available) be freely used in such room.

(2). If no identification can be obtained within the period during which such body can be safely kept, the Police Officer concerned shall, before it is buried or burned record a careful description of it, giving all marks, peculiarities, deformities or distinctive feature which might lead to recognition.

(3). When the case is one of importance and photographs or casts can be taken of the face, a photograph or cast shall be taken.

(4). When for sanitary reasons, it is necessary to bury or burn the body, the course prescribed in the last preceding paragraph shall be adopted.

Bodies to whom sent for medical examination.

13. Bodies for medical examination shall be sent to the nearest Civil Surgeon, and from the Police station jurisdictions of Tamman, Talagang and Kailar Kahar in the Jhelum District, shall be sent to the Medical Officer at Talagang when such an officer is stationed there.*

When body to be so sent.

14. In cases where there is any doubt regarding the case of death, and in cases where the bodies of persons who have been apparently run over by Railway engines or trains are not identified, the body shall be sent for medical examination if is likely to arrive in a sufficiently sound state to admit of such examination.

EXPLANATION.—Poisoners have been known to place the bodies of their victims across the line of rail with a view to its being thought that death was caused by a Railway accident.

Mode of sending bodies.

15. With respect to the sending of bodies for medical examination, the following regulations shall have effect, that is to say—

(1) A light and strong *doolie* (litter) with a covering to protect it from sun and rain shall be supplied and maintained at the expense of the Judicial Department at every Police station;

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* No. 2360, dated 4th June 1877.

From—The Secretary to Government, Punjab, Home Department.

To—The Under-Secretary to Government, Punjab, Police Department.

In reply to his No. 155, dated 21st May last, conveys approval of the Hon'ble the Lieutenant-Governor to the Medical Officer at Talagang performing *post-mortem* examinations for the Police Stations of Tamman, Talagang and Kailar Kahar, and to his drawing the usual fee of Rs. 16 in each case.

(2) The clothing left on the body shall be properly secured round it; any instrument likely to have caused death remaining in or on the body shall be left there if it can be secured;

(3) A layer of charcoal, two inches deep, shall be placed in the *doolie*; the body shall be covered with charcoal, freely dusted with carbolic acid powder, and some leafy branches placed over all;

(4) Police Officers along the route shall be bound to assist in obtaining men to carry such doolies, so that the body may be sent in as rapidly as possible;

(5) Two Police Officers who were present at the investigation shall accompany the body, and if necessary, suitable means of conveyance shall be provided for them;

(6) Expenses for charcoal and porterage of *doolies* shall be recovered from the Sheriff;

(7) On the arrival of the body at district head-quarters, it shall be at once placed and watched in the dead-house, and intimation shall be sent, through the District Superintendent of Police, to the Civil Surgeon as quickly as possible;

(8) When forwarding such intimation, the District Superintendent of Police shall give the Civil Surgeon all available information as to the supposed cause of death;

(9) After depositing a body in the dead-house the Police shall have nothing to do with its disposal, either by sending portions to the Chemical Examiner, or ultimately, by burying or burning it.

Things sent for medical examination.

16. Things for medical Examination shall, when bodies are so sent in, be sent with the body under charge of the same escort; and, when bodies are not sent in, with an escort which shall take them to the Civil Surgeon without relief.

Rules regarding things sent for medical examination.

17. With respect to things sent in for medical examination, the following provision shall have effect, that is to say—

(1). Liquids, vomit, excrement, and the like, shall be placed in clean wide-mouthed bottles or glazed jars, and the stoppers or corks shall be tied down with bladder, leather or cloth, and the knots of the cord shall be sealed with the seal of the Police Officer who made the investigation; such bottles or jars shall be tested, by reversing them for a few minutes, to see whether they leak or not;

(2) Supposed medicines or poisons, being dry substances, shall be similarly tied down in jars or made up into sealed parcels

(3) Blood-stained weapons, articles or clothes, shall be marked with a seal and shall be made up into sealed parcels ;

(4) On each bottle, jar and parcel shall be a label describing the contents and stating where each was found, and on such label shall be impressed a counterpart of the seal used ; a copy of each label and a counterpart impression of the seal used shall be given in the report hereinafter prescribed ;

(5) If the things are to be despatched by post, the precautions described in the resolution given as No. IV in the Appendix, shall be taken.

Fee for *post mortem* examination.

18. (1). Under the orders of the Government of India, Financial Department, No. 3050 of 11th August 1882, Medical Officers, other than Civil Surgeons in medical charge of civil stations and Assistant Surgeons in charge of Dispensaries, are entitled to a fee of sixteen rupees for each *post mortem* examination and to a fee of Rs. 10 for conducting a *medico-legal* case other than a *post mortem* examination in cases not falling within the ordinary discharge of their duties, and whether or not they are required to give evidence in a Court of Justice in connection with such examination. No extra remuneration, save ordinary expenses as a witness, is admissible for giving evidence.*

(2). Shall be sent for medical examination according to the rule given in paragraph 13.

Report of investigation.

19. (1). When the investigation has been completed, the Police Officer conducting it shall draw up a report stating the apparent cause of death of such deceased person, describing any mark of violence which may be found on the body, and stating in what manner or by what weapon or instrument such mark appears to have been inflicted.

(2). Such report shall be drawn up in one of the forms given in Appendix II, or to the like effect.

(3). The report shall be signed by such Police Officer and other persons making the investigation, or by so many of them as concur therein, and shall be forthwith forwarded to the Magistrate of the District, or when the Magistrate of the district has so directed to the Magistrate of the division of the district in which such investigation was made.

(4). The plan of the scene of death [paragraph 8, subsection, (5),] the inventory of clothing, &c. [paragraph 8, subsection (8)], and when bodies or articles are sent for medical examination, a list of the things on and with the body and the particulars

* The above orders apply only to Medical Officers of Commissioned rank. Medical subordinates are entitled to a fee of Rs. 4 for conducting a *post mortem* or *medico-legal* examination not falling within the ordinary scope of their duties.

mentioned in paragraph 17, sub-section (4), shall form part of such report.

(5). In cases of death by hanging, the report shall state particulars as to the height of the support and the sufficiency of it, and the thing used to bear the weight of the body.

(6). A copy of every such report shall be made in Police station Book No. VI—*Miscellaneous.*

Reports how sent.

20. (1). Reports forwarded to the Magistrate of the district under the last preceding paragraph shall ordinarily, unless such Magistrate direct to the contrary, be forwarded through the District Superintendent of Police, who shall read and pass them on without delay.

(2). A District Superintendent of Police shall, when reading an investigation report, record on it any orders he may make in reference to further investigation.*

Information in poisoning cases.

21. (1). The ordinary symptoms caused by common poisons are described in Appendix III.

(2). Police Officers making investigations in cases where poison has been administered, shall record in their reports all information likely to be of value in assisting Civil Surgeons or the Chemical Examiner to form an opinion as to the precise poison employed.

EXPLANATION.—As the tests used for the discovery of different poisons vary with the poisons, and as the substance available for analysis is often very limited, it is very important that none should be destroyed by the use of wrong tests. For these reasons full information shall be carefully sought for and supplied.

Making over of property.

22. When the Police Officer has concluded the investigation, he shall make over to the proper persons all property which he may have taken into his charge in the course of the investigation and which is not required for the end of justice. A receipt shall be taken for property so made over in Police Station Book No. VI—(*Miscellaneous*).

Where cognizable offence disclosed.

23. If the facts disclosed on the investigation disclose the commission of a cognizable offence, and the person who appears to be guilty of such offence is arrested, the Police Officer concerned shall, when he has completed the investigation of such offence, take recognizances from the witnesses as provided by law.

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* It seems necessary to point out that where the body is not found or has been burned, there can be no investigation under Section 133, Criminal Procedure Code. In such cases if there are reasonable grounds for suspecting that a cognizable offence has been committed, the Police Officer should make an ordinary investigation without summoning persons to be associated with him. It has been the practice for Police Officers in charge of stations and superior Police Officers, *mero motu*, and also under departmental orders, to hold a second or further investigation in one and the same case. There is no writ in the Punjab of *melius inquirendum*, and as, in the Coroners Act (see Section 11), it is assumed that Coroners have the power to make further inquisition, the practice seems perfectly good.

Correspondence with Chemical Examiner.

24. Police Officers shall not correspond with the Chemical Examiner direct in matters relating to human bodies. Any necessary reference in relation to such subject shall be made to the Civil Surgeon.

Chemical Examiner not be referred to on insufficient grounds.

25. No case of human poisoning, with regard to which the Civil Surgeon does not recommend investigation by the Chemical Examiner, shall be referred to that officer without a special order from the Magistrate.

Language of reports and copy to Assistant Inspector-General.

26. (1). Reports submitted by Police Officers ignorant of English shall be in Vernacular, but in all cases of death caused by a Railway accident an English translation shall be made.

(2). A copy of all reports relating to deaths caused by Railway accidents shall, when made by a Police Officer other than a Railway Police Officer, be forwarded to the Assistant Inspector-General of Railway Police.

PART II.—DEATH OF ANIMALS FROM POISONING.

Procedure to obtain professional opinion.

26. When, in the course of an investigation in a cognizable offence, relating to the supposed unlawful killing of an animal, it is necessary to obtain a professional opinion as to the cause of death of such animal, the procedure hereinafter prescribed shall be followed.

Examination of carcass.

28. (1). If the animal appears to have been poisoned in the ordinary way, and there are no signs of puncture in the carcass, the mouth shall be examined, and anything abnormal found in it secured and placed in a clean jar or battle.

(2). The carcass shall then be opened and the stomach removed. The stomach shall be cut open and its appearance observed, whether congested or not. A piece of the stomach, the most congested part, about a pound in weight, and similar quantity of the liver shall be cut off and placed in a clean glazed jar or bottle, and some spirits of wine added, if available. Water shall be gently poured over the remaining portion of the stomach, and any undissolved arsenic or poison shall be carefully collected.

(3). The poison so collected or otherwise found shall be enclosed in a sealed parcel, and the jars or bottles shall be carefully corked or stoppered, and the mouths tied down with bladder, leather or cloth, and the knots of the cord sealed with the seal of the Police Officer making the investigation. Such jars or bottles shall be tested, by reversing them for a few minutes, to see whether they leak or not.

(4). On each bottle, jar and parcel shall be a label describing the contents and giving full particulars, and on such label shall be impressed a counterpart of the seal used; a copy of each label and a counterpart impression of the seal used shall be given in the case diary accompanying the despatch.

29. (1). If the animal appears to have been poisoned with needles, the carcass shall be flayed and the flesh near the puncture examined; if it appears inflamed, a portion of flesh near the puncture shall be cut off and secured in the manner ordered in the last preceding paragraph.

Needle poisoning.

(2). Any needle found shall likewise be secured.

30. The jars, bottles and parcel (including any supposed poison found) shall be transmitted to the District Superintendent of Police for transmission to the Chemical Examiner. The case diary forwarded at the same time shall contain the following information; that is to say—

Information to accompany substances sent.

(1) Class of animal *(horse, buffalo or bullock, &c.)*

(2) Age and general condition previous to poisoning.

(3) The symptoms after the poison was given, or before death.

(4) How long after feeding the symptoms were in coming on.

(5) What the prominent symptoms were.

(6) How long the animal lived after the symptoms made their appearance.

(7) What poison was supposed to have been used.

(8) Appearance presented by the carcass after death.

(9) Any other particulars likely to be of value.

31. (1). If the District Superintendent of Police considers that there are *primâ facie* grounds for believing that the animal was poisoned, he shall cause the jars and bottles to be examined whether they leak or not, and after they have been proved to be or have been made secure, they and any parcels shall be enclosed in a soldered tin case with an outer wooden cover, and despatched, carriage paid, to the Chemical Examiner. If the case is to be sent by post, the additional precautions described in the Resolution, given as No. IV in the Appendix, shall be taken.

Despatch of substances to Chemical Examiner.

(2). A label referring to the number and date of the letter intimating despatch shall be placed inside the box, and such letter shall contain an inventory of the jars, bottles and parcels so sent, with counterparts of their labels.

32. An English translation of the material parts of the case diary relating to the poisoning of such animal shall be forwarded with the letter intimating despatch of the box.

Information to be sent.

33. The owners of the carcass of a poisoned animal shall be encouraged to destroy it by cutting up the hide into small pieces, breaking up the horns and bones, and burying the whole at a considerable depth.

Destruction of carcass.

EXPLANATION.—Cattle are sometimes poisoned for their hides. The destruction of the hide removes this motive.

PART III.—MISCELLANEOUS.

Bills for costs.

34. Bills for all costs incurred in sending in substances for medical examination, whether connected with the death of human beings or of animals, shall be presented to the Judicial Department.*

APPENDIX.

No. I.

G. O. 336.—COURTS OF INQUEST.—B. A. E.

Military Department, No. 416 – "Regulations—Military," dated 18th December 1877.

With the sanction of Government Chapter IX, Section 14, of the Bengal Army Regulations is cancelled, and the following substituted :—

Courts of Inquests when to be held.

Paragraph 1561.—On all occasions of death by violence, or attended with suspicious circumstances, an inquest is to be held, to make inquiry in the cause of death, by what means and by whom caused.

To be convened by Commanding Officers where there is no competent civil authority.

Paragraph 1562.—At all stations, in or out of British India, where there is no competent civil authority to hold such court, Courts of Inquest are to be convened by the Commanding Officers on the bodies of persons under their command.

But by civil authority where such is available.

Paragraph 1563.—At those stations where there is competent civil authority at hand, investigations into the cause, &c., of death on the bodies of the persons referred to are to be made by such authority under Section 135 of the Criminal Procedure Code. Should it appear on such enquiry that a British officer or soldier is implicated, under circumstances rendering him liable to trial by a General Court Martial on a criminal charge under the 101st section of the Mutiny Act, all the circumstances connected with the death shall be fully investigated by a Military Court of Enquiry and the proceedings transmitted to Army Head-quarters for the orders of His Excellency the Commander-in-Chief in India as to the trial of the accused.

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* No. 4077, dated Lahore, 25th August 1871.

From—Under-Secretary to Government, Punjab, Home (Police) Department,
To— Officiating Deputy Inspector-General of Police, Rawalpindi Circle.

I am desired by His Honor the Lieutenant-Governor to inform you, in reply to your No. 1473 of the 11th August, that he considers that all charges for jars and vessels for the reception of subjects for medical examination, in order to preserve them from injury, or from being fraudulently tampered with on the way in from the Police Stations to the Civil Surgeon, should be defrayed by the Judicial Department.

Memorandum No. 4078.

Copy forwarded for information to all Commissioners, Deputy Commissioners and the Accountant-General, and to all Deputy Inspectors-General and District Superintendents of Police, Punjab.

The same course will be followed when the accused is subject to the Indian Articles of War, and the deceased is his superior officer.

In all other cases, the accused will be at once handed over to the civil power, who will dispose of his case.

Composition of a Military Court of Enquiry.

Paragraph 1564.—A Military Court of Enquiry will, under paragraph 1562, be composed of three officers of experience, and a Medical Officer attending (paragraph 1576). If the deceased belonged to a regiment, the Officer Commanding will convene the court; in other cases, the Commanding Officer of the station will issue the necessary order.

When there are not three British officers available to compose the court, Native officers may be employed with a British officer to conduct the proceedings, and a duly qualified interpreter.

Duties of a Court of Inquest.

Paragraph 1565.—The court will procure the attendance of non-military witnesses through the Cantonment Magistrate or officer in charge of the station bazaar, or the Civil or Police authorities, as may be necessary.

Courts of Inquest cannot administer an oath; accused or suspected persons *should*, on examination, be warned in accordance with paragraph 1570, and witnesses *may* be warned in the manner described in the same paragraph.

The court will award its opinion, after taking evidence, whether death was or was not caused by violence; and the written opinion of the Medical Officer on his examination of the body, as to the cause of death, is to be attached to the proceedings.

In case of suicide of officers or soldiers, Courts of Inquest are invariably to require distinct attestations to be attached to the proceedings from the Medical Officer of the Corps to which the deceased belonged, and to satisfy themselves, as far as possible, that insanity existed previous to and at the time of death, before deciding that such suicide was committed in a state of insanity.

No. 225, *dated* 15*th June* 1878.

From the Inspector-General of Police, Punjab, to Officiating Secretary to Government, Punjab, Home Department.

Inquests on bodies of European soldiers.

I have the honor to solicit an expression of the wishes of Government in the matter of inquests on the bodies of European soldiers.

2. The rules for the guidance of the Police are contained in my Circular No. 2 of the current year, in which I have embodied the latest Bengal Military Regulations on the subject.

3. The Code of Criminal Procedure makes no distinction in the matter of inquests between soldiers and civilians or between European British subjects and other persons being within the local jurisdiction of the Magistrate or Police Officer holding the inquest.

4. In my Circular I have drawn no such distinction, but you will observe that the Bengal Military Regulation quote only Section 135 instead of Sections 133 and 135 of the Code of Criminal Procedure, and mention Magisterial inquests only. I am not aware whether this omission is or is not intentional; but assuming that it is, I have directed Police inquests to be held only when there is no competent Magistrate to conduct a Magisterial inquests at hand, or where such Magistrate declines to undertake the duty.

5. Paragraph 1561 says, "on all occasions of death by violence, or attended with suspicious circumstances, an inquest is to be held." This language is more limited in its meaning than that employed in Section 133, Criminal Procedure Code, and difficulty might arise in consequence. But it is clear that inquests are to be held in all cases of death by violence or attended with suspicious circumstances whether the deceased be a British soldier or not, as the Regulation says *all* cases.

6. The Police hear of sudden and unnatural deaths of soldiers occurring in bazaars, &c., but we have not been in the habit of holding inquests when such deaths have occurred in barracks, in hospitals, or on the parade ground; and I apprehend that in such cases, without very clear and positive instructions to the troops, our action might be misinterpreted and be considered distasteful.

7. As the preservation of harmony between the civil and military element in Cantonments is very important, I make this reference, although I have no doubt that the law requires us to hold inquests in the cases I have described. Whether it would be advisable to provide by law for military inquests in the cases of soldiers who die from injuries received in the course of duty, or in barracks, &c., where comrades only are suspected, is a matter which seems to me worthy of consideration.

No. 1398, *dated* 10*th October* 1878.

From Officiating Secretary to the Government of India, Home Department, to the Officiating Secretary to Government, Punjab.

In continuation of Home Department letter No. 1347, dated 30th ultimo, regarding Police inquests on bodies of European soldiers, I am directed to say that his Excellency the Commander-in-Chief is opposed to any alteration of the Bengal Army Regulations, in order to allow of such inquests being held, on the ground that the bringing of Native Police in direct contact with British soldiers, is likely to lead to undesirable results. The Adjutant-General's letter conveying His Excellency's opinion points out that as yet no sufficient cause has been shown for change.

2. Under these circumstances, it appears to the Government of India that, as Section 135 of the Code of Criminal Procedure permits "inquiries" to be made by the nearest Magistrate, it will be better (for the reason given in paragraphs 6 and 7 of Colonel Miller's letter No. 225, dated 15th June last) if inquires into cases of sudden and unnatural deaths of soldiers are made by the Magistrate and not by the Police. The Police should, however, report all such occurrences to the Magistrate.

No. II.

Form No. I.

Death Report No. Police Station *(Name.)*

(When in Vernacular to be prepared on ½ sheet of native paper.)

Dated

Sudden Death from *natural* causes.

1. Name of the place where death occurred.	
2. Distance and direction from the Police Station in whose jurisdiction it is	
3. Date and hour of discovery of the death	
4. Names, parentage and residence of two or more persons who identify the body as that of the deceased person named in this report Note.—*Relatives of deceased, or two respectable witnesses to identification, should be obtained if possible.*	.....son of ..... resident of..... son of..... resident of.....
5. Name of deceased Parentage Caste Residence Condition in life	
6. Age and sex	{ Age { Sex
7. Condition of the clothes, ornaments, &c., as not indicating an *unnatural* death	
8. Position of the limbs, eyes and mouth	
9. Expression of the countenance	
10. Injuries or marks of violence the body may have received Wounds and Bruises—*Position, length and breadth*	
11. Blood, liquid or clotted ? where oozed from and to what amount ?	
12. In what manner, or by what weapon or instrument such marks of injuries or of violence appear to have been inflicted ?	
13. Is the body well nourished and vigorous or emaciated and weak ?	
14. Apparent cause of death	
15. Any signs of death having been caused by violence or poison, or any rumours of such being the case ?	

(Entries to be made on reverse of Form I.)

1. Description of each article, of clothing, ornaments, covering, weapons, &c., found on or near the body.

2.—Sketch plan of the scene of death.

3.—Brief history of the case.

Date _____ 188	*Signature of two or more respectable inhabitants of the neighbourhood present at the investigation.* A _____ B _____	*Signature of officer conducting the investigation.* (*Name*) (*Rank*)

FORM No. II.

DEATH REPORT No. POLICE STATION (*Name*)

UNNATURAL DEATH BY VIOLENCE.

Dated

(*When in Vernacular to be prepared on ½ sheet of native paper.*)

(UNNATURAL DEATH BY VIOLENCE.)

1. Name of place where the death occurred or where body was found (state which).
2. Distance and direction from Police Station in whose jurisdiction it is.
3. Date and hour of discovery of the death.
4. Names, parentage, and residence, of two or more persons who identify the body as that of the deceased person named in the report.

NOTE.—*Relations of the deceased or two respectable witnesses to identification should be obtained if possible.*

5. Name, parentage, caste, residence and condition in life of the deceased.
6. Age and sex.
7. Condition of the clothes, ornaments, &c., and marks of either having been forcibly removed or of being stained with blood or other matter.

NOTE.—*If the Civil Surgeon or other Medical Officer is expected to attend to examine the body, this information should be filled in so far as can be seen and without touching or removing any clothes, and in such case it should be completed after he has finished his examination of the body.*

8. Position of the limbs, eyes and mouth.
9. Expression of the countenance.

10. Injuries or marks of violence the body may have received. *Wounds and bruises.* Show position, length and breadth.

NOTE.—*Not depth, be careful not to probe wounds. If the Civil Surgeon or other Medical Officer is expected to attend to examine the body, this information should be filled in after he has completed his examination.*

11. Blood, liquid or clotted? where oozed from and to what amount?
12. In what manner or by what weapon or instrument such marks or injuries or of violence appear to have been committed?
13. Was there any rope or other article round the neck, or any mark of ligature on the neck?
14. Had such rope or article apparently been used to produce strangulation? and if the body had been suspended by it, could it probably have supported the body?
    In what mode was the other end of the rope attached to the support?
15. Were there any foreign matters, such as weeds, straw, &c., in the hair or clenched in the hands of the deceased, or attached to any part of the body?
16. Is the body well nourished and vigorous, or emaciated and feeble?
17. Is it stout, thin or decomposed?
18. Height by measuring from head to feet.
19. Distinguishing marks—*Position and appearance of moles, scars, &c.*
20. Apparent cause of death.
21. Are there any circumstances or rumours tending to show that deceased killed himself?

(*Entries to be made on reverse of Form No. II.*)

1. Description of each article found on or near body	
Found actually *on* the body Each article labelled, numbered and sealed.	Found *near* the body. Each article labelled, numbered and sealed.
Sent in attached to body.	Sent in separate packet.
Description of superscription or device of the seal used on above.	
2. Sketch plan of the place where the body was found.	
3. Description of surrounding ground, marks of footsteps or of a struggle. Marked peculiarity in the footprints. Marked pecularity in the shoes found or in feet of accused or suspected parties *corresponding* with the same noted peculiarities in the footprints.	

4. Brief history of case.

Dated 188 (*Signatures of two or more respectable inhabitants of the place present at the investigation*).	(*Signature of officer conducting the investigation*).
A _____	*Name*
B _____	*Rank*

FORM NO. III.

(When in Vernacular to be prepared on ½ sheet of native paper.)

UNNATURAL DEATH BY *poisoning*.

Particulars relating to the case, in ADDITION *to those given in Form No. II.*

1. Was deceased in good health previous to the attack ?
2. If not in good health, what was he suffering from ?
3. What medicine was he taking ?
4. What did the last meal consist of ?
5. What was the interval between the last meal and the commencement of the symptoms ?
6. What did the deceased *last* eat or drink before the commencement of the symptoms ?
7. What was the interval between the very last time he ate or drank and the commencement of the symptoms ?
8. What were the first symptoms ?
9. Was he thirsty ?
10. Did he become faint ?
11. Did he complain of head-ache or giddiness ?
12. Did he appear to have lost the use of his limbs ?
13. Did he sleep heavily ?
14. Was he at any time insensible ?
15. Did convulsions occur ?
16. Did he complain of any peculiar taste in his mouth ?
17. Did he notice any peculiar taste in his food or drink ?
18. Was he sensible in the intervals between the convulsions ?
19. Did he complain of burning or tingling in the mouth and throat, or of numbness and tingling in the limbs ?
20. Was there vomiting ?
21. Was there purging ?
22. Was there pain in the stomach ?
23. Mention any other symptoms ?
24. Had the deceased ever suffered previously from a similar attack ?

25. How many other persons partook of the meal, or food or drink, by which the deceased is supposed to have been poisoned?
26. How many were affected by it, and in what way?
27. Did the deceased move from the place where the first symptoms were noticed; if so how far?

Date 188 . { *(Signature of two or more respectable inhabitants of the place present at the investigation.)* | *(Signature of officer conducting the investigation.)*

A _____ | *Name*

B _____ | *Rank*

(Form referred to in paragraph nineteen.)

No. III.

MEMORANDUM OF THE SYMPTOMS PRODUCED BY THE MORE COMMON POISONS.

Poisons.	Native Name.	Usual symptoms.
Arsenic ...	*Sammulfar Sunkhia* / *Hartal and Mansil.*	Vomiting; burning pain in the stomach; great thirst; sometimes cold skin; cramps in the limbs, and sleepiness.
Opium ...	*Afium and Afim* ...	Sleepiness; pupils small; complete insensibility; skin sweating; vomiting seldom occurs.
Aconite ...	*Bish* ...	Numbness and tingling in the mouth and throat; afterwards in the limbs; frothing at the month; sleepiness; occasionally convulsions or delirium, or paralysis.
Dhatura ...	*Dhatura* ..	Sleepiness; pupils enlarged; delirium; insensibility; vomiting rare.
Nux Vomica ...	*Kuchila* ...	Twitching in the limbs, followed by violent spasms and often lock jaw. The spasm ceases for a time and then again returns, often without evident causes; it usually affects the whole body. Shortest time before symptoms—15 minutes. Shortest time before death—1 hour.

Note.—Any one of the above symptoms may be absent, though the poison by which they are caused has been administered.

Effects of common poisons.

Poison.	Ordinary interval between taking the poison and the appearance of symptoms.	Ordinary time before death.
Arsenic ...	½ to 1 hour	6 to 12 hours.
Opium ...	½ to 1 „	6 to 12 „
Aconite ...	15 minutes	1 to 8 „
Dhatura ...	5 to 10 minutes	6 to 12 „
Nux Vomica ...	½ to 1 hour	6 to 12 „

(*Referred to in paragraph* 21.)

No. IV.

Precautions to be taken in despatching substances for Chemical analysis by post.

No. 2—68-77.

Extract from the proceedings of the Government of India in the Home, Revenue and Agricultural Department (Judicial),—under date Fort William, the 20th January 1880.

READ again the following papers regarding the transmission by post of packages containing human or other *viscera* for chemical examination :—

Judicial proceedings for August 1879, No. 70 to 74.

Read also the undermentioned replies from the Local Governments consulted on the subject :—

Government of Bengal, No. 3493, dated 22nd September 1879.

Government of the North-Western Provinces and Oudh, No. 1389, dated 28th August 1879.

Government of the Punjab, No. 759 C., dated 29th August 1879.

RESOLUTION.—Some cases have recently occurred in which packages containing human or other *viscera* consigned to the Post Office have during transit, become offensive, or positively dangerous, to the employés of the Postal Department in the sorting carriages attached to railway trains. One such package exploded ; another was so offensive that it was buried by the Post Office officials. An instance has also recently been brought to the notice of the Government of India in which transmission of a package containing a human stomach, and sent to the Post Office for the purpose of being forwarded to a

Chemical Examiner for analysis in connection with a magisterial enquiry, was refused by a Local Deputy Post Master on the ground that it contained an offensive article within the meaning of paragraph 9, Section 2 of the Postal Regulations.

2. The result has been to show that the proper working of the Postal Department will be endangered unless such packages are transmitted in absolutely secure cases. At the same time, if such parcels could not be transmitted by post, the result might be a serious risk of the failure of justice in many cases of poisoning. Under these circumstances, the Governor-General in Council, after consulting the Local Governments, in the Bengal Presidency, has resolved to prescribe the following rules for experimental adoption in regard to the mode of packing substances of the nature above described :

(1). The suspected *viscus* or other portion of the body to be sent for examination should be enclosed in a glass bottle or jar, fitted with a stopper or sound cork.

(2). If liable to decomposition, it should be immersed in methylated spirits of wine, which should be used in the proportion of one-third of the bulk of the material.

N.B.—The use of spirits of wine in packing *viscera* should be invariable, whether the season is hot or cold, and care should be taken that common bazar spirit is not used.

(3). The stopper or cork should be carefully tied down with bladder or leather, and sealed. To ascertain that it has been securely closed, the bottle or jar should be placed for some minutes with its mouth down.

(4). The glass bottle or jar should then be placed in a strong wooden or tin box, which should be large enough to allow of a layer of raw cotton, at least three-fourths of an inch thick, being put between the bottle or the jar and the box.

(5). The box itself should be encased in common *garah* cloth, which should be sealed in accordance with the usual rules of the Post Office as to parcels.

(6). Despatching officers will be held personally responsible that these instructions are carefully followed. Whenever practicable, such parcels should be packed under the immediate supervision of the District Civil Surgeon.

(7). At all stations were there is a District Civil Surgeon, the parcels should invariably be sent to the Post Office by that officer, and not by a subordinate Officer; but where there is no Civil Surgeon, they may be sent through the Sub-Divisional Officer.

(8). A declaration of contents to the officials of the Postal Department is unnecessary, and should not be made.

3. The Governor-General in Council trusts that these rules will be very carefully observed, and that they will obviate the recurrence or danger to the employés of the Postal Department. It will be

understood that they are not intended to interfere with any rule already prescribed by the Local Governments for the proper transmission of such bodies, but merely refer to packing when such bodies are sent through the Post Office.

ORDER.—Ordered that the Resolution be forwarded to Local Governments and Administrations in the Bengal Presidency for information and guidance, and to the Department of Finance and Commerce for information and communication to the Director-General of the Post Office of India.

APPENDIX B.

POINTS TO BE NOTED IN MEDICAL REPORT.

Station *day of* 18

I—Preliminary Particulars.

1. Name and father's name.
   Sex and age.
   Caste.
2. Whence said to have been brought.
3. Date and hour of examination.

II.—External Appearances.

Condition of body—
Stout, thin, decomposed, &c.
2. Height, by measuring from head to feet.
3. Distinguishing marks—
   Position and appearance.
   Moles, scars, &c.
4. Wounds, if present—
   Position, size, character.
5. Bruises.
   Position, size, nature, and probable date.
6. Mark of ligature on neck—
   Appearances of this on dissection.

III.—Internal Appearances.

1. Cranium and spinal cord—
   NOTE.—The spinal cord need not be examined unless any indication of disease or injury exists.
   Scalp-wounds, ulcers, &c.
2. Skull—Fracture.
3. Membranes.
4. Brain—Surface, section—Ventricles.
5. Vertebræ.

IV.—Thorax.

1. Walls, ribs, and cartilages.
2. Pleura, right—Pleura, left.
3. Right lung.
4. Left lung.
5. Larynx, trachœa, and bronchi.
6. Pericardium.
7. Heart.
8. Large vessels.

NOTE.—Observe the state of all the organs, and, where no disease or injury is found, write "healthy."

V.—Abdomen, &c.

1. Walls.
2. Peritoneum.
3. Mouth.
   Pharynx.
   Œsophagus.
4. Stomach and its contents.
5. Small intestines and contents.
6. Large intestines and contents.
7. Liver.
8. Spleen.
9. Kidneys.
10. Bladder.
11. Organs of generation—male.

VI.—Female Organs of Generation.

1. External organs—
   a. Development.
   b. Presence or absence of hymen.
2. Vagina—
   a. Appearance.
   b. Size.
   c. Injuries.
3. Uterus—
   a. Appearance.
   b. Size.
   c. Injuries.
4. Fallopian tubes.
5. Ovaries.
   a. Appearance.
   b. Size.

VII.—Muscles, Bones, and Joints.

1. Disease or deformity.
2. Injuries.
3. Fractures.
4. Dislocations.

VIII.—More detailed description of Injury or Disease.

NOTE.—The injured or diseased parts should be preserved in spirits, if possible.

IX.—Remarks by Civil Surgeon.

a. Cause of death.
b. Reasons for assigning the cause of death.

SPECIAL CASES.

1.—*Poisoning.*

1. Morbid appearances by which is indicated poisoning.
2. Class and nature of poison indicated.
3. *Post mortem* appearances observed which are not common in poisoning.
4. List of substances forwarded to Chemical Examiner.
5. Nature of vessel sent, and description of its seal.

2.—*Wounds or Injuries.*

1. Nature of Injuries.—Description.
2. Inflicted before or after death.
3. Injuries, how produced.
4. Foreign matter in wound.
5. Any disease present.
6. Cause of death.

3.—*Strangulation.*

1. External marks of violence.
2. Rope or articles round neck.
3. Marks on neck.
4. Made before or after death.
5. Marks produced by what article.
6. Could the rope have supported the body?
7. Could the strangulation have been self-inflicted?

4.—*Drowning.*

1. External marks of violence.
2. Foreign bodies in the hands.
3. Foreign bodies in the mouth or air-passages.
4. Water in the stomach.

5.—*Rape, &c.*

1. Number of days after alleged offence.
2. Age of the prosecutrix.
3. Past puberty or not.
4. Injuries inflicted—
   a. On the genital organs.
   b. On the body.
5. Hymen ruptured or not.
6. Apparent strength of prosecutrix.
7. Evidence of any venereal disease—
   a. On the woman.
   b. On the man.
8. Stained articles of clothing of prosecutrix and accused.
   a. Examination—microscopic and otherwise.

6.—*Abortion.*

1. Marks of external violence.
2. Injuries
   a. To vagina.
   b. To uterus.
3. Evidence of noxious drugs—
   a. In sexual organs.
   b. In stomach.
4. State of uterus.
5. Size and uterine age of fœtus

7.—*Infanticide.*

External Examination.

1. Describe external appearance, condition as regards putrefaction, spots, ecchymoses or injuries, &c.
2. Size, including length of body, and dimensions of head and throax.
3. Weight.
4. Condition of navel and umbilical cord.
5. Age—(*a*) Extra uterine.
   (*b*) Intra uterine.

Internal Examination.

1.—*Respiratory organs*—

(*a*) Dimensions and shape of thorax.
(*b*) Situation of diaphragm.
(*c*) Color, volume, shape, situation consistency, density and weight of lungs. Hydrostatic test.

2.—*Organs of circulation*—

(*a*) Condition of the heart and its cavities ... (to be first noted before removal of lungs.)
(*b*) Foramen ovale.
(*c*) Ductus arteriosus, its shape and dimensions.
(*d*) Ductus venosus.
(*e*) State of the umbilical vessels.

3.—*Abdominal organs*—

(*a*) Liver, size and weight.
(*b*) Stomach and intestines. The presence or absence of food, air, meconium, medicines, &c.
(*c*) Bladder and kidneys.

4.—*Brain and Spinal Cord*—

The cranium should be examined for fractures and punctures.
5. Evidence of alleged mother having been recently delivered.
6. Approximate date of delivery.

APPENDIX C.

Extract from Bombay Government Gazette, dated 20th November 1873.

The following rules for the guidance of Medical Officers in conducting *post mortem* examinations and examining wounded persons are published for general information :—

1. The Medical Officer shall, immediately on receiving from any person for examination a corpse or any other substance, inquire and note down the name and residence of such person, and if he be a District Police Officer, his number and rank, and shall without delay grant to such person a receipt for the corpse or other substance delivered by him. The receipt so granted shall contain a list of the

articles or substances received by the Medical Officer and the name of the person from whom they were received and to whom the receipt is given. It shall be the duty of the Medical Officer to examine all bodies sent to him as soon as practicable after arrival.

2. In cases where the body is sent to him, the Medical Officer should note the time of its arrival, the date and hour of the *post mortem* examination, the sex and height and apparent age of the deceased, the state of the body, whether well nourished or otherwise, the existence or absence of any caste or other marks not of recent origin, such as cicatrices, deformities and the like, and whether the marks upon it correspond with those mentioned in the police report.

3. In cases where he has been taken to the place where the body lies, besides the above, he should note the place and nature of the soil (if out in the open country) where he found the body, also its position and the state of the clothes, if any. He should also note in cases of death from violence, the position of the body in reference to surrounding objects, such as sharp stones and the like, contact with which, it may be alleged, has produced the injury, also whether any blood stains are visible on such objects or anywhere near the corpse, and whether any weapons are lying near it. In cases of suspected death from poisoning, he should note whether any appearance as if of vomited matters, &c., is present in the neighbourhood of the body.

4. In every case he should describe the condition in which he found the body, noting the degree of coldness, warmth, rigidity and putrefaction, and the amount and nature of the clothing or covering on it.

5. Commencing at the skull and terminating at the feet he should examine the bones to determine whether any of them are fractured or dislocated, and inspect the vertebral column throughout, also the teeth, hair, orifices of the body and general surface, and also note the state of the pupils, whether contracted or otherwise, and whether any substances are grasped in the hands.

6. If there be any wound or contusion on the body, he should describe its position, length and breadth. He should note the depth and direction of all wounds, whether there are any cuts on the clothes corresponding to them, and examine the wounds carefully for the presence of foreign bodies, preserving such as are found. He should also state whether in his opinion the wound was mortal, giving his reasons for such opinion, and he should be specially careful to examine the neck for marks of compression.

7. He should state his opinion as to whether the wounds, if any, could have been self-inflicted, or whether they might have been the result of accident, giving reasons for his opinion.

8. He should carefully examine any gun, sword, blood-stained instrument, stick or stone, by which the wounds may have been inflicted, and mark such instrument, so as to be able to recognize it if asked to do so. He should also compare the weapon with the wound

alleged to have been caused by it and state whether, in his opinion, it was possible for the wound to have been produced by it.

9. He should commence his dissection of the body by removing the top of the skull in the usual way with a saw, and note anything that may appear unusual.

10. He should then make an incision from the chin down to the pubes, so as to be able to examine the wind pipe, heart, lungs, liver, stomach, spleen, kidneys and intestines, also the urinary bladder, and note whether any of these organs appeared diseased, and whether any wound on the outside of the body communicates with the contents of the chest or abdomen.

11. In making his examination he should disturb as little as possible any organ which may communicate with an external wound, if he has reason to think that the body may be re-examined by another medical man.

12. In the case of females, he should examine the ovaries and uterus, bearing in mind that abortion is sometimes caused by the introduction into the uterus of pointed instruments which may cause death. He should note the presence or absence of pregnancy, the probable period to which pregnancy had advanced, and examine the external generative organs for marks of violence.

13. In the case of infants, he should note the condition of the umbilicus and cord, if any of the latter remains. He should also remove the lungs and try whether they sink or nearly sink in, or float in water.

14. In cases of suspected poisoning, he should not neglect to examine every organ of the body, and should pay special attention to the rules issued by the Inspector-General, Indian Medical Department.

15. He should bear in mind that death may possibly have been the result of starvation, exposure to cold or heat, smothering, drowning, strangulation, poisoning or disease, and state whether death was due to any of these causes, giving his reasons. He should also bear in mind the instructions already published for the guidance of Police Office in cases of death from drowning, hanging and the like.

16. He should keep all his original notes, even though he may make a fair copy of them afterwards, and lend them to any one to read.

17. In all cases the examination of the body should be thorough, and the notes of the appearances discovered should be as minute as possible.

18. Full notes should also be made in cases of examination of wounded persons.

19. When summoned to give evidence in any case in which he has made a *post mortem* examination, or examined a wounded person the Medical Officer should bring with him to Court the original notes made by him at the time of conducting such examination.

20. The notes of the examination in all cases, or a fair copy of them in the handwriting of the Medical Officer, should be at once made in a book kept at the hospital or dispensary for the purpose, and should be signed by him.

APPENDIX D.

STATEMENT OF THE CONDITIONS OF MEDICO-LEGAL ENQUIRY IN INDIA AS COMPARED WITH SUCH ENQUIRY IN ENGLAND.

Extract from the report of the Chemical Examiner, Punjab, for 1873.

Conditions of the enquiry in India compared with Europe.

The investigation and proof of *medico-legal* cases in India are generally conducted under very different conditions and by very different means from those in most countries of Europe, and it is very necessary for the officers engaged in this country to understand the value and the significance of the various parts of the investigation that each has to perform, and especially for the Magistrate to know how his decision is to be modified by the way in which the investigation has been conducted.

The proof of poisoning, though it may be clear by other evidence, depends mainly on establishing the cause of certain symptoms, or of death, that is, it rests principally on scientific evidence. Of this evidence there three parts,—the symptoms, the *post mortem* appearances if death occurred, and the chemical evidence, from the proper investigation and correlation of which the unknown cause may be established.

Evidence as to symptoms in Europe.

In Europe there is a class of qualified medical practitioners, diffused almost universally, who certify to the causes of death, the public registration of which is compulsory. When a person is seized with sudden illness followed or not by death, there is almost always a medical attendant sufficiently skilled in diagnosis to recognize the symptoms as those of some known disease, or, if not, he is able in one class of cases to give an opinion that these symptoms are not those of any known disease, but that they are those of a certain injury, or poison, or class of poisons; while in another class of cases he may only be able to say that they may possibly be those of a certain disease, but that they suspiciously resemble those of some poison or injury.

Evidence as to symptoms in India.

In India, qualified practitioners not being generally diffused among the people, the causes of sudden illness or death are not recognized by the ignorant relatives and attendants. In this way many cases of disease may be attributed to poison, or injury, or witchcraft, and from ignorance, doubt or enmity, be reported to the Police. On the other hand, cases of real poisoning may be passed over as cases of disease

This part of the investigation has generally to be conducted by the Police, who cannot be supposed to be skilled in the observation and estimation of symptoms. In addition, they have to get an account of the symptoms after they have occurred, and from ignorant witnesses, and they have to contend with a difficulty in getting them to speak the truth, unknown in Europe. The evidence, so far is therefore generally defective, and must be so till there be a class of practitioners spread among the people sufficiently skilled to certify to the causes of deaths. In all possible cases, the Police should have the assistance or advice of a Medical Officer, and the evidence of attendant *hakims*, who often show considerable acuteness in observation, should be taken down and signed by them.

Post mortem examination in Europe.

The second part of the investigation, the *post mortem* examination, is generally made in Europe by the medical attendant, along with another Doctor. In one class of cases an opinion can be affirmed that the *post mortem* appearances are, or are not, those of the suspected disease, but that they are not, or are, those of the suspected injury, poison or class of poisons. In another class, in which the *post mortem* appearances are not so diagnostic, an opinion can only be given expressing probability or uncertainty.

Post mortem examination in India.

In India the evidence from *post mortem* examination is also generally less definite from various causes. Not only is the evidence regarding symptoms, which ought to guide in distinguishing suspected and possible causes of death more imperfect, but very often the autopsy has to be performed without any information at all. The number of possible causes of death being very numerous, it is in such cases only possible to give an opinion of certainty or probability when marked and profound lesions are left by disease, injury and poison, and there is a chance of uncommon lesions or slight appearances which might prove important in evidence being overlooked. Again, the body often reaches the Medical Officer advanced in decomposition, when the slighter appearances left by disease, injury or poison, may not be recognizable. But in all cases it is distinctly to be understood that the examination should be made, as even in such cases many causes of death may be established or negatived. Also in all cases a complete, and not a partial examination, is more necessary in this country, on account of the imperfectness of the preliminary evidence as to the possible causes of death. Different causes may afterwards be suggested in the evidence regarding which judicial enquiries may be made.

In order to render this part of the evidence more definite and valuable, it is necessary that the Police, in handing over the body for examination, should at the same time hand over an account of all that is known as to the suspicious circumstances of death, and it should be noted by the Medical Officer whether he was in possession of this information or not, when making the *post mortem* examination.

Chemical evidence in Europe.

In Europe the third part of the evidence—the chemical—is one of the most definite in its results. The symptoms and *post mortem* appearances recorded by duly qualified and informed observers are laid before the Chemical Examiner, and the question asked is whether one poison, or at most one of a class of poisons, be present in the substances sent; and he certifies to the presence or absence of those of the poisons indicated, which can be identified by Chemistry.

Chemical evidence in India.

In India, from the imperfectness of the preceding evidence, the problem proposed is more indeterminate, and often insoluble. As a general rule, substances have hitherto been sent for analysis with no information as to what poisons might possibly have been used. This problem, which is seldom met with in a lifetime by an expert in Europe, resolves itself into a search for the poisons commonly used in the country, unless some suspicious appearances or particles lead to a conjecture in another direction. The number of substances that may cause death being practically indefinite, it would be impossible with a limited amount of material and time, to attempt anything else.

In order that the Chemical Examiner's evidence may be as definite as possible, if no poison is found, he should distinctly certify as to the poison he was led to examine for and whose absence he demonstrated.

Position of the Magistrate in England.

The position of the Magistrate, as regards the scientific witness differs in India and England. In England the scientific witnesses are really cross-examined by the defence, both as to the facts they have observed, and the opinions they bring forward; and similar witnesses may be brought forward to challenge their statements.

Position of the Magistrate in India.

In India, this is very seldom possible. The Civil Medical Officer has practically functions rather resembling those entrusted to him in some countries of Europe. He is a Government official, charged with the investigation of facts, regarding which he has to give evidence in the same way as the Police Officer. In addition, he has to interpret to the Court the precise value, significance and limits of the scientific evidence; and it is his duty to bring forward, with judicial carefulness, any conclusions or opinions connected with the facts. In India, also, it is physically impossible for the Chemical Examiner to be cross-examined, and his evidence has therefore to be taken without any other proof of attestation than his signature. He should, therefore, restrict himself to a statement of observed or demonstrated facts, and should on no account make mention of probabilities or opinions, unless specially asked; but it is his duty to reply to any questions regarding the meaning or limits of the scientific evidence which the local Medical Officer may wish to be referred, or which the Court may choose to propose.

Estimation of the value of the evidence.

If the cause of death be not satisfactorily proved by the scientific evidence, the Magistrate has to consider to what extent it proves or disproves anything. It is purely negative in value in the case of poisons not detectible by Chemistry which do not produce symptoms and *post mortem* appearances distinguishable with certainty from those of disease or injury. It is also negative in the case of detectible poisons of which the symptoms and *post mortem* appearances alone are not decisive, when the Chemical Examiner has not been led to examine for those poisons. In this class of cases the proof principally depends on whether the Medical Officer was in possession of the suspicious circumstances of death when making the *post mortem* examination, and whether the Chemical Examiner knew both these when examining for poisons. If the latter had no information, he could only certify to the absence of common poisons; and it is to be remarked that the large number of poisoning cases proved in this country is due to the ignorance of the natives, and that, as intelligence spreads, uncommon poisons will be used more frequently.

Meaning of "no poison found."

If no poison has been found, it should be noted that it may have been administered in the following cases:—

1*st*.—If a poison has been given for which there are no chemical tests.

2*nd*.—If a detectible poison were used for which the Chemical Examiner was not led to examine.

3*rd*.—If a volatile poison has been used which has been placed in circumstances in which it might have volatilized.

4*th*.—If certain organic poisons has been used, and a sufficient time has elapsed for their decomposition.

5*th*.—In the case of most organic poisons it is only the part left in the stomach after death that can be discovered, that which is absorbed into the system becomes chemically changed; so that it is really the part that does not cause death that is detected. Consequently, if the stomach has been well cleared out by the stomach pump or vomiting, or if sufficient time has elapsed before death to allow the poison to be absorbed, none may be detected.

6*th*.—Even in the case of metallic poisons, which can be detected after absorption, if sufficient time (three weeks to a month) elapse before death, the whole of the poison may be eliminated from the system by the kidneys, &c., and the patient may die from the lesions caused by the poison.

APPENDIX E.

THE POST MORTEM REPORT.

(To be sent to Chemical Examiner with articles transmitted in poisoning cases.)

DISTRICT.

day of 18

Name, sex, age, and caste.	Whence brought. Village, Thannah.	DATE AND HOUR OF		Information furnished by Police.
		Examination.	Despatch.	

N. B.—Observe the state of all the organs, and when no disease or injury is found write "healthy."

I.—EXTERNAL APPEARANCES.

1.—Condition of subject, stout, emaciated, decomposed, &c.	2.—Wound, position, size, character.	3.—Bruises, position, size, nature.	4.—Mark of ligature on neck, dissection, &c.

II.—CRANIUM AND SPINAL CANAL.

1.—Scalp, skull, and vertebræ.	2.—Membranes.	3.—Brain and spinal cord.

Note.—The spinal canal need not be examined unless any indication of disease or injury exist.

III.—THORAX.

1.—Walls, ribs, and cartilages.	2.—Pleuræ.	3.—Larynx and trachœa.	4.—Right lung.	5.—Left lung.	6.—Pericardium.	7.—Heart.	8.—Large vessels.

IV.—ABDOMEN.

1.—Walls.	2.—Peritoneum.	3.—Mouth, pharynx, and œsophagus.	4.—Stomach and its contents.	5.—Small intestine and its contents.	6.—Large intestine and its contents.	7.—Liver.	8.—Spleen.	9.—Kidneys.	10.—Bladder.	11.—Organs of generation external and internal.

V.—MUSCLES, BONES, JOINTS.

1.—Injury.	2.—Disease or deformity	3.—Fracture.	4.—Dislocation.

MORE DETAILED DESCRIPTION OF INJURY OR DISEASE.

REMARKS BY CIVIL SURGEON.

The *day of* (Signed).
18 . . *Civil Surgeon of*

APPENDIX F.

REPORT OF THE CHEMICAL EXAMINER FOR THE PUNJAB.

(Admissible as evidence under Section 325 of the Code of Criminal Procedure.

In the case of

I hereby certify that I received by
a packet from the of
alleged to have been despatched by him on the of
referred to in his office No. dated
and received by me on the of

2. The packet consisted of a
was sealed with a seal bearing the impression on the invoice hereunto attached, and reached me with seals
The contents of the packet were as follows :—

3. The above seals were opened in my presence and the contents of the package were duly examined by me, remaining under my immediate custody until the examination was completed. The poisons which I was led to examine for were

The result was as follows :—

No.

LAHORE :
CHEMICAL EXAMINER'S OFFICE. } *Chemical Examiner*
The 188 . } *For the Punjab.*

APPENDIX G.

(*a*).—A SHORT MEMORANDUM, BY THE CHEMICAL EXAMINER, PUNJAB, OF THE SYMPTOMS PRODUCED BY SOME OF THE MORE COMMON POISONS.

Usual Symptoms.

POISON.	
Arsenic. *Native name.* Sammul-far. Sankhya. Hartal and Mansil.	Vomiting; burning pain in the stomach; great thirst; purging; sometimes cold skin; cramps in the limbs, and sleepiness.
Opium. Afium. Afim.	Sleepiness; pupils small; complete insensibility; skin sweating; vomiting seldom occurs.
Aconite. Bish.	Numbness and tingling in the mouth and throat, afterwards in the limbs; frothing at the mouth; sleepinesss; occasionally convulsion or delirium or paralysis;
Dhatura. Dhatura.	Sleepiness; pupils enlarged; delirum; insensibility; vomiting rare.
Nux Vomica. Kuchila.	Twitching in the limbs followed by violent spasms and often lock jaw. The spasms cease for a time and then again return, often without evident cause; it usually affects the whole body. Shortest time before symptoms, 5 minutes. Shortest time before death 1 hour.

Note.—Any one of the above symptoms may be absent, though the poison by which they are usually caused has been administered.

Arsenic.	Ordinary interval between taking the poison and the appearance of symptoms, $\frac{1}{2}$ to 1 hour.	
	Ordinary time before death, 6 to 12 hours.	
Opium.	Ordinary interval before symptoms, $\frac{1}{2}$ to 1 hour.	
	Ditto	before death, 6 to 12 hours.
Aconite.	Ditto	before symptoms, 15 minutes.
	Ditto	before death, 1 to 8 hours.
Dhatura.	Ditto	before symptoms, 5 to 10 minutes.
	Ditto	before death, 6 to 12 hours.
Nux-Vomica.	Ditto	before symptoms, $\frac{1}{4}$ to 1 hour.
	Ditto	before death, 6 to 12 hours.

(*b*).—QUESTIONS THAT MAY BE PUT TO MEDICAL AND OTHER WITNESSES IN CERTAIN CASES.

No. 1.

Questions which may be put to a medical witness in a case of suspected poisoning after post mortem *examination of the body.*

I.—Did you examine the body of ————————, late a resident of——and, if so, what did you observe ?

II.—What do you consider to have been the cause of death ? State your reasons.

III.—Did you find any external marks of violence on the body ? If so, describe them.

IV.—Did you observe any unusual appearances on further examination of the body ? If so, describe them.

V.—To what do you attribute these appearances ; to disease, poison or other cause ?

VI.—If to poison, then to what class of poisons ?

VII.—Have you formed an opinion as to what particular poison was used ?

VIII.—Did you find any morbid appearances in the body besides those which are usually found in cases of poisoning by————————— ? If so, describe them.

IX.—Do you know of any disease in which the *post mortem* appearances resemble those which you observed in this case ?

X.—In what respect do the *post mortem* appearances of that disease differ from those which you observed in the present case ?

XI.—What are the symptoms of that disease in the living ?

XII.—Are there any *post mortem* appearances usual in cases of poisoning by———————— , but which you did not discover in this instance ?

XIII.—Might not the appearances you mention have been the result of spontaneous changes in the stomach after death ?

XIV.—Was the state of the stomach and bowels compatible or incompatible with vomiting and purging ?

XV.—What are the usual symptoms of poisoning by——— ?

XVI.—What is the usual interval between the time of taking the poison and the commencement of the symptoms ?

XVII.—In what time does ———————generally prove fatal ?

XVIII.—Did you send the contents of the stomach and bowels (or other matters) to the Chemical Examiner ?

XIX.—Were the contents of the stomach (or other matters) sealed up in your presence, immediately on removal from the body ?

XX.—Describe the vessel in which they were sealed up, and what impression did the seal bear?

XXI.—Have you received a reply from the Chemical Examiner; if so, is the report now produced that which you received?

XXII.—(If a female adult), what was the state of the uterus?

No. II.

Questions that may be put to a non-professional witness in a case of suspected poisoning.

I.—Did you know ——, late a resident of ——? If so, did you see him during his last illness and previously?

II.—What were the symptoms from which he suffered?

III.—Was he in good health previous to the attack?

IV.—Did the symptoms appear suddenly?

V.—What was the interval between the last time of eating or drinking and the commencement of the symptoms?

VI.—What was the interval between the commencement of the symptoms and death? (If death occurred.)

VII.—What did the last meal consist of?

VIII.—Did any one partake of this meal with ——?

IX.—Were any of them affected in the same way?

X.—Had —— ever suffered from a similar attack before?

If any of the following symptoms have been omitted in answer to question I, special questions may be asked regarding them as follows.

XI.—Did vomiting occur?

XII.—Was there any purging?

XIII.—Was there any pain in the stomach?

XIV.—Was —— very thirsty?

XV.—Did he become faint?

XVI.—Did he complain of headache or giddiness?

XVII.—Did he appear to have lost the use of his limbs?

XVIII.—Did he sleep heavily?

XIX.—Had he any delirium?

XX.—Did convulsions occur?

XXI.—Did he complain of any peculiar taste in the mouth?

XXII.—Did he notice any peculiar taste in his food or water?

This is with reference to Nux Vomica.

XXIII.—Was he sensible in the intervals between the convulsions?

This is with reference to Aconite.

XXIV.—Did he complain of burning or tingling in the mouth and throat, or of numbness and tingling in the limbs?

No. III.

Questions which may be put to a medical witness in a case of supposed death by wounds or blows, after post mortem *examination of the body.*

I.—Did you examine the body of———, late a resident of——— and, if so, what did you observe ?

II.—What do you consider to have been the cause of death ? State your reasons.

III.—Did you find any external marks of violence on the body ? If so, describe them ?

IV.—Are you of opinion that these injuries were inflicted before or after death ? Give your reasons.

V.—Did you examine the body internally ? Describe any unnatural appearance which you observed.

VI.—You say that in your opinion———was the cause of death ; in what immediate way did it prove fatal ?

VII.—Did you find any appearance of disease in the body ?

VIII.—If so, do you consider, that if the deceased had been free from this disease, the injuries would still have proved fatal ?

IX.—Do you believe that the fact of his suffering from this disease lessened his chance of recovery from the injuries sustained ?

X.—Are these injuries taken collectively, or is any one of them ordinarily and directly dangerous to life ?

XI.—Have they been caused by manual force or with a weapon ?

XII.—Did you find any foreign matter in the wound ?

XIII.—By what sort of weapon has the wound been inflicted ?

XIV.—Could the injuries have been inflicted by the weapon now before you (No.———in the Police charge sheet) ?

XV.—Could the deceased have walked (so far), or spoken, &c., after the receipt of such an injury ?

XVI.—Have you chemically, or otherwise, examined the stains (or the weapon, clothes, &c., now before you, (No.—in the Police charge sheet)

XVII.—Do you believe the stains to be those of blood ?

XVIII.—What time do you think elapsed between the receipt of the injuries and death ?

XIX.—What was the direction of the wound, and can you form an opinion as to the position of the person inflicting such a wound with respect to the person receiving it ?

XX.—Is it possible for such a wound to have been inflicted by any one on his own person ? Give your reasons.

In gun-shot wounds. XXI.—Give precise direction of the wound.

XXII.—Did the appearance of the wound indicate that the gun had been discharged close to the body or at some distance from it?

XXIII.—Did you find any slug, bullet, wadding, &c., in the wound or had ——made its exit.

XXIV.—Do you think it possible that you could have mistaken the aperture of entrance for that of exit?

No. IV.

Questions that may be put to a medical witness in a case of supposed infanticide after post mortem *examination of the body.*

I.—Did you examine the body of a $\frac{\text{male}}{\text{female}}$ child sent to you by the District Superintendent of Police on the —— of —— 18——? And if so, what did you observe?

II.—Can you state whether the child was completely born alive, or born dead. State the reasons for your opinion.

III—What do you consider to have been the cause of death? Give your reasons.

IV.—What do you believe to have been the uterine age of the child? State your reasons.

V.—What do you believe to have been the extra-uterine age of the child? Give reasons.

VI.—Did you find any marks of violence or other unusual appearances externally? If so, describe them accurately.

VII.—Did you find any morbid or unusual appearances on examination of the body internally? If so, describe them accurately.

VIII.—Do you believe the injuries you observed to have been inflicted before or after death? Give reasons.

IX.—Can you state how they were inflicted? Give reasons.

X.—Do you consider that they were accidental or not? Give reasons.

XI.—Had the infant respired fully, partially, or not at all?

XII.—Did you examine the person of ——the alleged mother of the infant? If so, have you reason to suppose that she was recently delivered of a child? Can you state approximately the date of her delivery? Give reasons.

No. V.

Questions that may be put to a medical witness in a case of supposed death by hanging or strangulation.

I.—Did you examine the body of ————, late a resident of ————and if so, what did you observe?

II.—What do you consider to have been the cause of death? State the reasons for your opinion.

III.—Did you observe any external mark of violence upon the body?

IV.—Did you observe any unnatural appearances on examination of the body internally?

V.—Was there any rope or other such article round the neck when you saw the body?

VI.—Can you state whether the mark (or marks) you observed were caused before or after death?

VII.—By what sort of article do you consider the deceased to have been hanged (or strangled)?

VIII.—Could the mark you observed have been caused by the rope or other article now before you, (No.——of Police charge sheet)?

IX.—Do you think that this rope could have supported the weight of the body?

(If strangulation.) X. Would great violence be necessary to produce the injuries you describe?

No. VI.

Questions that may be put to a medical witness in a case of supposed death by drowning, after post mortem *examination of the body.*

I.—Did you examine the body of————, late a resident of————and if so, what did you observe?

II.—What do you consider to have been the cause of death? State your reasons.

III.—Were there any external marks of violence upon the body? If so, describe them.

IV.—Describe any unnatural appearances which you observed on further examination of the body.

V.—Did you find any foreign matters, such as weeds, straw, &c., in the hair, or clenched in the hands of the deceased, or in the air-passages, or attached to any other part of the body?

VI.—Did you find any water in the stomach?

No. VII.

Questions that may be put to a medical witness in a case of alleged rape.

I.—Did you examine the person of Mussammat ——— ———? If so, how many days after the alleged rape did you make the examination, and what did you observe?

II.—Did you observe any marks of violence about the vulva or adjacent parts?

III.—Are these injuries such as might have been occasioned by the commission of rape?

IV.—Was the hymen ruptured?

N.B.—This question only to be asked in the case of the rape of a girl of tender years.

V.—Did you observe any further marks of violence upon the person of the woman?

VI.—Had she passed the age of puberty?

VII.—Can you state approximately what her age is?

VIII.—Did you find her to be a strong healthy woman, or so weakly as to be unable to resist an attempt at rape.

IX.—Did you examine the person of the accused?

X.—Did you observe any marks of violence upon his body?

XI.—Was he suffering from any venereal disease?

XII.—Did you find the woman to be suffering from a similar or other venereal disease?

XIII.—Had a sufficient time elapsed, when you examined the person of the woman, for venereal disease to have made its appearance, in case of her having been infected?

XIV.—Can you state approximately, how long the accused had been suffering from this complaint?

XV.—Can you state approximately, how long the woman had been suffering from this (venereal) complaint?

XVI.—Have you examined the stained articles forwarded to you, and now in Court (No.——of Police charge sheet)?

XVII.—What is the result of your examination?

XVIII.—Do you believe that a rape has been committed or not? State your reasons.

No. VIII.

Questions that may be put to a medical witness in cases of suspected insanity.

I.—Have you examined ——— —?

II.—Have you done so on several different occasions; so as to preclude the possibility of your examinations having been made during lucid intervals of insanity?

III.—Do you consider him to be capable of managing himself and his personal affairs.

IV.—Do you consider him to be of "*unsound mind*"; in other words *intellectually insane*?

V.—If so, do you consider his mental disorder to be complete or partial?

VI.—Do you think he understands the obligation of an oath?

VII.—Do you consider him, in his present condition, competent to give evidence in a Court of Law?

VIII.—Do you consider that he is capable of pleading to the offence of which he now stands accused?

IX.—Do you happen to know how he was treated by his friends (whether as a lunatic, an imbecile, or otherwise) prior to the present investigation and the occurrences that have led to it?

X.—What, as far as you can ascertain, were the general characteristics of his previous disposition?

XI.—Does he appear to have had any *previous* attack of insanity?

XII.—Is he subject to insane *delusions*?

XIII.—If so, what is the general character of these? Are they harmless or dangerous? How do they manifest themselves?

XIV.—Might such delusion or delusions have led to the criminal act of which he is accused?

XV.—Can you discover the *cause* of his reason having become affected? In your opinion was it *congenital or accidental*?

XVI.—If the latter, does it appear to have come on suddenly or by slow degrees?

XVII.—Have you any reason for believing that his insanity is of *hereditary* origin? Is so, please to specify the grounds for such an opinion; and all the particulars bearing on it, as to the insane parents or relatives of the accused; the exciting cause of his attack; his age when it set in, and the type which it assumed.

XVIII.—Have you any reason to suspect that he is, in any degree, *feigning* insanity? If so, what are the grounds for this belief?

XIX.—Is it possible, in your opinion, that his insanity may have followed the actual commission of his offence, or been caused by it?

XX.—Have you any reason to suppose that the offence could have been committed during a *lucid interval*, during which he could be held responsible for his act? If so, what appears to you to have been the duration of such lucid interval? Or, on the contrary, do you believe his condition to have been such as altogether to absolve him from legal responsibility?

XXI.—Does he now display any signs of *homicidal* or of *suicidal* mania, or has he ever done so to your knowledge?

XXII.—Do you consider it absolutely necessary, from his present condition, that he should be confined in a lunatic asylum? or again;

XXIII.—Do you think that judicious and unremitting supervision, *out of an asylum*, might be sufficient to prevent him from endangering his own life or the property of others?

No. IX.

Questions that may be put to a medical witness in a case of alleged causing miscarriage (Sections 312—316, *Indian Penal Code).*

I.—Did you examine the person of Mussammat---- ——— If so, when? What did you observe?

II.—Are you of opinion that a miscarriage has occured or not? Give your reasons.

III.—In what mode do you consider the miscarriage to have been produced, whether by violence per vaginam, or by external violence, or by the use of irritants *internally*? Give your reasons.

IV.—It is alleged that a drug called———was used, state the symptoms and effects which the administration internally of this drug would produce. Do you consider that it would produce miscarriage?

V.—Can you state whether the woman was quick with child when the miscarriage was produced? State your reasons.

VI.—Did you see the fœtus? If so, at what period of gestation do you consider the woman to have arrived?

No. X.

Questions that may be put to a Medical witness in a case of grievous hurt.

I.—Have you examined———? If so, state what you observed.

II.—Describe carefully the marks of violence which you observed,

III.—In what way do you consider the injuries to have been inflicted? If by a weapon, what sort of weapon do you think was used?

IV.—Do you consider that the injuries inflicted could have been caused by the weapon now shewn to you (No.—of Police charge sheet)?

V.—What was the direction of the wound, and can you form an opinion as to the position of the person inflicting such a wound with respect to the person receiving it?

VI.—Is it possible for such a wound to have been inflicted by any one on his own person? Give your reasons.

The Magistrate in putting this question will shew the Indian Penal Code to the witness, or the Magistrate may vary the form of the question so as to elicit the required information without calling the witness's attention to the Code.

VII.—Do you consider that the injuries inflicted constitute any of the forms of "grievous hurt" defined in Section 320 of the Indian Penal Code? If so, which of them? Give your reasons.

VIII.—Do you consider that the person injured is now out of danger?

IX.—It is alleged that the injuries were caused by——— Could they have been caused in the manner indicated?

X.—Have you chemically or otherwise examined the stains (on the weapon, clothes, &c.,) now before you (No.—in the Police charge sheet)?

N. B.—In case of the injuries being gun-shot wounds, questions XXI to XXIV under the head of No. III [Death by wounds] may be put to the witness.

XI.—Do you believe the stains to be those of blood?

(*c*).—POINTS TO BE ENQUIRED IN CASE OF DEATH FROM RUPTURE OF THE SPLEEN.

Report on rupture of the spleen, by Dr. Brown, Principal of the Lahore Medical College.

Rupture of the spleen usually occurs from violence affecting the spleen when it is already diseased, but it may occur when the structure is quite healthy if the violence is very great, or it can happen without violence if the spleen is in a very diseased state, when rupture has occurred either from muscular efforts in straining, coughing or vomiting or even, it is stated, spontaneously in intermittent fever; but these cases are very rare. It is therefore of great importance to determine what was the condition of the spleen in all cases in which death has been caused by rupture of this substance.

When the spleen is ruptured by violence, the marks of that violence can some times be seen on the body, but not in all cases, since rupture of the spleen often produces death so rapidly that no effusion of blood can occur, and also sometimes the violence appears only to affect the spleen, and not to injure other parts.

It is therefore quite possible that the spleen should be ruptured by violence, and yet no evidence of the injury be seen on the skin or other parts of the body.

The condition of the spleen previous to rupture can generally be determined by its size and consistency after death. A healthy spleen measures about 5 or 5½ inches long, 3 or 4 wide, and 1 to ½ thick, and it weighs about 6 ounces—varying from 4 to 8. When the spleen is so diseased as to render a rupture from slight violence probable, it will often weigh from 10 to 30 ounces, and measure from 7 to 12 inches in length. The healthy spleen does not project beyond the ribs but the diseased spleen does so,—often to a considerable distance.

The consistency of the spleen, when healthy is moderately firm, so that it may be cut with ease, leaving a sharp edge and smooth

surface when divided, but in disease the spleen may become quite soft and pulpy or even diffluent, so as to fall away like a thick liquid when the capsule is divided. This condition, however, may also occur from putrefaction, if the body is kept long after death or if the weather is very warm; and therefore these circumstances should also be ascertained.

The enlargement and softening of the spleen from disease is usually a result of a previous attack of intermittent fever or ague; it may also occur in other diseases, especially in typhoid fever, scurvy and purpura.

The part of the spleen which is usually ruptured is the concave or inner surface, and the extent of the rupture varies greatly; but death usually occurs more rapidly in proportion as the rupture is larger and deeper. When the rupture is small, the patient may live several days, or may even recover entirely.

If the rupture is extensive, the person is usually incapable of moving from the place where the rupture occurred.

Lastly, in some instances the spleen is covered with a layer of membrane caused by previous attacks of inflammation; this may delay or even prevent death by limiting the rupture or preventing excessive bleeding.

The questions therefore which appear necessary to ask in cases of death from rupture of the spleen are—

1*st*—What appearances of external violence were perceptible on the body?

2*nd*—What was the size and weight of the spleen after death?

3*rd*—How far did it project beyond the ribs?

4*th*—What was the consistency of the spleen—hard, firm, soft, pulpy or diffluent?

5*th*—How long after death was the body examined, and what was the temperature of the air?

6*th*—Was the body much putrefied?

7*th*—What was the position of the rupture?

8*th*—What was the length and depth of the rupture?

9*th*—Is it your opinion that the rupture was caused by external violence or not? State your reasons for your opinion.

10*th*—Were there any adhesions about the spleen; if so, were they older than the rupture or not?

TREATMENT OF POISONING.

In almost every case of poisoning, vomiting should be produced as soon as possible, in order to expel the remaining part of the poison from the stomach. If a Native Doctor or other medical man is at hand, this may be effectually accomplished by a stomach pump, but in default of this assistance, and these remarks are partly written for use in cases in which medical assistance cannot immediately be obtained, vomiting can always be produced by tickling the upper part of the throat with a feather from the wing of a fowl ; this should be done gently, so as not to draw blood, and continued till sickness occurs. At the same time, medicines to produce vomiting should be given, the most accessible of which is a mixture of common salt and warm water in the proportion of about 1 ounce of salt to 6 ounces of water, or 2½ tolas to 3 chittacks. This should be given every quarter of an hour till vomiting occurs, and its action is greatly assisted by the addition of a quarter of an ounce of powdered mustard seed (rai or surson) to each dose, or the mustard may be given alone with warm water, in the proportion of from half an ounce to an ounce in 6 ounces of water. It is not necessary to be very careful about the exact proportion of the dose either of mustard or common salt. If any European medicines are at hand, sulphate of zinc, white vitriol (safaid tutia) may be given in doses of twenty to forty grains every quarter of an hour, sulphate of copper (nila tutia) in doses of 5 to 15 grains, tartar emetic in doses of 2 to 3 grains, or lastly, Ipecacuanha in doses of 20 to 30 grains at the same interval, but the sulphate of zinc is greatly to be preferred, or the stomach pump should be used if available, except in cases of corrosive poisoning.

After vomiting is produced, it is desirable to administer antidotes. These usually differ for different poisons, and will therefore be mentioned under each separate substance, but as a general rule, *if there is any pain in the stomach, raw eggs beaten up with a little cold water should be given, or if this is not procurable, milk, the flour of some grain or linseed meal (atta, maida) mixed with hot water, or raw meat and water.* While if there is any

tendency to sleep, strong liquid tea or coffee, should be given in considerable quantity, and the patient kept awake by being watched by two men and constantly spoken to. If both pain and sleepiness are present, both methods of treatment may be employed. These remedies can never do harm and will most likely benefit the person.

When the effects of the poison begin to pass off, the best remedy to expel the residue of the poison is castor oil mixed with milk given in doses of one ounce, to act as a purgative, and repeated every three hours till abundant motions occur.

Generally the patient will be every much weakened by the action of the poison, as shewn by his cold skin, feeble pulse, pale countenance, and little strength. When these symptoms occur, it is advisable to give a table spoonful of rum (sharab) at intervals of two or three hours until the skin becomes warmer, and to cause him to take some food. Eggs beaten up with milk are perhaps the most accessible, but if this is objected to, flour and milk will form a tolerably good substitute.

In all cases of recovery, after the first twenty-four hours have passed from the time that the poison was taken, it is better to induce the sufferer to drink a large quantity of warm liquids such as milk and water, and then to administer purgatives. Frequently it will be possible to procure European medicine in time, but if not, either "kaladana" seeds or castor oil seeds "arend," the former in dose of 10 seeds, the latter in doses of from 2 to 3 may be given.

Remarks on the principal changes seen in post mortem *examination of persons dying from poisoning.*

In all cases of poisoning resulting in death, it is very necessary to obtain a *post mortem* examination, as this may probably show in what manner death has been caused, and whether there existed any other disease or injury capable of destroying life. But in India the progress of decomposition is so rapid that this source of information is less frequently available than in colder climates, still as often as possible a thorough examination should be made not only of the part into which the poison has been re-

ceived, which is generally the stomach, but also of all other vital organs, to prove that no disease or injury existed in them, capable of producing death. In particular it is most necessary in every case of suspected poisoning to examine carefully the surface of the body for marks of recent wounds or contusions, and also the skin about the neck for evidence of strangulation.

Of the internal organs of the body, the stomach is the one which most frequently undergoes change when poison is administered, and the change which is most common in this organ is that of inflammation. This is characterised here as elsewhere by redness, swelling, and alteration of texture.

Redness may be produced by staining of the lining membrane by articles of food or by congestion. The former may be at once distinguished by its being removed on washing in a stream of water, while the redness of inflammation may sometimes be told, by its not being confined to the most dependent part, as the colour produced by congestion usually is, but spreading more or less irregularly over the surface; still, if the congestion is extensive, it is difficult or impossible to distinguish it in this manner, and it is then necessary to ascertain that the structure of the lining membrane has become more opaque than natural, and that even when dissected from the rest of the stomach it is not transparent enough to show the finger placed beneath it. The redness even of inflammation may be entirely concealed by putrefaction, or inflammatory redness may be caused by disease of stomach, so that there is no certainty that the redness is caused by irritation of the stomach unless it is accompanied with ulceration.

The other structural changes which it undergoes, are first thickening, which is usually unequal at different parts ; second effusion of blood, this sometimes occurs in poisons, but is by no means characteristic; third, ulceration. This occurs chiefly in a few irritant poisons, such as arsenic, the ulcers are small and irregular, and often discoloured from the presence of the poison, but it is rare that there is any hardness about the ulcer, as is the case in chronic ulceration of the stomach ; sometimes, but very rarely,

the ulceration extends quite through the stomach, in cases of poisoning this only occurs when the inflammation is excessively great, but perforation from corrosion sometimes happens, and is at once distinguished by its soft and disorganised border which is usually much discoloured. It is necessary to remember that perforation sometimes occurs from softening of the stomach either before or after death, but this is at once distinguished from perforation by poison, by the fact that corrosion is seen generally in the mouth or other parts than the stomach, while softening only occurs in the stomach itself. But this is of less importance, as corrosive poisons are very rarely employed in India. Change of colour also occurs in the stomach in cases of poisoning by mineral acid, thus the mucous membrane is often blackened by sulphuric acid and rendered yellow by nitric acid.

Softening of the stomach may result from corrosive poisoning especially from an alkali, but it may be a *post mortem* change caused by the action of the gastric juice on the coats of the stomach after death. When this occurs it is known from poisoning by the thin smooth appearance of the membrane around the softened part, and the blood vessels forming black lines, also by the absence of thickening or induration, perforation of the stomach may occur from the same cause or from corrosive poisoning, but in the former case there will be no appearance of inflammation either in the coats of the stomach around the aperture or in the portion near it, but it will form a large irregular opening with thin ragged edges from which softened shreds of tissue hang.

Sometimes perforation of the stomach is caused by ulceration, but this is accompanied with induration and thickening of the coats of the stomach.

Inflammation of the duodenum not unfrequently occurs in poisoning, but the rest of the small intestines usually escapes any action. In some irritants the rectum is also inflamed, and even ulcerated. The intestines are scarcely ever perforated from the poison acting within them.

In cases of severe inflammation of the stomach, the peritoneal covering is frequently inflamed, and where perforation occurs, this

inflammation is much more extensive as the contents of the stomach are poured into the cavity of the abdomen.

The liver, spleen, and kidney are seldom altered, although in cases of metallic poison the absorbed poison is contained in them. The discovery of inflammation of the stomach or intestines even when accompanied by any of the changes above described is not of itself a proof that a poison has been taken, but it is always a ground for great suspicion, especially if the person was in other respects healthy, and the suspicion becomes almost a certainty if symptoms of poisoning appeared after a meal, while if poison is found in the inflamed stomach, it is quite certain that it has been taken during life.

The brain is much congested in those cases of poison which cause insensibility; this congestion however does not differ from that which is occasioned by suffocation from any cause, especially disease of the respiratory organs.

In the same class of cases, the lungs have often an increased quantity of blood, but this chiefly occurs at the back part, where congestion often happens at the time of death without disease there during life.

In poisoning by cantharides, the kidneys, bladder, and urinary passages are often much congested or even inflamed, but the appearances do not differ from those of acute disease. Also in poisoning by "kuchla," strychnine, or nux vomica, the spinal cord is sometimes congested, but this organ is too seldom examined in India for any safe conclusion to be made respecting it.

In cases of suspected abortion the vagina and uterus of the deceased female will require a careful examination. Sometimes there are evident marks of violence as the wounding or perforation of one of these organs, at other times a piece of stick generally from an acrid plant will be found there, and marks of inflammation around it.

In all cases of poisoning it is necessary carefully to ascertain the condition of the fœces in the large intestines. If there are none, or only liquid substances, it indicates that diarrhœa from some cause or other has probably existed during life, although

this alone does not prove that an irritant poison has been administered. While if the large intestines contain solid fœces it proves that purging has not occurred shortly before death, and that no powerful irritant poison can have been administered.

On the whole, therefore, *post mortem* examinations alone are not very conclusive as to the presence of poison, but they are extremely useful, first, to show that the appearances after death confirm the suspicion which may have been excited by the symptoms during life; thus if severe vomiting has occurred, inflammation of the stomach may be expected; if insensibility has happened, congestion of the brain may be looked for: secondly, an examination would prove whether there is any evidence of any other disease or injury sufficient to cause death; and lastly, it is necessary to obtain the poison which has been swallowed, if this has not been removed by vomiting or absorption.

ARSENIC.

White Arsenic.—Arsenious Acid—(Sankhia safaid, Sambal or Sambal Khar.)

Yellow Arsenic.—Tersulphuret of Arsenic—(Hartal) or Orpiment Haldia.

Red Arsenic.—Bisulphuret of Arsenic, (Mansíl) or Realgar Naushadar Kani.

Lately, arsenate of potash and lime in two cases have been found, probably made by heating common white arsenic with impure nitre, "shora." This mode of poisoning has not been mentioned in India, but it was known that there were various modes of preparing the arsenic for use.

Arsenic is the poison most commonly used to effect murder, as it is very easily procurable and destroys life in a small dose: also it is colourless and nearly tasteless, and so can readily be mixed with food without detection.

Symptoms, Acute form.—The symptoms caused by arsenic usually appear about half an hour to an hour after taking the poison.

There is generally first a feeling of faintness and sickness, with a burning pain at the region of the stomach and tenderness

there. This is followed by severe vomiting, sometimes of mucus and white arsenic mixed, at other times the vomited matters are yellow from the presence of bile, or brownish red from blood. Usually there is also severe purging with cramps in the legs, and the discharges from the bowels are often tinged with blood. There is also a uncomfortable feeling of the throat, either of burning pain, or of tightness and dryness with intense thirst. The pulse is small and weak, the skin either cold and clammy or very hot and moist, and there is great restlessness.

There is also usually severe burning pain in the epigastrium increased by pressure or breathing and gradually extending over the whole abdomen.

These symptoms however vary very much. Many cases are recorded in which the first pain was felt while the food containing the poison was being taken, while in others no symptoms appeared for 8 or even 10 hours. There is seldom any taste in the mouth, though sometimes a peculiar rough sensation is complained of.

After a time, the respiration becomes painful and catching, from the tenderness of the abdomen, and sometimes there is difficulty in speaking. Before death, the patient sometimes becomes insensible, but at other times his intellect remains clear to the last, but he is very weak and has a great tendency to faint, with palpitation of the heart; occasionally convulsions occur or tetanic spasms, with cold extremities and pulse small and weak.

Any one of the above symptoms may be absent. Thus out of 25 cases carefully observed, vomiting did not occur in 2 cases, diarrhœa was absent in 4 out of 15, pain was not complained of in 1 case out of 20, and thirst not in two cases out of 17.

On the other hand, other symptoms may be present. Thus the eyes may be bloodshot; this usually occurs when the patient lingers for more than a day; sometimes the urine is suppressed or there is difficulty in passing it; at other times there is intense headache with giddiness, convulsions, fits, or tetanic spasms, and occasionally there is delirium or deep sleep. Locked jaw also has occurred, and sometimes inflammation of the sexual organs.

Occasionally a vesicular eruption appears on the skin or excoriations about the anus.

Sometimes, but rarely, the chief, if not the sole symptoms, are excessive prostration of strength and frequent fainting ; vomiting and pain in the stomach may be entirely absent or very slight. This form of poisoning is usually occasioned by a very large dose of arsenic.

In the nervous form there may be no vomiting or purging or these may be slight. Sometimes collapse occurs with cold clammy skin, feeble pulse, and voice hoarse or whispering. At other times there is delirium mania, paralysis or coma ending in death : this usually results from a large dose of arsenic swallowed in solution, and is rarely met with in India.

CHRONIC POISONING BY ARSENIC.

This is generally effected by giving repeated small doses as in a case afterwards described, but it may be caused by living in rooms the walls of which have been painted or papered with arsenical colours, particularly green or yellow.

The symptoms produced are generally vomiting if the dose is at all large, colicky pains in the belly, diarrhœa, headache, loss of appetite languor, or hoarseness of voice, great thirst, and a peculiar silvery coating on the tongue, with eruptions on the skin, soreness and redness of eyes, gradual weakness, emaciation and anæmia, at length death may occur.

Questions have arisen respecting the taste and solubility of the poison, but it is generally agreed that the taste when the poison is given in solution is so slightly sweet as to be concealed by almost any liquid, while if it is partly in the solid state there may be a rough gritty taste from the particles of the powder. Concerning the solubility, Dr. Taylor states that cold water will not dissolve more than 1 grain to an ounce, and hot water allowed to cool on arsenic only 1½ grains, but if boiled on it, it will dissolve as much as 11 grains to the ounce. Organic liquids however dissolve less, but arsenic is soluble in fatal proportion in tea, coffee, milk, beer, spirits, and even oil. A very large

quantity may be suspended in a thick liquid such as gruel or cocoa, but only a part is dissolved of this.

The smallest fatal dose is from 2 to 3 grains. The earliest appearance of symptoms (otherwise than the taste) recorded was 3 minutes. The longest interval between the taking the poison and the occurrence of symptoms was 10 hours ; in this case however, the action was delayed by much food having been taken previously. The usual interval is from half an hour to an hour. The earliest period of death on record took place 2 hours after the poison had been swallowed. Deaths have occurred as late as 2 or 3 weeks after the poison has been taken. The average period however of the fatal termination is 18 hours, but more than half the cases terminate within 6 hours of the time at which the poison was swallowed.

The symptoms observed in a case of poisoning by arsenic are scarcely sufficient of themselves to characterise this poison as very similar symptoms may occur in a case of epidemic cholera, but if the vomiting and purging is seen to contain blood, and especially if there is any distinct redness of the eyes, eruption on the skin, or inflammation about the anus, the probabilities of arsenic being the cause of death are very much increased ; and even the fact of the fatal illness commencing shortly after a meal, and of several persons being attacked at one time is not sufficient to distinguished this form of poisoning always from cholera, since in the latter disease it occasionally happens that the attack is shortly after a meal, and sometimes though more rarely, that several persons are attacked at once. Still, however, in the Punjab attacks of cholera are comparatively rare, especially in the cold season, and it is extremely unlikely that several persons would be attacked in one house with cholera at a time when no one else in the neighbourhood was affected with this disease. Also in cholera the skin is cold almost from the first, but in poisoning by arsenic the skin is first hot and only cold at the last. The tenderness of the abdomen and difficulty of breathing do not exist in cholera as they do in cases of poisoning by arsenic.

Arsenic is not usually destroyed or removed by the putrefaction of the body. It has been detected in a coffin after 14 years' interment when only the skeleton remained and some earthy matter. In such a case it may be necessary to prove that there is no soluble arsenic in the soil about the grave. The process of putrefaction is considerably modified by the presence of arsenic; when much is present, the stomach often remains, even in the hottest weather of India, firm, hard, and with a peculiar smell, and the tissue is so little altered that the condition of inflammation can be easily recognised. This, however, is not always the case; sometimes the tissues are dried up or partly converted into a fatty substance called adipocire. In a case at Kumalia, 1869, No. 107, a woman died from poisoning by arsenic and was buried 8 days; afterwards the body was examined and was too decomposed to be recognised, but the stomach was found in a perfect state of preservation with numerous yellow patches of sulphide of arsenic adherent to it.

In addition to the use of arsenic as a poison for human beings, it is not unfrequently employed to destroy cattle, in order to obtain their skins, which in many parts are the perquisites of the chamars. Many such cases have been referred from the Peshawar and other districts. In some of these the poison in the form of white arsenic has been simply mixed with attah and made into a ball of an oval shape about 1½ inch long, which in one case contained 19 grains of white arsenic in 1,000 grains; sometimes grass is mixed up with the ball to make it more attractive to the cattle. In two cases a peculiar mode of poisoning was employed, pieces of grass were moistened with a solution of arseniate of potash, probably made by fusing white arsenic with common nitre, and these were left about for the cattle to eat. Nothing could be ascertained as to the perpetrators of this act.

Symptoms in animals.—Arsenic produces frequent evacuations from the bowels, and the discharges are very liquid—the respiration is difficult, and there is great thirst. It is poisonous in a large dose to horses. It should be mentioned that arsenic

is not the only poison used to destroy cattle, sometimes aconite is used, the root being made up into a ball with flour like that already described.

Treatment of Poisoning by Arsenic.—Vomiting generally occurs from the action of the poison itself, and should always be assisted by the administration of warm liquids, such as milk and water, or eggs or flour beat up with lukewarm water, but if a stomach pump is available, and any one capable of using it, it should always be employed. If the vomiting is not abundant rai or sarson (mustard powder) and water may be given in the proportion of 1 or 2 tolas or 2 or 3 teaspoonsful in a chittack of warm water every quarter of an hour, till vomiting is produced. Or if this is not procurable, any oily substance, as ghi, mixed with warm water will generally have the desired effect. Sulphate of copper, nila tutiya, in doses of four to five grains or sulphate of zinc in doses of 20 grains every quarter of an hour may also be used as an emetic if they are available, and the stomach pump should be used if it is procurable.

The best common antidote is lime water. This is made by pouring a large quantity of water over lime (chuna) the water should be carefully poured from the deposit of lime and mixed with eggs and milk beaten together, of this the patient may drink as much as he can. Hydrated oxide of iron may be prepared by adding sodium or ammonium carbonate to any solution of a persalt of iron, the tincture of perchloride being the most usual. An excess of the alcaly must be avoided. If there is time it should be strained through a cloth and the precipitate washed with water.

Stimulants are necessary if the patient becomes cold and pale with a feeble pulse, and sharab and water may then be given freely, but recovery will seldom occur after these symptoms appear.

After the vomiting has quite ceased, it is advisable to give castor oil, or the seeds from which it is produced, to remove rapidly any of the arsenic that may have passed into the intestines ; of the former, 2 tolas weight may be given or a table-

spoonful; of the latter 2 to 3 seeds will be sufficient on the second day. If there is excessive pain in the abdomen it may be necessary to apply a few leeches, but this is not advisable till 24 hours have elapsed from the taking of the poison. If European medicines could be procured, the best emetic would be 20 grains of the sulphate of zinc or 5 grains of ipecacuanha powder given frequently. Under such circumstances also the hydrated peroxide of iron might be made by adding ammonia to the sesquichloride of iron, and well washing the precipitate, or even common magnesia may be of service as an antidote.

Post mortem Appearance.—The principal change that occurs in the body after poisoning by arsenic is in the stomach. The lining membrane of this is always extensively reddened especially towards the broader portion; this redness is sometimes only on lhe ridges which the stomach presents; at other times it is irregular in shape, but often it is nearly uniformly spread over the whole inner surface of the organ.

Often there are other patches of a deeper colour caused by blood diffused through the tissue beneath the lining membrane. On the surface there is usually an increased quantity of mucus and if the arsenic has been taken in the solid state, particles of this may be seen in spots of a white colour or sometimes of a yellow tint, from the conversion of part at least into the sulphuret of arsenic owing to putrefactive changes going on in the body. The stomach usually contains a brown matter mixed with blood, but if the arsenic is in large quantity, this may be of a yellowish hue.

The red colour of the lining membrane is not removed by prolonged washing, which distinguishes it from that produced from staining of the stomach by various red juices or blood poured into its cavity.

The redness of the stomach varies from a slight rosy blush to a deep red stain, like port wine or crimson velvet; sometimes it is limited to one or two spots, or is disposed in streaks following the lines of the rugœ. In a few cases it is absent, but it was found in 156 out of 161 cases.

Sometimes the lining membrane is much thicker in patches and excoriated or even ulcerated, portions being removed to a greater or less extent, and the surrounding tissue raised, reddened, and rather soft. Very rarely do these ulcers extend quite through the stomach, thus giving rise to perforation of that organ, still more rarely does gangrene occur.

In one or two instances no trace of inflammation of the stomach was discovered.

The lining membrane of the heart is often stained with blood especially on the left ventricle and in the aorta. It is usually most marked in the columnœ carneœ. The red stain often extends to one line in depth in the lining membrane. The blood in the larger vessels is dark and gelatinous, and does not form a firm clot when it has coagulated.

Of the other parts of the body the rectum is the one usually most affected, and the changes there closely resemble those in the stomach, with the exception of the absence of white spots of solid arsenic. The small intestine in the neighbourhood of the stomach is sometimes inflamed, but the rest of the bowels usually escapes alteration, as does also the mouth and gullet; these last have however been found inflamed.

The liver and kidneys, although they usually contain a large proportion of the absorbed poison, seldom show any marked change.

Very rarely the genital organs are inflamed, or even are gangrenous.

Dr. Massy, at Jullundar in 1872, found a body in a fair state of preservation though it has been buried for some days in April. The stomach was highly congested and the Chemical Examiner found arsenic in both stomach and liver.

Inflammation of the stomach and bowels and congestion of the lungs was found in the corpse of a man which had been examined seven days after burial at Muzaffargarh in March 1871.

State of the Heart in poisoning by Arsenic.—Case reported by Dr. Tandy in *Indian Medical Gazette* for 1873, page 64.

A corpse of a woman said to have died from cholera was exhumed, and the heart was found full of coagulated blood, and in the muscular structure of the left ventricle at the columnœ carneœ were many small extravasations of dark blue blood like bruises, the endocardium was healthy, but the stomach and intestines were congested in patches, and arsenic was found in the contents of the stomach, and it was proved that she had been poisoned, and the poisoners a man and a woman were hanged.

Dr. Bonavia of Lucknow first mentioned this peculiar appearance of the heart in the *Indian Medical Gazette* for 1866, page 252.

He states that in cases of arsenical poisoning he invariably found livid patches on the inner lining of the heart, more especially on that of the left ventricle about the columnœ carneœ. The colour when well marked resembled that of the lung and the size and hue bore some proportion to the amount of redness in the stomach.

No. 1.—*Case of Arsenical Poison.*—Two men named Dhul Singh and Ram Das ate their food together at Amritsar in May 1861, half an hour afterwards both suffered from nausea, vomiting, burning heat in the throat, and intense burning pain in the stomach ; they had also purging but remained sensible till death. Ram Das had twitchings in the limbs, but no convulsions. Arsenic was found in the stomach and in the vomited maters.

No. 2.—*Recovery from Arsenic.*—Futteh Din, Dhobi, a boy of 10 years of age, at Shahpur, took at 8 P.M. of November 22nd, 1862, some sugar and till seed from a man. Two hours after eating these he was attacked by vomiting and purging with severe pain in the stomach : linseed tea, and a little opium was given him, and afterwards castor oil. On the second day he quite recovered but arsenious acid was found both in the vomited matters and in the discharge from the bowels.

No. 3.—An inhabitant of Dera Ghazi Khan had a quarrel with a fakir, named Mudan Mohan, who in consequence left the town and went to reside by the river side. Some time after on the occasion of a fair, Mudan Mohan returned to the town and

bought some sweetmeats, which he soon after gave to the two grandsons of his enemy during their relation's absence, about 3 P.M. Shortly afterwards the elder of the two boys was taken very ill, complaining of a pain in his chest, and being unwilling to accompany his grandfather to the fair, he was then attacked by vomiting and purging, passing a white substance. He continued to suffer severely to 10 P.M., when he died, having only a native hakim to attend him. The Civil Surgeon saw him after death, and considered that his face resembled that of a child dead from cholera, a white powder was found in his stomach, which on examination proved to be arsenic.

His brother, aged 4, was similarly affected, but was attended by the Civil Surgeon and recovered. The rest of the sweetmeats in the shop were examined, but no arsenic was found in them so that it was concluded that the prisoner had spread arsenic over them after his purchase.

This, as far as the symptoms are noticed, is a very characteristic case. Two persons were affected shortly after eating the same article of food. There was no complaint of bad taste or pain in the mouth, but the first symptoms were pain in the chest probably at the region of the stomach, attended with a sense of weakness and disinclination to exertion. Subsequently there was violent vomiting and purging, and death in seven hours from the time of taking the poison.

No. 4.—*Case No.* 110 *of* 1862, *Gujrat.*—A woman after taking some medicine was attacked immediately by burning pain in the throat and stomach, afterwards vomiting and purging of blood occurred, and subsequently delirium and debility. She died in 5 hours, and on *post mortem* examination the throat, stomach and intestines were all found highly inflamed, and a poisonous quantity of arsenious acid was detected in the stomach and in the medicine given her.

No. 5.—*Case No.* 119 *of* 1862, *Jullundur.*—Two sowars were taken ill with vomiting and purging soon after dinner, there was also a burning sensation in the stomach, dryness of the throat, ramps in the limbs and insensibility, but both recovered after

copious vomiting. Two mehters were also affected similarly after partaking of part of the food, but also recovered after vomiting.

Arsenious acid was found in the crevice of a stone used to prepare curry powder for the dinner.

No. 6.—*Case No.* 128 *of* 1863, *Mooltan.*—A man was attacked by vomiting and purging soon after his evening meal: he had severe pain in the stomach, increased on pressure, difficult respiration, excessive thirst, body cold, great delirium and restlessness and died the next day.

On *post mortem* examination the stomach and the whole of the intestines were intensely inflamed, and ecchymosed; arsenious acid was found in the stomach.

A hollow glass pestle was found in one case filled with arsenious acid, this could be easily mixed with curry powder by inverting the pestle and removing the finger over the opening at the top and thus the poison mixed without giving rise to any suspicion.

No. 7.—*A case of slow poisoning by arsenic reported by Dr. J. W. Johnson.*—A Havildar's wife was living with the Hospital Assistant in a frontier regiment, and the Havildar used to eat food always at the house of the Hospital Assistant. On the 10th of January he and a sepoy partook of some food prepared by his wife and both suffered from vomiting and purging: he was treated with chlorodyne, milk and eggs and carbonate of soda and apparently recovered. On the 17th vomiting and purging again occurred with severe local pain in the stomach and tenderness; morphia, hydrocyanic acid and a blister were used, and the next day he was better, till dinner, vomiting and purging again came on with excessive pain, and blood was seen in the stools; morphia was given, but he was still in great agony. Nausea then occurred but no diarrhœa till the evening. The next day he was rather worse, pulse irregular, skin cold, but with morphia the vomiting was less.

21st. No vomiting or diarrhoea, but excessive nausea and painful breathing.

22nd. Pulseless, body cold, clammy, but has severe pain, but no vomiting, died in much agony in evening. On *post mortem*

examination stomach and duodenum were greatly inflamed, and an ulcer found in the duodenm nearly penetrating, rest healthy. The wife was committed and transported for 14 years. There was no photophobia, inflammation of the eyes or tetanus.

Case No. 8.—Two women at Amritsur after eating together of food prepared by a third person, were both seized with vomiting, purging, pain in the throat, and intense heat in the stomach. There was also difficulty of respiration, great depression of strength and excessive thirst, the pulse was small, frequent, and irregular, and the body cold and covered with a clammy prespiration, while there was great restlessness in both.

Both died, and arsenic was found in large quantity, both in the contents of the stomach and the vomited matters.

ADDITIONAL CASES OF ARSENICAL POISONING.

No. 9.—*Case No.* 291 *of* 1868, *Abottabad*.—Four men and a child partook of some "lassi" (butter-milk) together, 3 or 4 hours afterwards they were all attacked with severe abdominal pains, violent vomiting and purging. One man died after 10 hours from the time of drinking the lassi, the rest recovered.

On *post mortem* examination the stomach was found intensely congested, and its lining membrane inflamed. There were some purple spots of extravasated blood near the great curvature, but no ulceration. The stomach contained about ten ounces of a dark brown fluid mixed with a few white particles. The intestines were very much congested, especially in the duodenum cœcum and sigmoid flexure, where the mucus membrane was of a dark red colour but without any ulceration. The intestines contained a yellowish fluid almost destitute of fœcal odour. Arsenic was found in the contents of the stomach.

This case exemplifies the principal symptoms and *post mortem* appearances, which occur after poisoning by arsenic. The absence of any ulceration was probably due to the short interval before death—10 hours only.

No. 10.—*Case No.* 278 *of* 1868, *Hoshiarpur*.—A woman after eating some sweetmeats was attacked by excessive vomiting and

purging, great thirst and a burning pain at the epigastrium, but there were no cramps felt, the pulse was small and weak, and death occurred 48 hours after eating the sweetmeats.

On *post mortem* examination the stomach was found to be much ecchymosed, and to contain a large ulcer near the pyloric extremity with a hard irregular border. The intestines were ecchymosed throughout, but all the other viscera were healthy.

No. 11.—*Case No.* 268 *of* 1869, *Pind Dadan Khan.*—An infant was taken away from its mother for a short time; on its return it cried and was seized with vomiting and purging and died in about two hours' time.

On *post mortem* examination the mucous membrane of the stomach was found to be red and congested, especially along the greater curvature, and the stomach contained a thick milky fluid mixed with white gritty particles, which proved to be arsenic. The brain and lungs were congested, and the heart full of blood. The rapid death in this case was remarkable but was probably due to the large amount of poison swallowed, and the infancy of the sufferer.

No. 12.—*Case No.* 87 *of* 1869, *Ferozepore.*—Two men partook of some food, about a quarter of an hour afterwards both were attacked with very acute pains in the stomach with vomiting and purging: one of them became delirious and had twitching of the limbs, and died in ten hours; the other complained of cramps and tingling in the throat, and lived twenty hours. Arsenious acid was found in the contents of their stomachs.

No. 13.—*Case No.* 123 *of* 1869, *Jullundur.*—A Parsi took some food, and was soon afterwards attacked by burning pains in the stomach, which seemed to take away his breath; he vomited, and his pulse was strong and rapid, his tongue was dry and parched, he was very restless and had cramps in the legs and the back of the neck and shoulders, he died on the next morning in a spasmodic attack.

The body was not examined till eleven days after burial, and then it was much decomposed, but the mucus membrane of the

stomach appeared of a dark red colour, and arsenic was found in it in considerable quantity.

No. 14.—*Case No.* 86 *of* 1868, *Delhi.*—A woman ate some dhye (curds,) about one hour and a half afterwards she was attacked with flushing of the face, great restlessness and vomiting; subsequently purging occurred with tingling in the throat and great thirst; she became delirious, and at length insensible and died; arsenic was discovered in the stomach.

No. 15.—*Case No.* 158 *of* 1869, *Leiah.*—A boy ate some sweetmeats at the fair, and immediately after eating them he felt unwell, and went to his home; he was attacked at first by a discharge of saliva from his mouth, followed by vomiting, both at the fair, and on his way home. Subsequently he was purged and complained of a feeling of tightness about the throat, but had no cramps, delirium nor insensibility. On *post mortem* examination the stomach was found inflamed and abraded, and there was evidence of the presence of arsenic in its contents.

In this case the first symptoms was somewhat remarkable that of a discharge from the mouth of saliva; this however is sometimes the result of taking arsenic even in small doses.

No. 16.—*Case No.* 23 *of* 1871.—A musician in the Corps of Guides, Murdan, was admitted into hospital on January 20th, complaining of pain in his stomach and subsequently of vomiting and purging, and urgent thirst: at 3 P.M. he was pulseless, cold and collapsed, but the vomiting continued; the vomited matters contained flakes of mucus and clotted blood; his eyes were injected; he remained conscious till death, which took place about 4 P.M. On *post mortem* examination the stomach was found to be much injected, and the lining membrane eroded in patches, presenting streaks of blood and mucus. There were numerous ecchymoses along the greater curvature, and a greyish white powder was so closely adherent to the membrane that both were removed together.

The small intestines were much congested and ecchymosed in patches, but all the other organs were quite healthy. Arsenious acid in large amount was found in the contents of the

stomach. This case exemplifies many of the symptoms of poisoning by arsenic, such as the collapsed state, the injected condition of the eyes and the constant vomiting, also the condition of the stomach after death was highly characteristic.

No. 17.—*Case No.* 84 *of* 1871, *from Gujrat.*—A man named Rudu ate same food, about ten minutes afterwards he was attacked by pain in the stomach, followed by vomiting and purging: he complained of a burning pain in the throat, and spoke with difficulty; afterwards he was delirious, but did not become drowsy; his face was discoloured, and at length he died.

Arsenious acid was detected in the vomited matter.

No. 18.—*No.* 278 *of* 1870, *Jhang.*—Two women partook of the same food, both were soon attacked by vomiting and purging, dryness of mouth, spasms, vertigo, and prostration. One of the women died nine hours after eating the food, the other woman recovered. Neither of them complained of pain in the stomach nor of drowsiness.

On *post mortem* examination of the deceased woman, the brain was found to be congested and presented a clot of blood at the base, but the stomach was not at all inflamed, though it contained a large amount of arsenious acid. This last condition was singular, and was probably the result of the short time during which life continued.

Many of the above cases show the same symptoms, such as pain usually of a burning character in the throat or stomach; vomiting and purging and usually collapse, but in a few cases peculiar symptoms were observed, such as delirium, convulsions; in children stupor, difficulty of respiration and redness of the eyes, also cramps and spasms of the muscles.

The *post mortem* appearances generally depended on the length of time that had elapsed after taking the poison before death occurred.

In most cases redness of the stomach was observed with ecchymoses, and often redness of the intestines, but ulceration was more rarely met with and chiefly when a long interval had occurred before death.

No. 19.—*Case No.* 107 *of* 1870, *Umritsar.*—A boy of 7 years of age was seen coming out of a house vomiting. He had been there one hour only: there was afterwards purging and burning pain in the stomach, and he died in 2 or 3 hours. Arsenic was found in the stomach.

No. 20.—*Case No.* 267 *of* 1870, *Attock.*—A Mahomedan, with two other men, partook of some food. All were attacked with vomiting and diarrhœa, but the other two recovered, the first man died and on *post mortem* examination his stomach was found to be much inflamed, especially on the prominent folds, with patches of a greyish colour sticking to the surface. Arsenious acid was found in the contents of the stomach.

No. 21.—*Case No.* 208 *of* 1870, *Sirsa*,—A man in the Customs Department being suspected of murder, was suddenly taken ill with a disease supposed to be cholera. There being incessant vomiting and purging of a colourless fluid, pinched features, shrivelled fingers and blue nails. The appearances after death were said to be similar to those of cholera; the intestines and bladder being empty but the stomach was congested. A large quantity of arsenious acid was found in the contents of the stomach. No cholera existed in the district at the time of death of this person.

This case is important, as it shows that cases of arsenical poisoning may be mistaken for cholera, and there is reason to think that many of the so-called sporadic cases of cholera were really cases of poisoning by arsenic.

No. 22. From the report on the *Medico-legal* Returns by Dr. R. Harvey, 1876, page 246, *et sequentes.*

The following case was reported primarily by Dr. M. P. Warburton, of Jullundur, in September 1871.

A stranger came to a house in Jullundur on September 6th, 1871, to engage the services of Emam Bux as a Mukhtiar in Court, and gave a present of a quantity of sweetmeats. Emam Bux, his sister, Nur Bibi, and her daughter had already eaten their evening meal, but his mother, Mussammat Douli and his brother

Kurrim Bux had not had any food. They all took part of the sweetmeats about 7 in the evening: one hour afterwards Kurrim Bux was attacked with vomiting, and three hours afterwards, with purging; he also complained of dryness of the mouth, intense thirst and griping and shooting pains in the belly. The vomiting and purging continued till his death, ten hours after taking the sweetmeats.

The mother was affected in the same way, and died soon after her son.

The sister Nur Bibi, was also similarly affected at the same time as the others: she complained of thirst, choking in the throat, and heat and severe pain in the stomach, but gradually recovered without any purging.

Her little daughter, Mussammat Churi, aged 4, went to sleep after taking the sweetmeat, and did not wake till about half past nine; when she was attacked by vomiting, thirst and pain in the stomach, but was not purged, and subsequently recovered completely.

The Mukhtiar Emam Bux was attacked with vomiting about 1½ hours after eating the sweetmeats: this continued all night, but there was no purging; there was great thirst and heat and pain in the stomach. On the morning of the 7th September he was admitted into hospital, still suffering from vomiting of green matter, milk and raw eggs were given, and castor oil which brought away two green stools. On the eighth there was purging with slime and blood, the urine also was tinged with blood and scanty, and the pain and tenderness in the epigastric region remained. On the 11th he was feverish, but purging stopped. On the 12th he was slightly jaundiced; his tongue had a silvery appearance and his throat was ulcerated. Castor oil was given and produced six greenish stools. On the 13th an eruption of herpes appeared on the right chest, neck and arm, also on the right ear and lips. The throat was more painful. The eruption dried up on the 15th day, but the tongue was still silvery, complexion sallow much emaciated, eruption scabbed, thirst getting well.

The bodies of Kurrim Bux and Mussammat Douli were examined on the 7th about 3 P.M. ten hours after death.

In both the brain and its membranes were highly congested, the lateral ventricles empty, the lungs injected with blood.

The left ventricle of the heart contained dark fluid blood, and its lining membrane in each case was stained red, but the stain was removed by water in a few seconds.

The lower part of the œsophagus was highly congested in Kurrim Bux's case, and the whole of the œsophagus was slightly congested in Mussammat Douli's case. The stomach of each contained about a pint of green fluid, tinged with blood, and with stringy jelly-like mucus. The whole of the mucus membrane was intensely inflamed with numerous spots of extravasated blood, and there was a quantity of tenacious jelly like mucus, mixed with a white powder, and in the case of the woman with some yellow substance. The intestines contained a jelly like mucus mixed with blood, and were highly congested, especially the large intestine in the woman in whom alone Peyer's patches were enlarged. The liver, spleen and kidneys were congested, the bladder empty and congested. Arsenious acid was found in the contents of the stomach by the Chemical Examiner.

These cases have been very carefully reported by Dr. Warburton, and it shows the wholesale way in which poisoners often act in the Punjab ; it is probable that the death of the Mukhtiar was the only one desired, but sufficient poison was given to seriously affect five persons and kill two of them.

It will also be seen that those who had taken food recovered after vomiting without any purging, probably the arsenic was carried out of the stomach with the food which sheathed the mucous membrane to some extent, while in the empty stomachs of the two who died, part of the arsenic adhered to the mucous membrane, and could not be evacuated by the vomiting, while another part passed into the intestines and was absorbed.

The child who went to sleep was affected one hour later than the others, showing that sleep delays the absorption of the poison, and the symptoms of Emam Bux which were carefully recorded

shows the after effects of a dose which would probably have proved fatal if the stomach had not contained food before the poison was swallowed.

ROUGH MODE OF EXAMINING A STOMACH FOR ARSENICAL POISON.

Dr. Center's notes of the rough mode of testing for poisons. Annual Report of 1881, page 7.

If a suspected solid is found in the stomach, vomited matter or drugs, the following plan should be used :—

1. Heat a fragment on the point of a knife or on a slip of mica "abrak" easily got in any bazaar, in the flame of a spirit, lamp.

2. Heat another fragment in a test tube.

3. If a sublimate forms in the tube, add to it a few drops of the solution afterwards described.

By the first test all substances are divided into the volatile non-volatile and organic.

The volatile consisting of white arsenic, yellow arsenic, corrosive sublimate, calomel and ammonia chloride, disappear when heated.

The non-volatile composed of all other mineral substances remain, zinc oxide does not melt, but has a greenish yellow colour while hot, and is white when cold. It is insoluble in water. Alum swells up, gives off water and forms a white infusible residue ; it is soluble in water and has a sweet astringent taste. Borax swells up and melts into a clear liquid solidifying into a clear glass when cold. Nitre melts into a clear liquid and deflagrates if a fragment is dropped on a live coal. Common salt crackles from imprisoned water and then melts into a clear liquid. It is further recognised by its solubility in water and its well known taste. Carbonate of lime sulphate of lime and some siliceous substances do not fuse, the first effervesces with a drop of acid, and the two others remain unchanged. Starchy or fatty matters burn with a white flame, leaving a black residue of carbon.

Of the volatile group, white arsenic will volatilise without melting, giving a bluish colour to the flame and a white smoke of white arsenic, having a smell of garlic. Yellow arsenic will burn with a blue flame, and give a yellow smoke with the same smell.

Corrosive sublimate, calomel, and ammonium chloride will also volatilise, giving off white smoke tinging the flame, but there is not the garlic odour. To distinguish these powders, take a fragment and add it to water. Arsenic and calomel will not apparently dissolve, but the fine powder will partly sink, and partly float. Corrosive sublimate and ammonium chloride are at once distinguished by their ready solubility.

If to the solution some potash is added, corrosive sublimate gives a yellow precipitate of mercuric oxide. Ammonium chloride gives no precipitate, but if the potash solution is heated, there is an odour of ammonia. There remains to be distinguished white arsenic and calomel.

The impure calomel (ruskapur) sold in the bazaar might be readily confounded with the former.

To distinguish between these, apply the third test. Place a small fragment in a dry warm test tube and heat it in the flame of a spirit lamp, it will volatilise and condense in the colder part of the tube, showing a white or colourless deposit of crystals. If a microscope of low power or even a strong lens be available, and the crystals are seen to be octohedral or modified octohedra, the substance is white arsenic. The calomel crystals are long and prismatic, and if a drop of solution of potash is allowed to run down the tube on the sublimate, the calomel will form the black deposit of black wash. The arsenical sublimate will only dissolve.

If it be desired still further to confirm the arsenic, place a fragment in another small dry test tube, and add enough dry powdered charcoal to cover it.

Heat this in the flame of a spirit lamp, so that the charcoal becomes red hot: there will be a brilliant black sublimate of

reduced metallic arsenic in the cool part of the tube along with some white sublimate of octohedral crystals of white arsenic; or the white sublimate in the first test tube may be boiled with a little water which will dissolve enough to show the liquid tests of ammonio nitrate of silver, and ammonia sulphate of copper, the first giving a yellow and the second a pale green precipitate.

These solutions can be made in any dispensary, and are described in the British Pharmacopœia and every text-book of Materia Medica. A fragment of yellow arsenic heated on a piece of mica melts into a dark liquid, gives off a white smoke, having a garlic odour, and colours the flame of the spirit lamp bluish. If heated in the test tube, it melts and sublimes, giving a yellow sublimate, which is red when hot. On further volatilising, it all oxidises to a white sublimate of octohedral crystals of white arsenic.

Mode of extracting the poison.

Many of the packets contain only lumps of white or yellow arsenic, or the same roughly powdered or mixed with flour, dough or bread.

In about 80 per cent. of the stomachs which contain arsenic, the poison being very insoluble is found in solid fragments adhering to the coats of the stomach or imbedded in the mucus and fibrinous exudation produced by the inflammation of the mucus membrane, and all that may have to be done is to pick off a few fragments and identify them as above described.

The above tests can easily be employed by a Surgeon or an Assistant Surgeon without any elaborate apparatus, but it is thought useful for medical students especially to add a description of such tests as may be used in a laboratory, and which they will learn while at the Medical College to employ.

LABORATORY TESTS FOR ARSENIC.

MEDICO-LEGAL ANALYSIS OF POISONING BY ARSENIC.

(Taken principally from Dr. Tarleton Young's lectures on Analytical Chemistry.)

When a case of suspected poisoning by arsenic is sent to a medical officer having the necessary chemicals and apparatus, he should first carefully inspect the substance sent, or the mucous membrane of the viscera for any white or yellow solids.

If any are detected, they should be removed carefully, placed in a test tube, and treated as described afterwards under Reinsch's test. If no such pieces are visible, the contents of the stomach should be largely diluted with water, and submitted to repeated decantation from one vessel to another. In this way any white or yellow arsenic in fine powder can be detected, as their weights contrasted with that of the organic matters present, cause them to subside to the bottom, where they can easily be recognised as white or yellow gritty powders, to which the sublimate test or Reinsch's test may be applied as afterwards described.

If no piece or powder of arsenic can be detected on washing and decanting the contents of the stomach, the substance should be prepared for Reinsch's test by cutting it into pieces if necessary, and introducing it into an evaporating basin in which dilute hydrochloric acid and a piece of bright copper foil is boiling. If the copper remains bright after boiling in the acid alone, but tarnishes when the suspected substance is added, there is reason to suspect the presence of arsenic, and Reinsch's test, as afterwards, described, should be used.

Note.—If the jar of viscera sent for examination is found on opening to contain living maggots, as will sometimes occur, it may be at once concluded that the poison present, if any, is neither arsenic nor corrosive sublimate. As, if either of these is present in poisonous quantity, maggots would never have been developed. The viscera of animals or men poisoned by arsenic have generally a less offensive smell than those from beings which have died from other causes, owing to arsenic being an antiseptic and preventing decomposition.

Brande and Taylor recommend that, in cases of suspected poisoning by arsenic, the substance or liquid suspected to contain the poison should be mixed with strong hydrochloric acid in a retort and then slowly distilled. The distillate will contain any arsenic that may be present in the form of chlorides free from organic impurities, and this liquid can be used in either Reinsch's or Marsh's test as afterwards described.

ANALYSIS FOR ARSENIC IN A LABORATORY.

In all the analyses for arsenic in a laboratory specially prepared and chemically pure re-agents must be employed, as the sources of fallacy are many, and can only be thus avoided. And consequently the first step must be to prove that every thing used, except the substance to be tested, is free from arsenic.

1. *Reinsch's test.*—Half fill a small evaporating basin with pure distilled water. Acidulate strongly with hydrochloric acid, and drop a piece of bright pure copper foil into the liquid. Heat to the boiling point—if no dark deposit collects on the piece of bright copper foil, the materials used can be pronounced free from arsenic, antimony, bismuth, mercury, and iron. Next add to the boiling liquid the substance to be examined. If it contains arsenic, a greyish black deposit will at once begin to form and accumulate upon the previously bright copper foil. Remove the piece of foil covered with the deposit, dry it by gentle pressure between the folds of some white filtering paper ; roll it up into a small pellet, and drop it into a perfectly clean and dry narrow test tube.

Heat the test tube in the flame of a spirit lamp, beginning a little above the copper foil, and gradually heating it to the bottom of the test tube—a white glistering sublimate will arise, and collect on the sides of the cool portion of the tube.

This sublimate examined microscopically under a quarter of an inch objective, will be found to consist of crystals of characteristic octohedral form, and these crystals may be dissolved in boiling distilled water, and they will then give a pale yellow precipitate with ammonio nitrate of silver and a bright yellow precipitate with hydrochloric acid and hydrogen sulphite

2. *Marsh's test.*—Take a wide mouthed bottle of about 10 ounces capacity, closed by a caoutchouc cork, having two holes; through one hole a thistle funnel tube is inserted, through the other a vertical glass tube, drawn out to a fine point at its further end, but bent horizontally at right angles, and again bent vertically at right angles at about 8 inches from the former bend; place in the bottle some pure granulated zinc, add enough distilled water to cover this and see that the end of the funnel tube dips below the level of the surface of the water. Next slowly pour a small quantity of pure sulphuric acid down the thistle funnel tube. Action at once commences. Hydrogen is evolved, and emerges from the pointed orifice of the delivery tube. On no account should the gas be lighted, as it is an explosive mixture of oxygen from the air in the bottle and hydrogen: if a light was applied too early, a dangerous explosion might occur. After a time, the gas should be collected by introducing the pointed tube to the top of an inverted test tube of small size, and this should be removed while still inverted from the apparatus, and a flame applied to the interior of the tube. If no explosion occurs, the air has been expelled, and the apparatus is fit to be used, by applying a light to the gas issuing from the pointed tube. A flame of a yellow colour is seen; owing to sodium volatilised from the apparatus. Over this burning jet of hydrogen, and in contact with the flame, a clean cold dry, white porcelain crucible lid or plate is now to be held momentarily. No stain or mark will appear on it if the materials and apparatus are properly pure and free from arsenic.

Next pour the substance to be examined in solution down the thistle funnel into the interior of the bottle. The following phenomena immediately occurs if arsenic is present:—

1 The action in the interior of the bottle increases in vigour.

2. The flame of the burning jet elongates and increases to three times its former size: it assumes a violet or purplish tinge, and emits a white smoke.

3. On depressing the white porcelain plate or crucible lid, as before into the burning jet, a black metallic looking deposit of arsenic is obtained if any compound of this is present. This deposit is readily soluble in a solution of either calcium or sodium hypochlorite or in strong nitric acid by heat.

4. If the bent tube through which the gas is passing is heated in the flame of a spirit lamp, a black deposit of arsenic forms in the interior of the tube, just beyond the heated portion. When cold the glass on which the black ring is seen may be filed off, and dropped into either of the solutions mentioned in paragraph 3, when the black deposit dissolves in the liquid.

5. The gas if passed through a solution of silver nitrate, gives a black precipitate of metallic silver in a fine state of division.

If the black deposit of arsenic referred to in para. 3 or 4 be dissolved in boiling nitric acid and the solution evaporated quickly to dryness, the residue re-dissolved in water will give a brick dust red precipitate with ammonio nitrate of silver.

Flietman's test.—In a test tube place a few pieces of solid caustic potash and some pure metallic zinc. Add just enough water to cover the two and boil,—hydrogen is evolved,—then cover the mouth of the test tube with a cap of filtering paper, moistened with a single drop of a solution of silver nitrate. The paper remains clean and white. Pure hydrogen having no effect on silver nitrate: this shows that the apparatus and tests are free from arsenic. Next, add the substance to be examined: replace the cap of filtering paper moistened with silver nitrate solution and boil again. If any arsenic is present, arseniuretted hydrogen will be given off, and the silver nitrate solution on the white cap will turn black from reduction of metallic silver.

This test is extremely delicate, and has the additional advantage of being able to detect arsenic even in the presence of antimony, as antimony, unlike arsenic, has not the power of uniting with nascent hydrogen evolved from zinc and caustic potash to form antimoniuretted hydrogen or stibene.

Bloxam's test consists in electrolysing the suspected solution between two platinum foil electrodes, attached to a battery of some four to six Grove's cells. Nascent hydrogen when produced by the aid of electricity has the power of combining with arsenic to form arseniuretted hydrogen which is collected, burnt and tested as in Marsh's test, the oxygen simultaneously formed being allowed to escape.

This has the advantage of zinc not being used in the process, so that there is less likelihood of arsenic being present as an impurity in the substances used.

Orpiment.—The tersulphuret of arsenic, called hartal, and the bisulphuret realgar, called by the natives mansil, are not unfrequently used for the purpose of poisoning, they are both found in nature, and are also made by heating arsenious acid with sulphur. The former occurs in masses of a bright yellow colour, with a glassy fracture and a striated appearance, the latter is in dark red masses.

The symptoms are similar to those produced by arsenious acid which they often contain mixed with them, being chiefly those of inflammation of the stomach with much vomiting and purging, great depression and death. The vomited matters are yellow. The treatment must consist principally of the administration of warm water to promote vomiting, and subsequently of mucilaginous drinks, as linseed tea or flour and water. Eggs may be given, but are probably only of service in sheathing the stomach and protecting it from injury.

The appearances after death are similar to those of poisoning by arsenic, there being inflammation of the stomach and bowels, with yellow or red granules, contained in the lining membrane.

Case No. 28 *of* 1867, *from Punjab Report, Gujranwala.*—A child took some "gur" (coarse sugar), and in one or two hours was attacked with violent symptoms, and soon died. Yellow arsenic sulphide was found in the stomach and also in the prisoner's house, but he was a druggist. The sentence was commuted to transportation for life.

Case No. 1143 *of* 1886, *Gujrat.*—A piece of haryal proved to be sulphide of arsenic.

Sulphide of arsenic can be most easily examined chemically by fusing it with nitre when deflagration occurs and potasium arseniate is found: this gives a characteristic brick dust red precipitate with silver nitrate.

Arseniate of potash is sometimes, though rarely, made by the natives, probably by fusing common arsenic with nitre. The cases in which it was employed were as before stated, those of attempts to poison cattle. In animals it has been found that this drug produces symptoms similar to those of arsenious acid—diarrhœa especially being very severe.

Treatment.—As this salt gives an abundant insoluble precipitate with persalts of iron, the sesquioxide of iron, commonly called iron rust, might be administered if procurable, or the impure sulphate of iron found in most bazaars called "kye" might be given mixed with water in doses of a masha every half hour.

Arseniate of Copper Scheeles green.—Hurryal is occasionally used to colour sweetmeats: it might produce all the symptoms of arsenious acid poisoning as pain and vomiting, the vomited matters being of a green colour. The powder is easily detected by adding liquor ammonia, in which it dissolves, forming a purple solution, which gives a red precipitate with nitrate of silver. In case No. 210 of 1865 sweetmeats were found coloured green by this arseniate of copper in Lahore.

DHATURA

Is obtained from two plants, the datura fastuosa (kala dhatura), and datura alba (sada or safaid dhatura).

The seeds are generally used: they are large, reniform, and can often be recognised by the naked eye, but they are similar in several respects to the seeds of the capsicum (lal mirch) which may be mistaken for them if care is not employed. This is probably the poison which is most commonly used in India, especially for the purpose of facilitating robbery or other crimes, by rendering the injured party insensible. It is usually administered

in doses too small to produce a fatal result, but if a large quantity is taken, or if the person is in a weak state, death not unfrequently occurs. The same happens if it is given to several persons at the same time; if any one of them eats much more than his share of the poisoned food, he not unfrequently pays for his greediness with his life, as the food contains enough to stupify the whole party, and therefore too much for any one to eat a large quantity and yet recover.

Out of 123 persons poisoned by dhatura only 20 died.

Dhatura is almost always used to facilitate robbery and only rarely to produce death, though this occurs occasionally from too large a quantity being taken. Dr. Center in his report styles it the "Thag poison" and says that: "There could scarcely be arranged a poison so suited to the thag as dhatura. It is a common weed growing everywhere. The seeds are not unlike those of capsicum or red pepper, one of the commonest ingredients of native food. It has almost no taste, and in about half an hour the victim becomes delirious, generally tearing off his clothes which the thieves want. Afterwards he usually falls into a state of insensibility, which equally suits the poisoners. Further, if the poison is taken in a large dose, the effects may last for some days, during which the victim is unable to give any rational information respecting the robbery: thus giving the criminals every opportunity of effecting their escape. This peculiarity is due to the poison being usually given in the form of whole or pounded seeds, which are hard and difficult of digestion, and pass slowly through the stomach and bowels. The poison being absorbed at the time into the system. If the poison was given in solution, or in a more soluble form, it would act like any other poison, and either cause speedy death or its effects would pass, off in a few hours."

"This gives two important indications, the one as regards treatment, the other as regards detection. 1st. After an emetic has acted, an energetic purgative should always be given to remove all the seeds from the intestines; and 2ndly, the excreta and contents of the intestines should be forwarded for examination

as well as the contents of the stomach. In several cases the seeds could not be found in the stomach, but were discovered in the fæces."

It has sometimes been doubted whether this substance is to be considered a poison or only an intoxicating drug, inasmuch as most persons to whom it has been administered recover from its effects, but it is certain that in several other cases, it has produced death, and therefore it must be considered a poison. Out of 92 cases no less than 21 proved fatal, and it is probable that many cases which result in death are never known, while those who survive would naturally complain of whatever injury has been done to them while insensible.

Symptoms.—This drug has a bitter taste, which it generally imparts to the food with which it is mixed, and which is sometimes recognised while being eaten. The symptoms usually occur about ten minutes after the poison is taken, though they may be delayed from half an hour to an hour. There is at first dryness in the throat, attended with a feeling of faintness, headache and giddiness, and the person has difficulty in walking straight, and appears as if intoxicated, while at the same time he is very restless and suffers from thirst.

The pupils of the eyes, if examined, are found to be dilated and insensible to light, and he will sometimes complain of indistinct vision, and of drowsiness, and almost always falls asleep. The sleep may either increase to complete insensibility with dilated pupils and a flushed face, and muttering delirium, or the patient may awake and then become delirious. The delirium is characterised by great restlessness, frequently moving about, and often by a tendency to go naked and to pick at various objects. The pulse is generally slow, the pupils still dilated, and there is great thirst. After a time, the patient becomes insensible again, and is greatly exhausted, sometimes convulsions occur with low muttering delirium, and at length he dies.

If, as more often happens, he recovers, the insensibility usually persists for a day or more, and the patient remains occasionally in an idiotic state able to speak but not to understand for

some time longer, and usually has no recollection of what has occurred after his last meal. Sometimes vomiting is an early symptom, though this is rare.

Major T. Chamberlain of Lucknow gives the symptoms as follows :—

" The usual symptoms which reveal its agency in persons found insensible may, fairly as a law, be understood to be the following. I. Sense of confusion, heat and thirst. II Sickness, either very restricted or excessive. III. Drowsiness. IV. Giddiness. V. Loss of consciousness. VI. Incoherency of speech; VII. Face suffused, giving the sufferer the appearance of a drunkard under the influence of spirits. VIII. Clutching at imaginary objects; picking the ground with fingers unconscious of what the sufferer is about. IX. Insensibility with heavy breathing, and it is in this state that 90 in every 100 are discovered by the police or chaukidars generally in most out stations.

All victims agree in stating that the taste is very bitter and acrid, followed after by a burning suffocating sensation."

It is stated that a smaller dose will produce death if taken when the stomach is empty. This poison differs greatly in its effects from those of arsenic or aconite, since vomiting rarely occurs and sleep more or less deep always, while delirium is a frequent symptom in this mode of poisoning and not in either of the other two.

It is more closely related to opium, but it differs in the fact that the pupils are always dilated in poisoning by dhatura, and almost always contracted in poisoning by opium. Delirium also is very rare in poisoning by opium, but is frequently the case in poisoning by dhatura, and as above stated, is of a peculiar kind.

The diseases which might be mistaken for the effects of this poison are fever with delirium, epilepsy, mania, sun-stroke and apoplexy. The first disease is distinguished by its progress being not so rapid, and the attack not usually occurring shortly after a meal. Delirium too does not occur on the first day of an attack of fever.

Epilepsy is distinguished by delirium rarely occurring, and the convulsive movements of the limbs being constant and intense. There is also usually foaming at the mouth in epilepsy. The attack generally bears no relation to any meal, and usually occurs several times to the same individual, while death rarely takes place in the first attack.

Mania or acute madness generally occurs in persons who have shown previous symptoms; its first attack does not necessarily occur shortly after a meal; besides, it does not terminate either in death or recovery, so rapidly as the delirium caused by dhatura.

Sun-stroke only occurs in the hot season, and is distinguished by the intense and peculiar heat of the skin, also by delirium not occurring, and by the attack seldom commencing so soon after eating. Apoplexy is seldom complicated by delirium :— bears often no relation in time to eating, and does not often occur in young people.

Post mortem appearances.—The condition of the lining membrane of the stomach varies after death by this poison; very often it is inflamed in patches about the larger extremity, but not ulcerated; at other times it is free from inflammation; often parts of the seeds can be seen adherent to it. The brain is usually much congested and full of blood.

Treatment.—Vomiting rarely occurs in this form of poisoning, hence emetics should be given if the patient can swallow, and the best is the mixture of ground mustard seeds and warm water, which can always be obtained, or cold water with salt may be used, though it is less efficacious.

If however, as will often occur, the insensibility is very great, the stomach pump may be employed if there is any native doctor or other medical man to superintend its use. Otherwise the best remedy to employ while the patient cannot swallow is to pour a large quantity of cold water on the head of the patient from a bhisti's mussuk. The water, if possible, should be freshly drawn from a well, and this cold affusion should be continued for about four minutes, and then the head and body carefully dried.

Under this treatment the sufferer will generally become somewhat conscious, and no time should then be lost in administering emetics.

After the illness has lasted two or three hours, it will usually be advisable to give small quantities of rum sharab from time to time, about one chittack every hour, or oftener if there will be a risk of the patient's dying by exhaustion.

If the patient survive more than a day, it is desirable to give some purgative medicine ; castor oil is the most useful in doses of half a chittack, but kaladana seeds may be given, about 30 to 40 of the seeds at a time.

If the head is very hot, it is recommended to apply 3 or 4 leeches to the forehead, but this must be done with great care, and only if the pulse is strong.

Case No. 23.—Extracted from the *Indian Lancet* of August 1st, 1860, reported and treated by Dr. Aitchison.

Busunki, ætat 35, employed as a chaudarí, had been ill for some time with a cough for which he went to a native hakim, and on November 23rd, 1859, at 8 A.M. he took some medicine ; on arriving at his own house about half an hour afterwards, he complained of headache and feverishness, and went about nearly naked ; he was also restless, moving about from place to place and was attacked by convulsive fits.

He was seen at half past seven in the evening, at which time he was in a state of unconsciousness, with greatly dilated pupils. He continued in a state of restless delirium, incessantly tossing his head from one side to another. The pulse was slow and the mouth dry.

He vomited after an emetic was given, and then began to stare about and talk deliriously ; afterwards he had two convulsive fits in which he foamed at the mouth.

The next morning he was less delirious, and the pupils were natural. He remained unconscious till the 3rd day, and then recovered his senses, but he became weaker ; and on November 28th, five days after he had taken the poison, he died from exhaustion. On enquiry it was found that he had never had any

fits before this illness. The patient was treated at first with emetic of mustard, flour and hot water, afterwards cold affusion was applied to the head and carbonate of ammonia administered internally as a stimulant. On the second day castor oil was given as a purgative.

This case is a very well reported example of the ordinary symptoms of poisoning by dhatura, since delirium, insensibility, and dilated pupils were all observed.

No. 24. *Case No.* 75 *of* 1866, *Punjab Record.*—A man visited a house while food was being cooked : he left suddenly, and the three persons who partook of the food were taken ill and one died. Dhatura seeds were found in the food, and also on the person of the man who was sentenced to death.

This case was important, as murder was evidently intended and not robbery, the man having left before the unconsciousness occurred.

Case No. 25, *Gogaira, January* 1860.—A man named Furida went to the house of Mussammat Hatim one evening, while her husband was absent, and took an opportunity of mixing some dhatura seeds with the rice that she was cooking, as he afterwards confessed. Mussummat Hatim, another woman, and an old man partook of the rice when it was cooked, but the poisoner refused to do so. Shortly after eating, Mussummat Hatim was attacked with extreme giddiness, and her mouth and throat became very dry, and subsequently she became insensible as did also the other two.

The next morning the two women were seen to rush from the house in a very excited manner, tearing off their clothes till they were almost naked, and throwing about bricks like mad people. On entering the house, the old man was found insensible, lying on his bed and clutching at it ; his breathing was loud and as if his throat was filled with phlegm ; he was perfectly unconscious and remained so for three days. The two women recovered on the second day, one of them declared that she had been raped while insensible.

An infant also partook of a portion of the food and became insensible. Seeds of the dhatura were found on the prisoner who alone was quite unaffected by any illness.

Case No. 26.—Another very interesting case in which death occurred happened near Amballa in 1861. A man named Din Muhammad was sent with some money to Amballa. On his way he met with a person named Devera, with a companion. These persuaded him to drink some liquid which they had mingled with pounded dhatura seeds, as they afterwards confessed.

Shortly after Din Muhammad had drunk this, he complained of feeling thirsty and confused. He was seen to stagger about as if drunk, and then to fall and become senseless. From this condition he was roused by pouring cold water over his head ; he then got up and began to roam about like a madman and to strip off all his clothes. Afterwards he ran up a tree and jumped off into thorns, and then began to run about laughing and singing, and to eat earth. Subsequently he fell down and died vomiting before death.

In all these cases similar symptoms occurred, the patients became insensible and delirious. The delirium being of a peculiar character, attended with a disposition to divest themselves of their clothes and to become extremely restless:.

Case No. 26.—*Lahore, November 2nd,* 1859.—Lulloo had been married to Kirpoo for 14 years without having any children He therefore asked Muhammad Shah to give them some medicine which would produce fertility. This was done at their own house, while they and the prisoner were alone present. Half an hour afterwards the male sufferer felt his head going round and subsequently he became insensible as also did his wife. They were found by the man's brother in an insensible state, and the woman remained so for three days, and then died, but the man recovered.

The prisoner confessed that he had given dhatura.

Case No. 27.—This case happened at Kassauli in the Punjab, and was investigated there on the 24th of August 1860. From the evidence it appeared that Ballu a Brahmin, was travelling

with his brother and some cartmen, and also another Brahmin, named Sadda Nund; that on July 21st, the last person prepared a dish called chori, made of chuppaties and sugar, of which the two brothers ate rather largely, the cartmen sparingly, and the prisoner Sadda Nund not at all. Very shortly afterwards the two brothers were taken ill and became insensible; the cartmen appeared also as if intoxicated, but the prisoner was not affected. Ballu died the next day, remaining insensible up to the time of his death.

The prisoner confessed that he had ground dhatura seeds to powder, and mixed them with the food. In consequence none were detected on examination of the contents of the stomach of the deceased, but this was found to be very much inflamed.

This is also a very characteristic case, inasmuch as those who ate largely of the poisoned food suffered from insensibility while those who ate less were only intoxicated by it.

No. 28. *Case No.* 112 *of* 1862, *Umritsar.*—Two men became insensible after eating some dhall: they remained so for several hours, but ultimately recovered. A large quantity of white dhatura was found in the dhall left.

No. 29. *Case No.* 5 *of* 1869, *Hissar.*—Three persons began to suffer from thirst, dryness of the mouth and vomiting half in hour after taking some food; they then became drowsy and delirious; the pupils of the eyes were seen to be dilated; they remained delirious for two days and nights and then recovered. Dhatura seeds were found in the sugar which they had eaten.

No. 30. *Case No.* 27 *of* 1868 *from Punjab Records for* 1868.—Some travellers leaving Lahore were joined by a stranger, who supplied them with atta, and two of them also took some native liquor from him: they soon became ill, and appeared like drunken men: they were taken to Umritsar and treated for poisoning by dhatura. One man who had taken the spirit died in a few days, the rest recovered. No dhatura was found, and the prisoner was acquitted.

No. 31. *Case No.* 38 *of* 1869, *Jullundur.*—Five persons of the same family became insensible after taking some food and remained so for 24 hours, after which they recovered, but their pupils were

seen to be dilated. Dhatura seeds were found in the vomited matters.

No. 32.—*Case No.* 12 *of* 1876, *from the Punjab Records for* 1876.—The accused confessed that he had administered dhatura to his wife, as he said, to frighten her. She and another woman partook of the food into which the poison was introduced, and both became intoxicated and suffered from vomiting and purging, but recovered. The accused was sentenced to 2½ years rigorous imprisonment, but no compensation was awarded to the sufferers.

No. 33.—*Case No.* 31 *of* 1870, *Delhi.*—Five persons partook of food together, but all complained of a peculiar bitter taste, and one hour afterwards they were all attacked by headache and giddiness. They all became stupified, but complained of cramps and twitchings of the limbs. They were unable to stand but fell down and kept on rolling about. They all vomited, and then recovered. Dhatura seeds were found in the vomited matters.

No. 34.—*Case No.* 121 *of* 1870, *Lahore.*—A Sikh ate some dahi. Half an hour afterwards he began to be delirious and threw off his clothes, he vomited and gradually recovered. Dhatura seeds were found in the vomited matters.

No. 35.—*Case No.* 130 *of* 1868, *Muzaffargarh.*—A man became insensible in less than one hour's time after drinking some buttermilk, and died in 8 hours. Dhatura seeds were found in the milk.

No. 36.—*Case No.* 205 *of* 1869, *Karnal.*—Two men partook of some majun with which dhatura seeds had been mixed by a third man who afterwards confessed it. Both the men became insensible, and were conveyed to the hospital, where they were found to be in a state of complete coma with dilated pupils and stertorous breathing; no pulse could be felt at the wrist and both soon died. Dhatura seeds were found in the stomach of each of them.

No. 37.—*Case No.* 61 *of* 1886, *Umballa.*—A woman and a child became delirious after eating some food, but both vomited, and then recovered. Dhatura seeds were found in the food in poisonous quantity.

No. 38.—*Case No.* 111 *of* 1866, *from Hissar.*—A poisoner was reported to have killed at least 15 persons, as he was in the habit

of giving poisoned sweetmeats to travellers who afterwards became insensible and many died. Dhatura seeds were found in a little bag in his clothes.

An account of 32 cases of dhatura poisoning was given by Assistant Surgeon Nil Ratan Banerji in the *Indian Medical Gazette* for 1885, page 209. All but four recovered. In every case there was dryness of the throat, dilated and insensible pupils and peculiar delirium : the physical strength appeared increased, and the voice was in an undertone. The bowels were generally constipated, but sometimes there was loseness and enteritis, vomiting only occurred in one case.

ON THE DETECTION OF DHATURA SEEDS.

As this poison can be best recognised by the eye it has been thought advisable to give a short account of its appearance, especially as there is no special reference to this in books on poison. There are two different kinds of seeds used in India for the purpose of poisoning ; the one safaid dhatura, (datura alba), is of a whitish colour less yellow than the seeds of the capsicum (lal mirich), and at the same time both larger and thicker, so that while 286 seeds of the capsicum are equal in weight to a two anna piece, or 22 grains and a half, 107 seeds of the dhatura are equal to the same.

The kala dhatura seeds (datura fastuosa) are of a black or reddish colour. Some however are of a fawn colour ; they are somewhat thicker but less broad than capsicum seeds : 246 are equal in weight to a two-anna piece. All these seeds are usually described as reniform, but they are rather flat and half oval shaped, being also often angular at one part. The capsicum seeds are of a pale yellow colour, quite different from the seeds of the datura fastuosa, which are usually dark or tawny and much thicker than the former, which are irregularly flat. The datura alba seeds are of a dirty white, and for the most part are much larger and thicker than the capsicum—as may be seen by comparing their respective weights ; but a small dhatura seed might be mistaken for that of a capsicum or a very large seed of the latter for one of the former. If the external covering of the dhatura alba seed be taken off the interior is about the size

and shape of a capsicum seed, but this could be distinguished by a microscopical examination, especially as the markings of the outer skin are very distinct.

Observations on detection of dhatura seeds by Dr. W. J. Palmer, *Indian Medical Gazette*, 1866, p. 176.

Seeds of white dhatura.	*Seeds of Capsicum.*
1. Kidney shaped, one end smaller than the other or ear shaped.	1. Kidney shaped equal at both ends.
2. Outline irregular.	2. Outline rounded.
3. Quarter inch long, less in width.	3. Shorter but wider than dhatura.
4. Greenish brown when fresh, yellowish brown when dry.	4. Pale yellow always.
5. Funiculus large, white fleshy hilum a deep furrow on the half concave border of the seed.	5. Funiculus thin cord like, hilum prominent, concave border short.
6. Surface scabrous also reticulate except on the compressed sides there glaucous from pressure.	6. Uniformly scabrous sides as rough as the borders.
7. Convex border, thick with a large furrow between two edges.	7. Convex borders thick but rounded with no furrow.
8. On section the embryo is curved and twisted in a fleshy albumen.	8. On section the embryo is curved and twisted in a fleshy albumen.
Other differences from Blyth given ;—	
9. The taste of the dhatura seeds is very feebly bitter. The watery decoction causes dilatation of the pupil.	The taste of the capsicum seed is very pungent, a watery decoction irritates the eye excessively, but does not dilate the pupil.
Additional note by Dr. Brown :—	
Both ends of the embryo of the dhatura point in almost the same direction.	The two ends of the embryo of the capsicum point in opposite directions.

The following description of the mode of recognising dhatura seeds is taken from Dr. Center's annual report :—

MODE OF RECOGNISING DHATURA SEEDS FROM DR. CENTER'S REPORT FOR 1876.

In about one-third of the cases of dhatura poisoning, whole seeds are administered, and all that requires to be done is to collect a number of seeds from the contents of the stomach, or from the vomited matter or food or other substances, and to identify them. The seeds used in nine-tenths of the cases are those of the white dhatura, (*datura fastuosa alba.*) They are very tough and difficult to powder, unless they are first roasted, which is usually done by practised dhatura poisoners when they wish to give this drug in powder.

If the seeds are whole, they can only be confounded with capsicum seeds, but these are of a bright yellow colour, thin and with an even edge (that is an unfurrowed edge uniformily convex from one flat surface to the other). While the seeds of the white dhatura are thicker, of a dull greyish white colour and grooved around the edge. By comparing white dhatura seeds with capsicum seeds the difference is clearly seen.

On slitting up the suspected seeds with a sharp knife, the embryo of the capsicum is seen to be coiled in a spiral manner. While that of the dhatura is arranged in two concentric curves, and the two ends of the embryo of the dhatura point nearly in the same direction, while the two ends of the embryo of capsicum point in nearly opposite directions, to such an extent that if the radicle which is the undivided end of each seed is made to point due north, the other end of the embryo of the dhatura which is divided, will point north-east; but the other end of the capsicum will point south-west, while the radicle points to the north.

The embryo of the capsicum seed can generally be easily seen without slitting the seed, if it is first soaked and then pressed between two pieces of glass, but the dhatura seed being much thicker and less transparent, the embryo can only be seen by cutting through the seed horizontally.

The seed coats of the dhatura and capsicum also differ in the characteristic markings, under a low power the outer seed coat of the dhatura shows irregular convoluted ridges surrounding oblong spaces, while that of the capsicum presents fainter ridges arranged more regularly in lines concentric with the convex border of the seed, and a mamillated appearance in the centre of the seed.

The seeds and their fragments are easily isolated from mixtures such as bread, food, vomited matters or fœces, or the contents of the stomach, these must be thoroughly soaked and broken up in water and by stirring and washing off the lighter particles till the seeds and their fragments are left behind as a residue. The fragments after soaking have a much higher

specific gravity than the seed coverings of other articles of food as dhal or the food itself.

Physiological test for dhatura.—This is extremely simple. To the powdered seeds add two drachms of water, and a few drops of dilute acetic acid, and allow it to stand for twenty-four hours. Filter and evaporate the solution to a small bulk. A drop of the residue if put into the eye of a cat or other animal, will dilate the pupil.

All the seeds when carefully examined by the naked eye present dots on their exterior which on a microscopical examination are seen to be composed of convoluted ridges surrounding spaces. On the capsicum seed these convoluted ridges run nearly parallel to each other, and are joined at right angles by short ridges, so that most of the spaces have an oblong form, and are in lines curving round the seed. But in both species of dhatura the ridges are more convoluted and irregular, joining at acute angles and circumscribing irregular spaces.

The embryo of the seeds of dhatura differs from that of plants belonging to other orders. It has a large quantity of hard nutritious substance commonly called albumen surrounding the true embryo which is thread like ; and is situated in a peculiar somewhat circular groove near the edge of the albumen. In scientific description it is stated to be sub-peripherical and curved, in this respect however it scarcely differs from the seeds of the capsicum except that one extremity of the curved embryo which is divided into two semi-cylindrical lobes or leaves has two curves in the dhatura alba and only a single one in the capsicum, which is continuous with the arch, but this difference is so liable to be overlooked or concealed by breaking the embryo in the process of extracting it that it should not be trusted to alone.

If the embryo of the dhatura seeds is carefully examined, it will be found that both ends point in nearly the same direction ; but the embryo of the capsicum seed is so placed that the cotyledons point in almost the opposite direction to the radicle. This difference in the seeds has not been noticed by former writers.

Stas' process for extracting the alcaloid of dhatura and of other poisons.—The suspected substance cut into small pieces if necessary is mixed with about twice its weight of pure strong alcohol, rectified spirit, and from 10 to 30 grains of Tartaric or Oxalic acid is added, it is then to be kept warm in a flask at about 160° Fr. for five hours, then allowed to cool and filtered, and the filtered liquid is evaporated nearly to dryness at a temperature of 95°, either over strong sulphuric acid or in a current of air. If fat or insoluble matter separates during the concentration the liquid should be again filtered and evaporated as before. The residue should be dissolved in absolute alcohol and again evaporated at a low temperature to dryness. This residue should then be dissolved in water and mixed with powdered Bicarbonate of soda, and then violently shaken with four or five times its bulk of ether in a large test tube or flask. It should then be allowed to settle, the clear ether drawn off and evaporated in a watch-glass spontaneously, the residue will be the alcaloid sought for nearly pure.

Chemical tests for dhatura.—To a solution of the alcaloid prepared as above described add Bromine or Hydrobromic acid, this gives with all salts of dhatura a yellow amorphous precipitate insoluble in weak acids, and sparingly soluble in strong mineral acids, after a little time the precipitate becomes crystaline in star shaped crystals. Carbonatic acid gives a yellow amorphous precipitate, readily soluble in all acids even acetic acid, and Iodine or Iodide of potassium gives a reddish brown amorphous precipitate soluble in acetic acid, and only sparingly soluble in potash solution. Terchloride of gold gives a light yellow precipitate which soon becomes crystaline, it is insoluble in potash and sparingly soluble in acetic acid or dilute hydrochloric acid.

None of the following precipitate salts of dhatura, chloride of mercury, nitrate of mercury, ferrocyanide and ferricyanide of potassium, potassium chromate or sulphocyanide or gallic acid. $\frac{1}{3000}$th of a grain of datrrine will dilate the pupil.

OPIUM.

Native name, afiun or afim, is the concrete juice from the seed vessels of the opium poppy, and is made largely in India. It is frequently used for the purpose of suicide, sometimes for that of murder, and occasionally to facilitate robbery or other crimes, it also often produces death from being given as a medicine in an overdose, especially to young children. Children are sometimes poisoned by opium by sticking a solid piece on the roof of their mouth or smearing it on the tongue of the child. In some cases the mothers cover their nipples with opium and the child sucks it with the milk. And it is frequently used for infanticide. The symptoms caused by a poisonous dose of this drug are as follows :—The patient after about half an hour to one hour feels drowsy and giddy, at first there is a short stage of excitement, face flushed, pulse quicker, skin burning hot and moist and pupils contracted, gradually becoming insensible ; and if left alone he falls asleep, the slumber gradually becoming deeper ; but still he can be roused by loud talking or forcible shaking, but though he temporarily becomes conscious he soon falls back into a state of stupor. At this time the pulse is generally small and quick, the face flushed and the skin warm and moist, the smell of opium can often be perceived in the breath. Vomiting sometimes occurs, but is very rare, and purging scarcely ever, while the patient seldom complains of pain or of anything but being disturbed by those who wish to recover him. The pupils are generally contracted and insensible to light. Occasionally nettle rash occurs. After a time the sleep becomes so deep that the person cannot be roused by any means, in fact he is quite insensible, the pulse and breathing now become slow, the skin cold and livid, the limbs flaccid, and the breathing stertorous. There is often a rattling noise in the throat, and the patient dies frequently in convulsions. In some rare cases sleep is not a prominent symptom, but there are convulsions or even tetanic spasms—this happens chiefly with children. Occasionally the pupils are dilated instead of being contracted, and sometimes the patient becomes conscious before dying.

The sudden form of poisoning sometimes occurs after a large dose, the patient falls into a deep sleep five or 10 minutes after taking the poison and dies in a few hours. The pupils are usually dilated.

In some cases convulsions are the principal symptoms. Sometimes paralysis occurs as a result of opium poisoning or inability to empty the bladder ; but usually there is only as a result, heaviness dry tongue, and loss of appetite for one or two days. Sometimes there may be albuminuria numbness or an eruption of the skin or loss of taste.

Shortest interval before symptoms a few minutes; longest interval 8 hours, ordinary interval half hour to an hour. Smallest dose for adults four and a half grains, but one-twelfth of a grain has killed an infant seven days old. Shortest time before death three-quarters of an hour; ordinary time of death seven to twelve hours. Few cases that survive twelve hours terminate fatally. Those who are accustomed to the use of opium can take very large quantities of this drug.

Cases of poisoning by opium are entirely different from common cases of arsenic or aconite, owing to the general absence of vomiting and purging, and the existence of deep sleep. In the latter respect they resemble somewhat poisoning by dhatura, but from it they differ in there being usually no delirium, the patient remaining in cases of poisoning by opium in a deep sleep, while in poisoning by dhatura he often moves about more or less. The diseases which resemble poisoning by opium are as follows :—

Apoplexy greatly resembles this form of poisoning, in fact the brain is often in a similar state when opium has been given in poisonous doses, to that in which it is after apoplexy has happened. It may be distinguished by the pupils being usually contracted in death by opium, and dilated in apoplexy, and by the patient being able to be roused from sleep at first at least, in poisoning by opium, but not in apoplexy ; besides this an attack of apoplexy often occurs when a person cannot have taken food recently ; while on the other hand in poisoning by opium the poison may be found in the stomach. Although apoplexy

usually occurs in persons above 40 years of age; yet cases have been recorded at all ages. In hœmorrhage into the pons varolii the pupils are contracted, while after death by opium they are sometimes dilated.

Sunstroke.—Many of these cases are similar to this form of poisoning in the suddenness of the attack, and the sleepiness or insensibility of the sufferer; but they differ in only occurring in hot weather, and in the skin being remarkably hot and dry in cases of sun-stroke while in poisoning by opium it is moderately warm and moist.

In opium poisoning also the pupils are usually contracted, and in dhatura poisoning dilated. In poisoning by alcohol the smell can usually be detected in the breath. If convulsions occur opium poisoning may be mistaken for poisoning by strychnia or nux vomica, but in the latter there is great rigidity and little movement of the limbs, the contrary occurs in poisoning by opium.

Epilepsy may resemble poisoning by opium especially when coma occurs after a short epileptic fit, but it rarely causes death, and the pupils are generally dilated in cases of epilepsy, but contracted in poisoning by opium.

TREATMENT.—Emetics must always be given as soon as possible—the best is the mixture of a spoonful of ground mustard seeds with four spoonfuls of hot water every quarter of an hour; but the hot water either alone or mixed with a large spoonful of salt may be given if the mustard seed cannot be procured Vomiting must be maintained as long as the vomited matters smell of opium.

If European medicines are at hands 20 grains of Sulphate of zinc or 5 grains of Sulphate of copper may be given every quarter of an hour; and if medical assistance is obtainable the stomach pump should be used.

The person affected should by all means be prevented from sleeping, this can best be done by causing him to walk about the room between two men or to keep talking by asking repeated questions and insisting on answers, should this fail his feet should be gently beaten, care being taken not to injure him, or the

hair may be gently pulled. It is recommended that a strong infusion of coffee or tea should be frequently given as this has the power of preventing sleep. Infusion of catechu may also be recommended.

Dashing cold water over the face is often of service, or pouring it into his ears, but care should be taken to dry the person afterwards and not to repeat the cold affusion too frequently.

Subcutaneous injection of Atropine has been found to be useful ; $\frac{1}{20}$th of a grain every 20 minutes watching the effect.

Inhalations of Nitrite of Amyle have been recommended.

If a galvanic battery could be procured this may be used to maintain respiration ; or artificial respiration may be performed by laying the person on his face with a pillow beneath the forehead, and then rolling him on the side and repeating this manœuvre 18 times a minute ; and at the same time raising the arms above the head while the patient is on his side, and pressing them on to the chest while he is on his face.

Postmortem appearances—Decomposition usually occurs early—The lining membrane of the stomach is usually healthy or only slightly congested, but the brain is almost always very full of blood, which is some times poured out into small clots, sometimes the ventricles of the brain contain much fluid but at other times they are nearly dry. The lungs, liver, and kidneys are usually much congested. These *postmortem* appearances however are not always found, and when found they are by no means characteristic as the same may occur in death by natural causes.

Opium was found in sufficient quantity to poison a man in the stomach of a corpse at Delhi in a fearful state of decomposition, black swollen, and emitting a diabolical odour. —*Indian Medical Gazette*, 1875, p. 4.

And in a case at Rawalpindi No. 278 of 1869, Dr. Fairweather reported that the native doctor smelt opium in the stomach of a man who had died 19 days previously in August. Opium was found on chemical examination in the stomach.

Chronic poisoning by opium.—Opium eating is very common in the Punjab, and here as elsewhere it produces its deleterious effects; these have been described as emaciation of the body, a withered countenance with glassy deep sunken eyes, loss of appetite, indigestion, and constipation, and failure of bodily and mental powers gradually increasing, till at length premature old age comes on, while the craving for the drug becomes greater, and the dose has to be made larger. If the person is prevented from obtaining opium as occurs in the Jails, Dr. Dallas, late Inspector-General of Jails for the Punjab, states that he generally appears very miserable and listless, with a haggard countenance and restless wild looking eyes, he refuses to eat and becomes very weak and unable to work; at last he is generally attacked by diarrhœa, to which he would probably succumb if a small dose of opium was not allowed; generally about three grains is sufficient even for persons who state that they have been in the habit of eating 18 mashas, which are equal to 160 grains of solid opium daily.

No. 39.—Case reported by Dr. Scriven in *Indian Medical Gazette*, 1869, p. 182:—

A boy took some tincture of opium; the quantity was not known. Three hours afterwards he was found comatose, with stertorous breathing and contracted pupils: $\frac{1}{8}$th of a grain of sulphate of atropine was injected into the rectum, and four hours after $\frac{1}{8}$th of a grain more. He gradually recovered: no vomiting occurred.

No. 40.—Opium treated by subcutaneous injection of atropia and artificial respiration reported by Dr. Brown of Lahore in the *Indian Medical Gazette*, 1873, p. 214:—

A European woman took about 180 grains of solid opium, half an hour afterwards an emetic was given, this only once caused vomiting, but she became insensible in one hour.

Three hours after taking the poison, she was brought, to the hospital: she was quite insensible, her pupils contracted, immovable, pulse quick, but respiration slow, and sighing. The stomach pump was used and opium detected by smell; 15 minims

of the liquor atropine were injected, and half an hour afterwards 20 minims more, then the pupils dilated a little, but the respiration being very slow, artificial respiration was kept up for eight hours, and the electricity applied 14 times, after which she became sensible and recovered.

No. 41.—Belladonna used as an antidote. Case reported by Dr. Scriven in *Indian Medical Gazette*, 1870, p. 54 :—

A European took about 8 grains of opium, three hours afterwards he was found comatose, with stertorous breathing, and extremely contracted pupils. Emetics were given and quarter grain of a sulphate of atropia injected into the rectum, and one hour after another quarter of a grain, he gradually recovered but suffered from dryness of the throat and tongue.

No. 42.—Opium poisoning reported by Dr. Johnson in *Indian Medical Gazette*, 1873, p. 184 :—

A Musalman ate 44 grains of crude opium but must have vomited part of it at 8 P.M. The next morning at 9 A.M. he was found insensible, pulseless, comatose with stertorous gasping breathing, chronic spasms and shivering, body cold with clammy sweat.

The pupil of the right eye was contracted, left one dilated. The stomach pump was used, and much opium was evacuated. Enemas of turpentine were given every half hour, and in five hours he could answer to his name: he recovered eventually.

No. 43.—Another man took 6 grains of extract of opium by the advice of a quack for bronchial catarrh, he became comatose but recovered under treatment.

No. 44.—A third man after taking his usual dose of 18 grains of extract, swallowed a large quantity of the concentrated extract, and became insensible and died with pupils widely dilated, but no opium was found in the stomach.

Assistant Surgeon Cheytun Shah in the *Indian Medical Gazette* for 1881, p. 88, says that he stopped suddenly the use of opium in 15 cases of prisoners accustomed to it, and several private cases without ill effects. Extract of gentian being given to increase their appetite.

No. 45.—*Reported by Dr. H. Williams of Ferozepore*, 1870.—A woman found dead in a brothal. The brain and lungs were congested, heart healthy. A large quantity of opium and a small quantity of alcohol found in the stomach; probably opium was given while she was under the influence of liquor..

No. 46.—In a case which occurred at Ferozepur, April 1862, the history of which is not given, the stomach contained about three-quarters of a pint of dark coloured fluid, and was covered everywhere with rosy patches, as if of recent inflammation. The small intestines also appeared inflamed. A large amount of opium was found in the fluid contents of the stomach.

ADDITIONAL CASES OF POISONING BY OPIUM.

No. 47.—*Case No.* 250 *of* 1868, *Hissar*, *September* 15*th.*—A man drank a mixture of oil and laudanum at 7 o'clock. The first symptoms occurred one hour afterwards, and consisted of congestion of the eyes and dryness of the throat. He was not purged nor did he vomit, but he became drowsy, and afterwards delirious, and at length insensible. There were twitchings of the limbs and the face became blackened before death, which took place ten hours after drinking the medicine. Opium was found in the stomach.

No. 48.—*Case No.* 87 *of* 1869, *Jullundur*, *March*, 7*th.*—A man named Chuni drank some substance, and shortly afterwards became drowsy and subsequently insensible, and remained so for 12 hours. He was then brought to the dispensary, and was found to be totally insensible, and unable to swallow anything. His skin was cool, the pulse could scarcely be felt, but when felt, it was frequent and fluttering, with occasional intermissions. The breathing was sighing, labouring and irregular. The pupils were at first contracted, but just before death, they became dilated. Opium was found in the stomach after death.

No. 49.—*Case No.* 303 *of* 1869, *Jullunder*, *October* 1*st.*—A man named Gusita took a dose of opium. He was attacked by drowsiness and insensibility with sighing, irregular respiration, small, weak and frequent pulse, and contracted pupils. The body

was moderately cool, he died, and on a *postmortem* examination there was found general congestion of all the venous system, and opium in the stomach.

No. 50.—*Case No.* 83 *of* 1870, *Hoshiarpur, April,* 18*th*—Munu took some drug; three hours afterwards he was attacked by an inclination to vomit, but was only sick once, and was never purged; he then became drowsy and fell asleep, and at length became insensible with twitchings of the limbs, until he died nine hours after taking the drug. Opium was found in the contents of the stomach.

No. 51.—*Case No.* 124 *of* 1870, *Kasur, June* 16*th*.—Seroni, a woman, took some opium at 3 P.M.: she soon afterwards became sleepy and complained of severe itching of the skin, and cramps in the legs; she then became delirious and subsequently comatose with stertorous breathing. She died eleven hours after taking the poison.

No. 52.—*Case No.* 159 *of* 1870, *Delhi, May,* 12*th*.—A boy, aged 7 years, named Gurdan, took some sherbet; two hours afterwards he became insensible; he vomited and his arms moved convulsively and became stiff; a bloody liquid flowed from his mouth; his eyes were sunken; he died, and opium was found in the stomach.

No. 53.—*Case No.* 54 *of* 1865, *Hissar*.—A European who was known to keep acetate of morphia for bronchitis went to his bed-room at 8 A.M., having told his servants not to disturb him. At 4 P.M. a visitor came and found him lifeless and his body cold. Three hours afterwards the pupils were seen to be dilated, the skin of the body livid, the membranes and sinuses of the brain congested, but the viscera healthy. Morphia was found in large quantities in the stomach.

No. 54.—*Case No.* 60 *of* 1870, *from Rohtak*.—A Brahman who was addicted to the use of opium, churrus and bhang, took a large quantity of opium on June 6th. He was insensible all day and the next day he partly recovered, but again became worse; he was sent to the Rohtak dispensary, but died on the way.

Opium was found in the contents of the stomach. A peculiar bright red colour was seen in the muscles, the upper part of the stomach and the membranes of the brain.

No. 55.—*Case No.* 186 *of* 1870, *Hoshiarpur.*—A thief finding it impossible to escape, took a lump of opium, and became insensible and died, though vinegar was given as an emetic; this however would assist the solution of the poison. Opium however was found in large quantity in the stomach.

No. 56.—*Case No.* 128 *of* 1868, *from Murdan.*—A boy took supper, and one hour afterwards he was attacked by nausea, but did not vomit. He soon fell into a deep sleep; the following morning he was brought to the dispensary, but was then deeply comatose with contracted pupils, and he died in ten minutes. On *postmortem* examination, the brain and its vessels were deeply congested, but the viscera were healthy, except two red patches on the stomach, in the contents of which opium was found in large quantity.

No. 57.—*Case No.* 190 *of* 1868, *from Rohtak, July 6th.*—A sepoy was taken suddenly ill two hours-and-a-half after eating; he became worse and died in a little while. On *postmortem* examination the brain and its membranes were highly congested, but the lungs and other viscera were healthy. Opium was found in the stomach.

No. 58.—*Case No.* 208 *of* 1868, *from Murdan.*—A Sikh soldier went to a village and on his return appeared to be confused; he went to sleep, but at midnight he was found breathing stertorously, with contracted pupils, and died soon after. Opium was found in the stomach.

No. 59.—*Case No.* 124 *of* 1870, *from Raipur.*—A woman took a large dose of opium, soon after she became sleepy and delirious, and complained of cramps and severe itching all over the body; at length she fell into a state of stupor, with stertorous breathing, and never awoke. She died in eleven hours after taking the drug. The body in three days after death, in June, was too decomposed to permit of a *postmortem* examination, but

on chemical examination, a large quantity of opium was found in the stomach.

No. 60.—*Case No.* 190 *of* 1868, *from Kohat.*—A sepoy was taken suddenly ill two-and-a-half hours after taking food, and died shortly afterwards. The superficial veins of the brain were congested, but no hœmorrhage occurred, and the lungs and other viscera were healthy. Opium was found in the stomach. This case was thought to be heat apoplexy till after the chemical examination.

No. 61.—*Case No.* 197 *of* 1868, *from Rawalpindi.*—A child became insensible with stertorous breathing and dilated pupils, one hour after eating food, and died in 19 hours. Opium was found in the contents of the stomach.

MODE OF DISTINGUISHING OPIUM FROM DR. CENTER'S ANNUAL REPORT FOR 1876.

This drug can usually be readily identified by its physical appearances, its dark red, almost black, colour, its characteristic odour and taste. If there is any doubt, a fragment placed in water partially dissolves, giving a more or less reddish solution. To one portion of the solution a drop of tincture of steel should be added; this gives a deep red solution of meconate of iron if opium is present. This red colour is not altered by boiling. This distinguishes it from the somewhat similar red solution of ferric acetate which on boiling deposits the iron as a red precipitate, leaving a clear liquid above. To another portion of the opiate solution add some strong nitric acid; the solution will be reddened from the action of the acid on the morphia.

These tests can easily be applied to the contents of a stomach, or to vomited matters having the odour or appearance of opium being mixed with them. Take a small quantity of the contents, acidulate it with dilute sulphuric acid, and then allow it to stand for some hours afterwards; filter and test the filtrate as above described with tincture of perchloride of iron and with nitric acid. This can be done even in the *postmortem* room in a few minutes.

The substances should be cut up into very small pieces and mixed with water and a little alcohol, and then strongly acidulated with acetic acid. It should then be kept warm, but not boiled, for an hour, constantly stirring, afterwards it should be allowed to cool, then filtered, and the filter washed with alcohol. The united liquids should then be evaporated at a temperature of 170° F. to a small volume, and this again filtered and washed with a little dilute alcohol.

Next a slight excess of acetate of lead should be added, which will give a fawn coloured precipitate of meconate of lead with organic matter, and leave morphia in the solution if opium is present. When the precipitate has subsided, it should be separated by filtration, and both the precipitate and filtrate tested separately, the former for meconic acid and the latter for morphia.

First–Meconic Acid.—The precipitate on the filter should be washed into a glass by making a hole at the bottom of the filter paper, and using a strong stream of water from a washing bottle to drive it through. On the precipitate subsiding, the excess of water should be poured off and sulphuretted hydrogen passed through the precipitate till it is uniformly black : it should be allowed to subside and be then filtered, the filtrate which contains the meconic acid should be evaporated to a small bulk, and then tested by adding ferric chloride or tincture of steel; this will give a blood red colour of ferric meconate which is immediately bleached by the addition of hydrochloric acid, but is not affected by mercuric chloride or by boiling : mercuric chloride will bleach sulphocyanic acid, and boiling would destroy the colour of an acetate; a single grain of opium may be detected by the above tests.

Second—Morphia.—This is contained in the filtrate in the form principally of acetate, together with excess of acetate of lead. The acetate of lead is separated by passing sulphuretted hydrogen through the liquid, then filtering and evaporating the liquid to dryness, and re-dissolving the residue in a little distilled water,

and filtering again if necessary. This solution should be tested for morphia as follows :—

1. Add a little strong pure nitric acid, this will give an orange red colour if morphia is present; the colour is not altered by the hyposulphite of soda.

2. Add a neutral solution of sesqui-chloride of iron, if morphia is present, a blue colour is produced, but this is discharged by free acids, caustic alkalies or heat.

3. *Duprés' test.*—Add to the solution some iodic acid dissolved in fifteen times its weight of water and some starch paste, and then gently pour on the top of the mixture, so as not to mix with its previous contents, some very dilute solution of ammonia. Two coloured rings will be found at the point of contact, the upper one blue and the lower one brown.

Morphia may be separated from the solution by rendering it alkaline by a strong solution of carbonate of potash, and then agitating it with either a mixture of two parts of absolute ether and one of absolute alcohol, or with two or three times its bulk of amylic alcohol, then separating the fluid and allowing it to evaporate spontaneously when morphia crystallises out.

ACONITE.

Called in Hindustani by a variety of names, as mitha bish or mitha taliya, also mitha zahar, dakra, ate singia and mishuri bish, mohara or kath. bish, or simply bish or bikh, longtalia or kala mora. The root of the aconitum ferox is usually employed, though other parts of this plant as well as of some other species of aconite might be used.

Aconite is rarely used for the purpose of murder or suicide, but in Europe it is often an accidental cause of death; out of 86 cases of death by aconite, only 2 were cases of murder, 7 of suicide and 77 of accidental poisoning.

In the Punjab also it is very rarely used for murder, though it is very easily obtained, especially near the hills, but its black colour renders it unfit for mixing with food and its pungent taste also.

It is seldom found in collections of drugs on travelling poisoners.

Symptoms.—Soon after the poison is taken, it causes a peculiar burning or tingling sensation in the throat or mouth, especially if it is chewed—this differs from that of capsicum in not commencing so soon, but lasting longer than that of the latter plant. Subsequently there is a burning pain in the throat and stomach with tenderness on pressure—this is succeeded usually by vomiting, great weakness, and numbness, with giddiness and tingling felt in the limbs, and sometimes all over the body.

There is generally inability to walk from muscular weakness, but at the same time great restlessness.

Very often there is imperfect vision, but the pupils are natural or dilated, and peculiar sensations as if the throat was too narrow, or as if parts of the face had become swollen: there is also great weakness and much anxiety. The pulse becomes small and feeble, slow and irregular, the skin cold and damp, and the person dies remaining usually sensible till death, though sometimes he is so weak that he does not willingly move or talk. Purging sometimes occurs: occasionally convulsions occur or paralysis, while more rarely delirium is one of the symptoms.

The smallest fatal dose has been one drachm or sixty grains of the root. The symptoms have appeared as soon as two minutes after swallowing the poison; though occasionally no change occurs till two hours afterwards. The earliest time that death has occurred is one hour. The average period is however four hours—and some persons have lived as long as twenty hours.

The symptoms of poisoning by aconite resemble in some respects those caused by arsenic, but they differ in the peculiar tingling in the mouth, throat and limbs, also in the vomiting not being tinged with blood.

From opium it is at once distinguished by the same sensations, and by the absence of sleep, also by vomiting usually occurring when aconite has been taken.

In the same respects it differs also from dhatura in which the taste in the mouth is only bitter; also delirium or unconsciousness is rare with aconite, but common with dhatura.

Post mortem appearances.—The stomach and intestines are often much inflamed or even ulcerated; sometimes, however, they are quite healthy; the brain is usually much congested with blood, as are also the lungs and liver.

There is no disease that can be mistaken for the effects of aconite, if only the symptoms are clearly ascertained. Injury or disease of the spinal cord may produce tingling in the limbs and weakness, but death is not so rapid, and palsy is almost always present, while the disease can be ascertained by a *post mortem* examination.

Treatment.—If vomiting should be slow in occurring, it is always advisable to give the emetic of mustard and warm water, or common salt and water, that has already been described; this may also be given if the vomiting seems insufficient to remove the poison. After an hour has elapsed from the time when the poison was given, one ounce of castor oil or two castor oilseeds may be administered in milk. If, as is usually the case, the patient is very weak, sharab (rum) may be used freely every quarter of an hour; and if his limbs become cold or he complains of cramps, they should be rubbed with hot cloths. Strong hot tea is sometimes useful, or if this is not procurable, catechu (kuth) in the dose of two ruttees, dissolved in hot water, and given every hour may be substituted; and ammonia should be given internally.

If the stomach pump is available, it should be used. The patient should be kept in a recumbent posture, and when the stomach is emptied, twenty drops of tincture of belladonna or four drops of solution of atropine should be given, or if these are not procurable, one or two seeds of dhatura may be used.

If tincture of digitalis is procurable, half a drachm should be given, and a mustard poultice applied over the region of the heart.

Artificial respiration may be required.

No. 62.—*From the Report on Medico-Legal returns by Dr. Harvey, page* 211.

An interesting case reported from Gujranwala in October 1877. The mother-in-law of a Hindu confessed to have given him half a tola or 90 grains weight of mitha teliya, (aconitum ferox). She said that about half an hour after swallowing the poison, the man began to complain of pain in the stomach and numbness and tickling sensations in the throat, and subsequently there was severe vomiting, followed by coldness of the extremities collapse and rigidity of the fingers and wrists. Death took place about 7 hours after taking the poison.

On *post mortem* examination, congestion of the brain and its membranes was found, also of the liver : intestine and endocardium on the right side of the heart and the mucous membrane of the stomach was remarkably congested with a few patches of ecchymoses. But no evidence of the presence of aconite or any other poisons was found by the Chemical Examiner.

No. 63.—*Aconite poisoning at Kasauli,* Indian Medical Gazette, 1882, *page* 323, *reported by Apothecary J. Forsyth.*

A person took 48 grains of a jungle plant given him by a Hakim, as good for fever, just before eating his breakfast; in two hours time a sense of tingling and heat in the mouth and stomach came on with giddiness and loss of muscular power : a mustard emetic was given, and he was sent to the hospital in a collapsed state, with complete loss of muscular power and cold extremities. The heart's action was feeble and intermittent : no impetus could be felt and only one beat of the radial pulse per minute, but on using the stethoscope, 5 or 6 contractions were heard in a minute. The intellect was clear, the respiration slow and gasping.

Tincture of digitalis was injected and given internally with brandy and carbonate of ammonia, and in five hours he recovered completely.

No. 64.—*Case No.* 5 *of* 1864, *Hoshiarpur.*—A man ate some chuppatis and was soon attacked by a burning sensation in the throat and vomiting; he foamed at the mouth and died about

three hours after partaking of the food. Aconite was found in the stomach.

No. 65.—*Case No. 92 of 1866, Punjab Records.*—A man died with the symptoms of poisoning by aconite. It was proved that his wife had a lover who gave her some medicine wrapped up, but no poison was found. Both the man and woman were condemned to death.

No. 66.—*Case 440 of 1882.*—A child was found dead in a field. There was no evidence of the symptoms, but aconite was found in the stomach.

No. 67.—A man named Lehnoo, residing at Jullundur, received one day, in 1860, some chuppatis from another man named Moosuddy. Shortly after eating them, Lehnoo felt a peculiar sensation in his throat as if he was being strangled, and he became very weak but was able to stagger to the door of a neighbour where he remained till he died two hours afterwards.

The prisoner confessed that he had put "*mitha taliya*" that is, aconite in the chuppatis, but none was detected on chemical examination.

No. 68.—*Probable case of Aconite.*—A sowar of the 17th Irregular Cavalry was quite well at Attock on the 10th of April 1861, up to 8-30 P.M. At 7-30 P.M. he ate his food, consisting of chuppatis and sugar: about one hour afterwards, he became unwell and rapidly got worse. It is stated by his companions that he complained of feeling as if his limbs were swelling and also his body, and of a want of power to move, though he was perfectly sensible and remained so till death occurred. He said that he bit some hard substance in the sugar which tasted bitter and pungent. He vomited three or four times and was unable to walk to the hospital at 10 P.M. even with assistance, but fell down in a sort of fit. He died about 11 P.M.

The contents of the stomach were given to some fowls.

The stomach was considerably and universally congested and some patches of ecchymosis were seen.

No. 69.—Roylah, a man at Mazuffurgarh, took some hulwah from another man who confessed that he had put some moriah

(mitha taliya) in it; about half an hour after he was seized with severe internal pains—he walked for a short distance and afterwards vomited four times; he then complained of cramps in the body and dryness of the throat, but did not become drowsy nor fall asleep. About an hour and a quarter after he ate the drug, he died.

On *post mortem* examination, the pupils were dilated, the stomach was much inflamed in patches of irregular shape. The lungs were congested, as was also the brain and other organs.

Aconite was found, and the alkaloid extracted from the root which was found on the man who gave the sufferer the poison.

No. 70—A man at Ferozepore, in 1869, ate some sweetmeats—walked about a mile to his village, then in about half an hour he was attacked by burning sensations in the stomach and chest, afterwards all over the body; vomiting and purging occurred, but he did not become insensible or drowsy, he died in 18 hours. Aconite was found in the sweetmeats.

No. 71—A case from Hoshiarpur in 1869 died, but the symptoms are not mentioned; the stomach was inflamed with patches of redness, the intestines and peritoneum congested.

Aconite was found in the contents of the stomach.

No. 72—*Case* 108 *of* 1879 *of Dera Ismail Khan.*—Five men partook of some coffee prepared by another man. One merely tasted it and complained of its strange taste, and its producing tingling of the lips. A second man feeling numbness and tingling went home and vomited, and then recovered, but the other three died. Aconite was found in their stomachs.

No. 73—*Case No.* 705 of 1884, *Umballa.*—A lad after taking food complained that he had a hot feeling in his mouth which became dry, and the tongue was dragged into his throat; he vomited, and became cold, but afterwards recovered. Aconite was found in a packet.

ADDITIONAL CASE OF POISONING BY ACONITE.

No. 74.—*Chief Court Records No.* 347 *of* 1878.—A man took some "gur" (coarse treacle) from a stranger: he complained of its peculiar bitter taste, but went to sleep, he soon, however, woke,

complaining of thirst, dryness of the mouth, and a peculiar sensation as if insects were running over his body; he drunk water from the well and again lay down, and the next morning was found dead, and without money.

The person who gave the "gur" pointed out a piece of aconite root in the thatch of an adjacent house, the owner of which was certainly innocent: some money too was found on the stranger. No poison was detected in the stomach, but the stranger was sentenced to death.

Aconite is also sometimes employed to destroy cattle instead of arsenic. It is made into a large ball with flour. It usually causes vomiting, great weakness, sometimes purging and foaming at the mouth and at last death.

Mode of detection of Aconite.

The root is generally seen as a short, black, conical, hard solid, a minute portion of which if chewed, gives a tingling and numb sensation in the tongue and lips. The root when dry, breaks with a short fracture, showing a white or brownish centre, sometimes hollow. It consists of a central pith enclosed by a delicate layer of thin brown cells. It is made up of parenchymatous cells, loaded with starch granules, and containing no woody fibres at all.

Separation of the alkaloid.—This is best done by Stas' process as described for dhatura already.

The tests for the alkaloid are—

1. By adding strong sulphuric acid, it is coloured first yellow, then dirty violet, and red if sugar is added to this.

2. On adding solution of phosphoric acid, it will give a violet tint, if heated. But the best test is to inject it under the skin of a frog, when the legs will speedily become paralysed, or by feeding mice with it, when the same occurs. A very minute drop touched on the lip will cause persistent numbness and tingling for a long time.

After the more common poisons have been described, it remains to consider those which are less frequently employed. It will be convenient to associate these according to their

mode of action, dividing them into irritants or acrids, narcotics and acronarcotics ; but the acrids themselves may be again divided into three well marked sections—1st, the corrosive poisons; 2nd, the metallic irritants, and 3rdly the organic acrids. The corrosive poisons act chemically on the parts with which they come in contact, so that if the poison is in great quantity, it actually destroys that portion of the body which it touches. These are of course most deadly poisons, but they are seldom used in India, because they are not usually easily obtainable. Those which can be procured are sulphuric acid, sold principally to dyers: other mineral acids, but these are seldom manufactured,—carbonate of soda or of potash, and quick lime. Sometimes also caustic soda is made by mixing carbonate of soda with lime, but it has never been used as a poison, and also there is corrosive sublimate which is generally considered a corrosive poison, though it more often acts as a simple irritant.

SULPHURIC ACID.

Oil of vitriol—Gandak-ka-tezab.

This acid is made in Lahore and in Amritsar for the purpose of dyeing with indigo, and of making soda water, &c. Several cases of poisoning by this acid have occurred in Calcutta. In Sweden it is often used to effect suicide, and in England it is sometimes employed to murder infants and intoxicated persons.

Symptoms and external appearances.—If the strong acid comes into contact with the skin, it turns it first white then brown, and soon dissolves it, while the surrounding tissue becomes inflamed. Immediately after this acid has been taken, there occurs violent burning pain extending through the throat to the stomach, followed by vomiting of a dark liquid mixed with blood and shreds of mucus. The vomited matters effervesce on a plaster floor and alter the colour or even corrode articles of clothing. The tongue and inside of the mouth at first usually appear white, but afterwards become grey, at other times they escape injury. The pulse is small and frequent, breathing quick, skin cold and clammy : there may be cramps or convulsions. The abdomen is distended, very painful, and so tender that

there is usually difficulty of breathing: often the bowels are confined and there is much thirst. After a hour, the sufferer becomes exhausted, but remains quite sensible till death, which ordinarily occurrs from 18 to 24 hours after the poison has been taken. If this, however, gets into the windpipe, death may take place in a very few minutes.

The smallest fatal dose is one drachm, about sixty drops, of the strongest acid used in England, but in India the acid is usually weaker, so that a larger quantity might be required.

Earliest appearance of symptoms.—Necessarily immediate, since, as soon as the acid comes in contact with the mouth or throat, it begins to act upon the lining membrane, and causes pain, change in colour, &c.

Shortest fatal period.—It may produce death while being swallowed by passing into the windpipe, but if it falls into the stomach, it does not often destroy life till two hours after it is given. The average duration of life is ten hours, but some have survived days or weeks, or even months, and have yet died evidently from the changes produced by this poison in the throat or stomach, as stricture of the gullet may occur.

Treatment.—In these cases the stomach pump should not be used, as the throat is so softened by the action of the poison that it is almost impossible to pass the instrument without causing fatal tearing of the parts about it: and emetics are dangerous, chalk mixed with milk and water is the best antidote, and if chalk is not procurable, the plaister (chuna) from pukka walls and floors may be used instead, as this contains much chalk; also water allowed to stand for 10 minutes on sujjee matti may be given, but this must be done cautiously, and not in large quantities as it is itself a poison, or soap and water or oil may be used.

If European medicines are at hand, bicarbonate or sesquicarbonate of soda, mixed with water, may be given in doses of a half drachm every ten minutes. If none of the above are procurable, flour and water or raw eggs and water may be given with great advantage in very large quantities, or any oil, as til oil, may be used, or even water alone.

Post mortem appearances.—The stomach is always partially carbonised, and extremely soft, sometimes perforation occurs with signs of peritonitus. The mucus membrane, between the rugœ is always intensely reddened with extravasation of blood, and the stomach is much contracted. The duodenum is usually similarly affected.

The blood is syrupy and has an acid re-action.

No. 72.—*Case of recovery after swallowing strong sulphuric acid, reported by Tara Prosumo Roy, in the* Indian Medical Gazette *for* 1871, *page* 93.

A woman swallowed about half an ounce of strong oil of vitriol : immediately afterwards she had some burning pain extending from the mouth down the throat to the stomach, with copious vomiting of dark clotted blood. She was soon collapsed, with feeble pulse, cold extremities, lips swollen and excoriated. Magnesia and milk were given till the vomiting of blood ceased, and then white of eggs and brandy, and she quickly recovered, but with much difficulty of swallowing. The sulphuric acid was strong enough to char cloth.

No. 73.—*In case No.* 176 *of* 1867, *from Jullundur.*—Sulphuric acid was found mixed with the flour of the Government Bakery, but it was recognized before any bad effects were produced.

Other acids as nitric acid, (shora ka tezab) muriatic acid (namak ka tezab) ; and sulphate of indigo are very rarely procurable in the Punjab, and have never been used for poisoning, and therefore require only a short notice. The symptoms are similar to those produced by sulphuric acid, only the colours of the vomited matters vary in different acids, being yellow with nitric acid, and blue with sulphate of indigo.

The treatment also is precisely the same, except that chalk should be sparingly used, if muriatic acid is ascertained to have been taken, as it forms a somewhat poisonous composition with this acid.

Smallest dose required to cause death, about two drachms. Period at which symptoms occur, probably is always instanta-

neous, though some suicides have been able to conceal them for half an hour.

The period at which death occurs.—If the acid gets into the air passages it may produce death in the act of swallowing, otherwise the shortest case on record is one in which death happened in one hour from the stomach being perforated by the effects of the acid : the usual period, however, is from 18 to 24 hours ; sometimes death takes place suddenly when the patient seems recovering. Persons may die at an interval of from one week to eleven months from the remote action of the acid producing inflammation and narrowing of the throat or stomach.

Post mortem appearances in poisoning by mineral acids.—Marks of the action of the acid are often seen on the face, neck, or hands. Sometimes the lining membrane of the mouth is extensively corroded, at other times the throat is the only part affected. Usually, however, the principal changes are in the stomach, which contains a blackish thick fluid—has its lining membrane blackened on all prominent parts, and reddened beneath or corroded, or even perforated, and then its contents escape into the cavity of the abdomen.

The symptoms alone may be satisfactory proof of poison by one of these acids. Thus, if immediately after swallowing a liquid there is sense of burning in the throat and stomach, and violent vomiting, especially if this contains blood, and there are white spots on the neck or red spots on the dress there is a certainty that a mineral acid has been given.

Phosphoric, tartaric, and citric acids are not usually procurable, and hence not employed ; but the symptoms are similar though less severe, and the treatment is the same as for the mineral acids.

But oxalic acid has been employed here once as a poison (Dr. Chever's Med. Jurisprudence, pp. 164-5). No account was obtained of the symptoms, but in Europe it usually causes immediate pain in the throat and stomach, with violent vomiting, often of blood ; and death may occur in ten minutes if a large quantity is taken ; but if the poison is more diluted, pain may

be only after some time, or not at all, and vomiting not till 20 minutes, though subsequently violent vomiting and great weakness occur, at length causing death.

The smallest fatal dose is one drachm. The earliest time of appearance of symptoms, immediately, if in large quantity. The earliest time of death—three minutes. The usual time of death —one hour.

The treatment for poison by oxalic acid resembles greatly that for the mineral acids, excepting that neither carbonate of soda nor carbonate of potash should be given, as the compounds which these salts form with oxalic acid are themselves poisonous. It is advisable also not to give any water which is not mixed with chalk, as water increases the rapidity of the action of the poison. In this case, as in other corrosive poisons, the stomach pump should not be used—but lime is the best remedy, which can be given either in the form of plaister or mortar from a pukka building, or the ordinary kunkur of the roads beaten to a powder, and mixed with water would be of great service.

CORROSIVE SUBLIMATE AND OTHER SALTS OF MERCURY.

Darchikna.

Raskapur, a mixture of corrosive sublimate and calomel.

Shingraf, vermillion or sulphuret of mercury.

Metallic mercury is sometimes given as a poison, though it is not injurious unless it is oxidated. In case No. 19 of 1868, from Rawalpindi, it was found in chappatis, and in case No. 105 of 1867, it was mixed with dhall, in neither case did it produce any symptoms. An amalgam of mercury and tin probably scraped off a looking glass, has been found in food, but would not be poisonous.

This poison although somewhat corrosive, yet is less so than the other substances already described : it is very rarely used in India, but one case occurred in the Punjab in which raskapur was mixed with bread for the purpose of poisoning. The symptoms caused by it are, that there is usually an acrid metallic taste in the mouth, so that the poison is noticed as soon as it is swallowed ;—subsequently there is burning pain attended with a

sense of constriction in the throat, and after a short time, pain in the stomach also; the pain is greatly increased on pressure. There is violent vomiting often of blood and mucus—tenderness all over the belly, and afterwards severe purging. The face at first is usually flushed, and the eyes bright, but sometimes the countenance becomes anxious and pale. Convulsions or fainting fits may occur before death. Very usually the lips, tongue, and inside of the mouth appear of a white colour from the chemical action of this poison.

The mucous membranes in contact with this poison are shrivelled, and turned white, sometimes œdema of the glottis occurs and death from asphyxia.

The body becomes cold, the pulse small, quick and irregular, the respiration difficult, the urine is scanty, or suppressed; sometimes profuse hœmorrhage occurs, or convulsions or death takes place from collapse.

This poison resembles, to a considerable extent, arsenic in its mode of action, but it differs, 1st, in the symptoms beginning immediately; 2ndly, by there being a decided taste in the mouth; 3rdly, by the mouth being discolored; 4thly, by blood being more frequently vomited.

Sometimes symptoms of salivation occur, especially if the patient lives for a long period. When this happens, abundance of saliva is formed and discharged from the mouth, which becomes sore and gives off a disagreeable smell, sometimes said to resemble that of brass. There is a peculiar metallic taste in the mouth and great tenderness about the jaws, while the tongue and gums are reddened and swollen and sometimes ulcerated.

These symptoms are frequently caused by mercury administered by native hakims with good intention, but in ignorance of its danger. It must however be remembered that they may occur, especially in children, without any mercury having been administered. Among the consequences of such treatment are permanent closure of the jaws ("atresia oris") from inflammation or contraction after ulceration of the tissues of the cheek. Many cases of this sort are seen at the Calcutta hospital.

Treatment.—Vomiting almost always occurs, so that emetics are seldom required.

The best antidote is eggs, beat up with cold water, but only a moderate quantity, usually about four eggs, should be given, as the compound which mercury forms with these may again become poisonous if too many are used. In default of eggs, wheat flour or fresh chopped meat is very useful, and may be given with water in large quantity. Iron filings also are recommended either alone or mixed with zinc as this reduces the mercury to the metallic state in which it is inert.

Lastly, tea or catechu ("kuth") mixed with warm water, may be freely given with advantage,—a moderate dose of opium also is very useful not only as an antidote, but also as it relieves pain.

If the person survives and salivation has occurred, an ounce of castor oil should be given in milk, and the mouth should be freely washed with a solution of alum, (phitkari,) in cold water, two ruttees of phitkari to every chittack of water. Sharab also may be given with good effect in moderate quantity.

The *post mortem* appearances are chiefly those of inflammation of the stomach resembling arsenic, though occasionally also the lining membrane of the mouth is altered in colour which does not occur in poisoning by the latter. It is stated that sometimes the stomach is of an ash grey colour from reduced mercury, but this is very rarely the case; usually it is of a deep red colour from inflammation, or with blackened patches from extravasated blood.

No. 75.—*Case No.* 324 *of* 1868, *from Umballa.*—Some sweetmeats ("luddoos") were said to have caused vomiting and purging in four men after eating, lasting for four hours. A mixture of corrosive sublimate and calomel was found in the sweetmeats. This was probably "ruskapur" or impure calomel.

No. 76.—*Case No.* 75 *of* 1870, *from Jagádhri.*—A man brought something like a sweetmeat to the house of a married neighbour, and told the wife to eat it at once, but she being busy put it aside, and gave it to her husband. He immediately felt a peculiar sensation like soap, and spat out the greater part, but a little was swallowed, this produced vomiting, constriction about

the throat and profuse salivation. He was unable to speak for six hours, but was quite sensible; he then recovered. Corrosive sublimate was found in the vomited matters.

No. 77.—*In a case of a Rajah near Cattach, reported by Dr. Stewart in the* Indian Medical Gazette, 1877, p. 60.—A compounder gave 20 grains of corrosive sublimate instead of 20 grains of hydrate of chloral. The bottle was labelled Hyd. Perchloride: five minutes afterwards purging came on, but no vomiting; on the next day, blood was passed out with pieces of mucous membrane, but he recovered in four days. Enemas of opium (grain viii.) were given.

A servant to whom the Rajah gave a similar dose to see if it was right, had pain and heat in the throat, and this produced vomiting, afterwards there was purging with bloody stools, but he also recovered without salivation.

No. 78.—*Case No.* 320 *of* 1886, *from Dera Ismail Khan.*—A woman after being severely beaten by her husband, was believed to have taken poison. The lining membrane of the stomach was of a slate colour, and corrosive sublimate was found in it.

The smallest fatal dose is 3 grains. The first occurrence of symptoms is immediately on swallowing.

The bazaar calomel (ruskapur) often contains corrosive sublimate in poisonous quantity.

The sulphide of mercury (shingruf) is occasionally found in the stomach as a result of putrefaction, but is not used as a poison.

MODE OF EXAMINATION FOR SALTS OF MERCURY.

From Dr. T. Young's Lectures on analytical chemistry.

1*st.*—Reinsch's test conducted as for Arsenic. On the copper foil "A" is obtained a deposit of a light greyish colour, which on polishing assumes a brilliant mirror like lustre. On heating it in a test tube, a grey sublimate is obtained which microscopic examination shows to be composed of small grey globules of metallic mercury, the test tube is now to be inverted when the copper foil falls out. Nitric acid is then added, and heated, when

the mercury dissolves in the acid. To the result of the solution confirmatory tests may be added if thought necessary, but the appearance of the copper foil in polishing and the sublimate it yields on heating are generally considered sufficient proofs of mercury.

Tests.—Evaporate to dryness the acid solution, and re-dissolve in distilled water: sulphuretted hydrogen gives at first a yellow, and then a black precipitate.

Sodic carbonate, a reddish brown precipitate; potassii. iodide, a scarlet precipitate very soluble in excess.

Stannous chloride or formic acid, if boiled with it, gives at first a white precipitate, and if further heated, a greyish precipitate of metallic mercury.

ALKALIES.

No cases have been recorded of poisoning by these substances in India, but as both impure carbonate of potash (jaokhar) obtained from burning the stalks of barley, and impure carbonate of soda, (sajji matti), are in common use, an accident causing even death might occur. The latter substance is made by burning various plants belonging to the natural order chenopodiaceœ and in particular the salsola indica, and collecting the ashes. Lime (chuna) another common substance has also proved fatal in Europe. The symptoms of poisoning with akaline substances are as follows: An immediate burning pain and acrid taste in the mouth, throat and stomach; violent vomiting, often of blood, the vomited matters turning blue clothes to a green color, cold sweats, excessive weakness, great pain in the stomach, increased by pressure, and purging sometimes of blood: or should any of the alkaline liquid reach the air passages, cough and difficulty of breathing ending in death may result.

Sometimes collapse occurs or diarrhœa; great tenderness of abdomen, quick pulse and fever. But with potash the pulse is slow and weak, and convulsions and insensibility occur.

Treatment.—The best antidote is a dilute acid, especially vinegar or lemon juice, which may be given freely in as large a quantity as the patient will drink; should these not be at hand, oil, either linseed, poppy or even mustard oil, may be administered. Small doses of opium are also frequently of service. The stomach pump should never be used, as it may perforate the softened throat.

The smallest fatal dose observed in England,—half an ounce.

The shortest period before death,—three hours.

Average period before death,—24 hours, but the patient may survive weeks or months or even more than a year, and ultimately die from the effects of poisoning, since this sometimes occasions such an alteration in the capacity of the throat, as at length to prevent the person swallowing food, so that he dies of starvation.

Post mortem appearances.—The stomach is of a dark red colour, soft, and inflamed, and has an alcaline reaction; sometimes it is blackened by the alteration of the blood.

DETECTION OF THE CAUSTIC ALKALIES.

These are all soluble in water, and even in dilute solutions they give the following tests:—

1. It has an earthy metallic taste.
2. It turns reddened litmus paper blue again.
3. It turns turmeric paper brown.
4. It yields a lake colour with solution of phenile, eosine or cochineal.
5. It causes no effervescence if added to carbonate.
6. It destroys the purple or lake colour which acids give with methyle orange solution.

SALINE IRRITANTS.

There are few salts which, although in a small dose not hurtful or even beneficial, have in Europe occasionally proved fatal in larger doses. Those commonly found in India and

from which, therefore, there is a risk of accident occurring are :—

Nitre saltpetre, (shora); nitrate of potash. Common or culinary salt; (namak,) chloride of sodium; Glauber salts, (kharilun,) sulphate of soda; alum, (phitkari); sulphate of alumina; and potash.

These do not produce pain in the mouth or throat, but when taken in excessive doses, cause violent pain in the stomach with vomiting, usually after an interval of a quarter of an hour. Subsequently there is great pain and tenderness of the stomach, with purging often of blood. The sufferer becomes extremely weak and collapsed, and occasionally convulsions or deep sleep occur, and ultimately death.

Sometimes frequent but painful micturition, weakness, cold sweats, cramps in the limbs, convulsions, collapse and death; the urine is scanty or mixed with blood.

The smallest fatal dose of nitre is one ounce; the other substances would probably not prove fatal in so small a quantity. The least time in which nitre has occasioned death is two hours; but usually a much longer time elapses before saline poisons prove fatal.

Treatment.—Vomiting usually occurs spontaneously, and should be increased by drinking warm water; after a short time a mixture of flour and water should be used, and half a grain of opium may be given. If the patient is very weak, sharab will be useful to maintain his strength. The stomach pump may be employed if it is available or an emetic of mustard and water or sulphate of zinc given. Large quantities of water and mucilaginous drinks should be given and hot fomentations applied to the loins.

Mode of examination for the Saline irritants.—As these may be found in small quantities in the food or secretions of the stomach, no delicate test is of any service. But the salt may be separated by dialysis and crystallised, or in the case of nitrate of potash, recognised by its deflagrating

with organic matter and forming a carbonate, or by its giving off red fumes with copper foil and strong sulphuric acid.

Alum may be precipitated by ammonia, and proved by giving a blue colour when fused with cobalt, when heated with the blow pipe, and a white precipitate soluble in excess with caustic soda.

COPPER.

Poisoning with this metal intentionally is rare, but as natives generally use brass or copper cooking utensils both for themselves and for Europeans, these, if not carefully tinned, may impregnate the food, if, as is often the case it contains substances of a fatty or acid nature. The symptoms of poisoning by copper may thus accidentally occur. It is found that most sorts of liquid food may be boiled in a clean copper or brass vessel without danger, as the heat expels all air from the liquid, but if it is allowed to get cold, it then absorbs air and begins to dissolve the copper. If, however, the copper or brass vessel is not quite clean, the rusty portion of the copper may be dissolved while the liquid is boiling, though the metal is not injurious till it is oxidised, so that if kept perfectly clean and free from rust it may be used without danger for all substances not acid or fatty.

It is therefore necessary to be careful, first that the copper vessels should be perfectly clean; secondly, that the food should be removed from them while still hot, and thirdly, that no vinegar should be added while in the copper. If the copper vessels are tinned, there is no danger, provided the inner surface is uninjured, even in the addition of vinegar.

The preparations of copper usually obtainable in the bazaar are—

Sulphate of copper, nila tutia.

Subacetate of copper, zungar pitar.

Sulphate of copper is sometimes found in the stomach in cases of opium poisoning as it is used as an emetic.

Symptoms.—These resemble very much the symptoms of poison by arsenic or mercury.

There is generally a peculiar metallic taste in the mouth, called coppery, perceptible on swallowing the drug, afterwards there is a feeling of constriction in the throat and pain in the stomach, with nausea and vomiting of a greenish liquid and usually an increased flow of saliva. Subsequently there is griping pain, and purging often of a greenish matter; after this has lasted some time, the patient complains of weakness and coldness, great thirst, headache, giddiness, sleepiness, and often of cramps in the limbs, the pulse is small and quick, the skin cold, there is dyspnœa and great depression, sometimes convulsions or tetanic spasms occur, at other times jaundice is noticed and death at length occurs.

The smallest fatal dose is seven drachms of sulphate of copper. The earliest time for symptoms—immediately on swallowing. The earliest period of death—four hours. The usual period before death 24 hours.

The symptoms of accidental poisoning by copper vessels being acted on are the same as those of intentional poisoning if a large quantity is dissolved as sometimes occurs, but at other times a small quantity only is taken into the food daily and this at length produces the following changes. A few hours after eating there is violent pain in the abdomen with vomiting of greenish liquids and purging, or a griping pain with inclination to pass motions, but only a little bloody slime comes away and there is itching about the lower bowel, debility and cramps.

The abdomen is tender on pressure. Often there is heat of skin, headache, thirst, loss of appetite, foul taste in the mouth, furred tongue and a small feeble pulse. Sometimes there is a characteristic sign on the gums, a purple line near the teeth while their edges are retracted.

In a case examined at Lahore, a considerable quantity of sulphate of copper was found in bread, the grains of a blue colour could be seen with the naked eye and picked out. This salt is sometimes added as an adulteration to bread in Europe

to diminish the amount of yeast required, but never in so large a proportion as it was in this instance, as it would probably prove poisonous, if much of the bread was eaten. It should be mentioned that native hakims are accustomed to administer water boiled on pice as an emetic in many cases, especially of poisoning, and hence a small quantity of oxide of copper may be found in the stomach after death.

Treatment.—Administer the usual emetics if required, but generally mustard meal and warm water will be sufficient, or some mucillaginous drink.

The stomach pump may be used. Also white of eggs and cold water or milk may also be given freely with the best effect. Iron filings, loha-ka-ret, are also useful, about two or three mashas should be mixed with sugar and given every hour if they can be procured. Demulcents should be used and opium if there is much pain, or stimulants if exhaustion occurs. Afterwards caster oil or infusion of senna should be given with a little tincture of opium.

Post mortem appearances are those of inflammation of the stomach and bowels, sometimes with ulceration or even perforation. If the dose has been large the stomach is usually covered with a greenish substance, beneath which the membrane is of a bright red colour.

The liver is usually fatty, the kidneys congested and yellow.

MODE OF DETECTING COPPER.

1. Add a little water and dilute sulphuric acid to the suspected substance, and then suspend in it an ordinary sewing needle; in an hour or two this will become of a red colour if copper is present.

2. Pass sulphuretted hydrogen through the above solution, a black precipitate will fall insoluble in ammonium sulphide.

3. Add ammonium solution to the above, a purple colour will be produced.

4. Sodic carbonate gives a light blue precipitate.

5. Potassi ferrocyanide gives a brown or claret red precipitate.

In chronic poisoning the same changes occur and vary much in different cases in the amount and intensity of the inflammation.

No. 79.—*Ludhiána, case No.* 275 *of* 1869. A person 20 minutes after taking food began to complain of dryness of the throat, tingling and cramps; vomiting set in, but he recovered, afterwards sulphate of copper was found in the vomited matters.

No. 80.—Case of copper colic reported by Dr. Johnson in the *Indian Medical Gazette* for 1873, p. 184. Four Patháns cooked some food in *an unprotected* copper degchi and left it all night; on the next day they all suffered from severe abdominal pain not relieved by pressure, a feeling of fullness of the intestines and severe purging of greenish mucus discharge but no vomiting or nausea. They all recovered.

No. 81.—*Case No.* 215 *of* 1869, *Ferozepore.*—A custard pudding was brought to table of a green colour owing to its having been made of milk kept for some time in a copper degchie.

No. 82.—*Case No.* 473 *of* 1886, *Pind Dadan Khan.*—A woman was given some chupatis prepared by the second wife of her husband. She complained that they had a bitter taste and a green colour. Sulphate of copper was found in the chupatis.

No. 83.—*Case No.* 1111 *of* 1886, *Hoshiarpur.*—A man partook of some chupatis prepared by his wife and soon after was attacked by violent vomiting. The chupatis were examined and sulphate of copper in poisonous quantity was found in them.

LEAD.

Although some preparations of lead are sold in the bazaars of the Punjab, yet poisoning by this substance is very rare. Two cases however are mentioned by Dr. Chevers in his valuable work on Medical Jurisprudence, p. 294. The more common substances obtainable are:—

Oxide of lead, or litharge called murda sang; red lead, sandur; carbonate of lead or ceruse, —saffaida.

The symptoms caused by the preparations of lead when taken in a large dose, are metallic taste, burning pain in the throat and stomach, great thirst, vomiting usually commencing in about quarter of an hour after the poison has been swallowed ; great pain and tenderness in the belly. Purging rarely occurs as the opposite condition, constipation is more frequent. The pain in the abdomen is usually very. severe, and is described as being situated around the navel. The skin is cold and damp, sometimes convulsions occur, and afterwards death.

Sometimes cramps occur in the limbs or paralysis, urine is scanty, tongue coated, skin dry, headache, and local numbness occurs.

Anæsthesia of the skin takes place and the hand drops "dropped wrist" sometimes *amaurosis* or blindness, or occasionally gout is produced by chronic lead poisoning.

In England, slow poisoning by lead is not very uncommon owing to water being conveyed through leaden pipes, &c. ; this is rarely the case in India, but in Ceylon several soldiers belonging to Her Majesty's 13th Regiment were poisoned by drinking arrack, which had been contained in a leaden vessel. The symptoms usually caused by this mode of poisoning are pain about the navel with obstinate constipation, great thirst, loss of appetite, great emaciation, sallowness of the countenance, and the gums show a distinct blue line around the base of the teeth—this is particularly characteristic. This assemblage of symptoms is sometimes called the painters' colic, because, it is most frequently seen among those who are in the habit of handling white lead for the purpose of painting. If the person does not leave off his employment symptoms of paralysis occur called lead palsy ; this at first commonly attacks the arms themselves which lose their power and waste away, so that the sufferer can no longer lift up his hand without applying the other to it. Ultimately convulsions occur, or a kind of apoplexy in which the patient becomes giddy, extremely weak and at length insensible ; but such cases are not likely to be met with in India.

But lead poisoning may also be caused by keeping acid or fatty substances, as ghi, in earthen vessels, glazed with lead or even by keeping drinking water in leaden vessels, or in bottles which had been cleaned by leaden shot, if any of the shot remain behind.

Post mortem appearances.—The lining membrane of the stomach is often covered with a thick opaque white layer containing lead and mucus, beneath which it is usually much inflamed and sometimes ulcerated.

The bowels are also inflamed in patches, and often in chronic cases they are contracted at intervals and again distended beyond the contracted part. At other times however the appearances are much less distinct.

In chronic cases a blue line in the gums, composed of minute spots of sulphide of lead is seen, and sometimes a blue discoloration of the bowels in patches from the same cause, also a granular contracted state of the kidney is met with.

Treatment.—Emetics should be given unless there is much vomiting, the best is mustard and water ; or the stomach pump may be used. Subsequently Sulphate of Soda, Khari lun or the "Reh or Kullur" the efflorescence on the soil may be freely administered, as it is an excellent antidote, or Epsom salts Magnesium Sulphate can be given if they are procurable. If none of these can be obtained, the white of eggs also mixed with water would be very serviceable, or milk may be used in large quantity. Castor oil in doses of half a chittack to three-quarters of a chittack should always be given after the symptoms have lasted for three or four hours ; if the pain in the abdomen is very severe, one grain of opium may be added to each half chittack of the oil. In this way the bowels may be relieved and part of the poison removed.

In case No. 256 of 1876, lead was found in some soda water, but not in the solder used for tinning, though an officer thought that the yellow colour produced by adding Iodide of Potassium to Nitric acid which had been digested on a tinned

vessel indicated lead, but this was only the Iodine set free which appears yellow.

Detection of Lead.—In organic liquids lead can be best precipitated by Sulphuretted hydrogen which gives a black precipitate unless an excess of hydrochloric acid is present; or by acidulating the liquid with Nitric acid, and adding zinc which precipitates metallic lead, or thirdly by passing a current from a galvanic battery through the solution and receiving the lead on a platinum electrode. The metal lead is quite soft and malleable, of a bluish black colour and streaks paper. It readily dissolves in Nitric acid and the solution when neutralised gives

(1) A bright yellow precipitate with Potassium Iodide also with Potassium chromate and bichromate.

(2) A white precipitate with Sulphuric acid or any soluble sulphate.

(3) Heated or charcoal, it gives a metallic globule and brown or yellow incrustation.

ZINC.

Oxide of Zinc, (Missi); Sulphate of Zinc, (Safaid tutia.) These substances might prove poisonous in large doses and are commonly sold in bazaars. The former has been several times sent for examination among other medicines suspected of being used for poisonous purposes, and the second drug very seldom. No case of poisoning by either of them is at present known in India.

The symptoms which have been observed in England in poisoning by sulphate of zinc are:—

A metallic taste in the mouth occurs generally while swallowing, there is pain in the throat and stomach followed by violent vomiting and usually diarrhœa. The abdomen is tender, there are cramps in the legs, cold skin, quick small pulse, and the patient is very weak; sometimes convulsions occur, and occasionally a pustular eruption has been seen.

Post mortem appearances—Are those of inflammation of the stomach and intestines already described.

Treatment.—Vomiting usually occurs as one of the effects of these poisons, but it should be promoted by draughts of hot

water. White of egg mixed with cold water is perhaps the best antidote and may be given freely—but strong tea is also recommended or catechu (two ruttees) dissolved in water may be given, especially if antimony is supposed to be the poison, while if sulphate of zinc has been taken, a small quantity of sujjee muttee dissolved in water may be useful, not above one ruttee should be given at a time, however, as sujjee muttee is itself a poison in larger doses.

Sulphate of zinc acts as an emetic.

Opium may be given to relieve pain, and hot fomentations for colic.

ANTIMONY, ITS SYMPTOMS AND MODE OF DETECTION.

Sulphuret of antimony (surma) is often used as a cosmetic for darkening the eye lashes, and is commonly met with in collections of drugs, but is not used as a poison; often sulphuret of lead or peroxide of iron is substituted for the genuine surma.

The medicine called Surma safaid does not mean antimony but is merely carbonate of lime in the form of Iceland spar, and is not poisonous in any dose.

Tartar emetic, tartrate of potash and antimony is generally used as a medicine, and has occasionally produced death by accident, rarely it has been used for suicide of murder.

Symptoms.—These are very similar to those of arsenic, generally there is a metallic taste in the mouth, violent vomiting sometimes of blood, pain in the stomach, diarrhœa, great faintness and depression. The urine is suppressed, collapse occurs or delirium and convulsions and death. A pustular eruption is seen sometimes. Small doses of antimony frequently repeated cause diarrhœa, vomiting, small frequent pulse, great muscular depression, cold clammy skin, and death by exhaustion.

Post mortem appearances.—Great inflammation of the mucus membrane of the stomach with ulceration or sloughing of the mucus membrane which is discoloured varying from brown to black.

Treatment.—Vomiting is usually free so that emetics are not required, but the stomach pump may be used. Strong tea, infusion of catechu (kath) or tannic acid or any substance containing it, as acacia bark (kikar ki chil), galls (majuphal) or muen may be used as antidotes. Demulcent drinks and stimulants in small doses often repeated are useful, also opium carefully administered; keep the patient very warm by hot blankets or fires.

No. 84.—A case of poisoning by tartar emetic, reported by Dr. McConnell in *Indian Medical Gazette,* for 1874, January 27:—A Eurasian student in Calcutta took half a teaspoonful of tartar emetic, about 103 grains, shortly after a meal; he was immediately attacked by violent vomiting, on being seen half an hour afterwards, then a great depression and restlessness, pain in stomach, throat, constant retching and vomitings. Warm water was given and then Tr. Cinchonœ. In four hours time there was griping pain in the bowels, and purging and cramps in the legs. Morphia was injected and chloral given and he recovered.

MODE OF TESTING FOR ANTIMONY.

From Dr. Young's Lectures on practical chemistry.

In organic liquids the mode of testing is the same as for arsenic. Reinsch's test is performed in a manner exactly similar to that directed in the case of arsenic (which see page 100). But on heating the deposit of antimony obtained on the copper foil by this process, it is found to be non-volatile, thus differing from that of arsenic. The tube in which the heating has been conducted is next allowed to cool, and some weak caustic soda solution is added and enough weak potassic permanganate solution to just colour the liquid pink. This is now boiled and the solution of the permanganate of potash oxidises the antimonied deposit in the copper into antimonious oxide which acting as the anhydride of an antimonious acid unites with the weak caustic soda to form a soluble antimonite. The resulting solution rendered acid with hydrochloric acid and treated with sulphuretted hydrogen water yields the characteristic orange coloured precipitate of antimonial compounds.

2. *Marsh's test.*—This also is conducted as for arsenic (which see page 101). Antimoniuretted hydrogen or stibine is given off a compound analogous to arseniuretted hydrogen. On burning this gas it deposits a black stain on white porcelain held over the flame. The deposit so obtained is distinguished from the similar deposit of arsenic by its insolubility in solution of the hypochlorites of calcium, sodium or potassium ; 2ndly by its ready solubility in ammonium sulphide which also distinguishes it from a carbon deposit.

3. This gas is decomposed similarly to arseniuretted hydrogen by heat, but reacts differently with silver nitrate, a definite argento antimoniuretted compound being formed, and no antimony remains in solution if the nitrate of silver is in excess.

If it is passed over sulphur in the sunshine it is decomposed and a beautiful orange yellow sulphide of antimony formed even ·0001 of a grain of antimony will show this reaction clearly.

Flatman's test or the production of a hydrogen compound from caustic potash is not applicable to antimony as this element has not the power of uniting with nascent hydrogen developed from zinc and caustic potash.

Note.—Solutions of tartar emetic which is the commonest and most important compound of antimony give a white precipitate on acidulating with hydrochloric acid which is an oxychloride of antimony. This precipitate is easily soluble in excess of the acid.

CATHARIDES.—Indian substitute. Telini makhi—Mylabris chicorei.

Dr. Balfour in the *Agricultured Pests of India*, p. 37, says :—It is common in the neighbourhood of Karnál, about 1 inch long and one-third of a inch broad, the elytra or wing covers are marked with six cross stripes of deep blue and russet brown. It yields on an average one-third more of cantharidine than that used in England.

The elytra and integument are much softer than that of other insects, as the layers are separated by a large space crossed by fewer pillars of tissue.

This is rarely employed in India for a poison but is occasionally given to produce abortion or to relieve impotency, and when so employed it may cause dangerous symptoms. In one case these flies were applied externally for the purpose of injury and in another case several were found in spirit probably added to produce a greater stimulating effect. Only the symptoms caused by the *Cantharis vesicatoria* are fully known. These are burning feeling in the mouth or throat coming on soon after the drug is taken, occasionally blisters rise on these parts. Soon after there is excessive pain in the stomach, nausea and vomiting sometimes of blood or of white flakes mixed with a shining green powder. There is often also purging, great thirst, and weakness. After a time there occurs severe pain in the loins with a constant desire to pass urine, and at the same time great difficulty in doing so. There is also much irritation and swelling of the private parts or even inflammation and sloughing of the same. Sometimes there is headache, convulsions or delirium, faintness and giddiness, or symptoms like hydrophobia, urine bloody and purulent.

Death has occurred from the application of this drug to the skin only, as well as from taking it internally.

Treatment.—Emetics must be given as soon as possible. The most easily obtainable is either crushed mustard seeds, with warm water or salt and water as already mentioned. The stomach pump should be used if there is any medical officer present. Afterwards eggs beaten up with warm water or flour and warm water should be taken or any other liquid food excepting oil, this should not be swallowed as it facilitates the absorption, but it may be applied externally to any part that is blistered. Warm water should be applied to the sexual organs to diminish the pain if this is severe, and demulcent drinks or opium administered. Sometimes one or two leeches may be used with advantage if the pain is very great.

Post mortem appearances.—Extensive inflammation often occurs from this poison, extending from the mouth through the stomach to the intestines, and blisters sometimes form on the tongue and lips. The kidneys and bladder are frequently highly con-

gested or inflamed. Sometimes there is also congestion of the brain and of the lungs. The glittering particles of the insect may be often seen in the stomach which is usually much inflamed.

No. 86.—Case of poisoning Telini fly at Subathu reported by Surgeon-Major J. Tulloch, M.D., in the *Indian Medical Gazette* for 1875, p. 15.

An English soldier, after drinking, ate three telini flies weighing about three grains. Two hours afterwards he had severe pain in the stomach and could only pass blood when he attempted to urinate. In another hour he had violent vomiting and straining, burning in throat and stomach and great thirst, severe pain in the penis, but no other affection of the genitals. He reached hospital seven hours after taking the poison, and then complained of severe pain in the stomach, constant vomiting, great prostration, and a large patch of the centre of the tongue was denuded of epithelium, raw and bleeding. He suffered from strangury and tenesmus and passed blood both from the bladder and bowels. Bismuth and hydrocynic acid were given and demulcents, and he gradually recovered, but the urine was not free from blood till after the eighth day.

Detection of cantharides.—The glittering green particles may be seen on the mucous membranes of the stomach.

The substance to be examined should be boiled with one part of potash and twelve of water, then neutralised with sulphuric acid, and boiling alcohol and, after heating, filtered while hot. It should then be evaporated, mixed with chloroform, and after the chloroform has separated, this should be removed by decantation, and again evaporated; the residue should be mixed with hot almond oil, and applied to the skin for an hour when a blister will be produced.

ACRID CATHARTICS.

These purgatives are comparatively rarely given as poisons, but occasionally accidents occur from children or others eating part of the acrid vegetables, especially those which are berries. At other times there is reason to believe that they are used to procure abortion though they can only produce this effect when

given in a dose which endangers the life of the mother. The principal Indian ones are as follows :—

Croton tiglium,*	Jamalgota.
Ricinus communis,*	Arend.
Jatropha curcas,	Bagberendá.
Euphorbium officinum,*	Farfiyun Afárbíun.
„ tirucalli,	Lunka sij.
„ ligularia,	Munsa sij.
„ helioscopa,	Hirbisiah or kala.
„ nereifolia,	* Hirbiuro.
„ verrucosa,	Hirbi safaid.
„ longifolia,	Kachnoo.
„ tenuis,	Dhudi pater vala.
Citrullus COLOCYNTHIS,*	Indráin.
Cucumis trigonus,	Indrayan.
„ „ Hardwichii,	Indrain pahari.
Lagenaria vulgaris,	Belaschora tombi.
Garcinia,	Kali kutki.*
Garcinia morella,*	Osara rewand.
Juniperus sabina,	
Ipomea coerulœa,	Kaladana.*
Luffa amara,	Karaila.
Tricosanthes palmata,	Makal.
Luffa echinata,	Bindal.
Byonia *laciniosa*,	

Those marked with stars have been known to occasion death, the others produce similar symptoms but have not destroyed life as far as is ascertained at present. The symptoms occasioned by these poisons are burning pain in the throat soon after taking the drug, followed by vomiting which often ejects all the poison, and the patient then recovers; but at other times if all is not expelled, there is a severe twisting pain about the navel with tenderness and violent purging, sometimes of blood, great weakness, thirst, cold skin, feeble pulse, giddiness, and a tendency to faint, sometimes convulsions or delirium occur, but this is very rare, however there is usually violent cramps in the legs and feet.

After the purging has lasted for some time, the pulse becomes weak and small, the skin cold and clammy, and the patient evidently exhausted, at the same time, the cramps all over the body are very severe. Sometimes the weakness increases till death occurs, but more often, especially if the purging ceases and alcohol is given, the sufferer gradually recovers, but remains weak for some days.

Fatal doses:—3 seeds of castor oil, produced death ; two and a half drachms of croton oil ; one-and-a-half teaspoonfuls of powdered colocynth; two drachms of aloes ; and one drachm of gamboge have each proved fatal.

The effects of these poisons resemble greatly the symptoms produced by cholera, dysentery and diarrhœa, but they are distinguished by the symptoms coming on shortly after some food has been taken, and by the pain being chiefly situated in the region of the stomach.

The principal symptom is the violent purging which resembles that of cholera, but the patient's skin, and especially the tongue is not so cold nor is the voice so faint and husky as in a severe case of cholera. Frequently portions of the vegetables are seen in the motions also.

From dysentery they are distinguished in that the patient is usually in good health before he is attacked by the effects of the poison, also by the greater rapidity of the symptoms with a less amount of fever, and that vomiting is an early symptom in cases of poisoning, and is more severe than usually occurs in dysentery.

Diarrhœa not caused by poison is seldom so severe as in the cases above described, and the patient is not usually rendered so rapidly weak when no deleterious drug has been taken.

Treatment.—The principal treatment is to cause or assist vomiting, the mustard or salt water emetic should be given, till full vomiting is produced, and copious draughts of warm water used, and two or three drops of spirit of camphor are useful. When most of the irritating substance has been removed, warm liquids should be given in considerable quantity such as thin gruel or atta mixed with water, warm milk, and water or raw

eggs with cold water. A small dose of opium (half a grain every hour) will be often of great service, and the application of three or four leeches to the pit of the stomach is frequently useful. Besides this hot fomentations will be required, these may be prepared by dipping a flannel or numda into hot water and wringing it out and then applying it to the whole surface of the abdomen. When the patient is very weak stimulants, as sharab and water, with the addition of a raw egg should be given in moderate quantity (about half a chittack) every hour, or the stomach pump may be used and afterwards copious draughts of demulcents given.

Post mortem appearances.—These are generally intense inflammation of the lining membrane of the stomach on which sometimes part of the drug is found, also great inflammation in patches of the intestines, especially at their lower part, and sometimes ulceration of these organs.

Case No. 87.—Poisoning by Jatropha Curcas.—Reported in the *Madras Quarterly Journal,* July 1861. On November 11, 1848, a gentleman about 22 years old, ate from 15 to 20 nuts of the Jatropha Curcas supposing them to be harmless, and felt no ill effects for an hour and a half afterwards, then he began to experience a burning sensation in the throat and stomach which was followed by profuse purging, at first of ordinary motions, but afterwards of a thin watery discharge—this was attended with great pain and tenderness of the abdomen, and also some vomiting by which portion of the nuts were discharged.

After the purging had lasted one hour and a half the patient began to complain of cramps in the legs and feet. At this time however the purging ceased, but the cramps became very severe and extended to other parts of the body. The patient at the same time was extremely weak, and became deaf and his sight dim, his skin was cold and damp, the pulse weak and small and his features contracted. Six hours after taking the nuts he began to improve, his skin became warmer and he slept, but during the whole of the following day the cramps and pain in the abdomen remained. Some other persons who had eaten a

less quantity of the nuts were similarly affected but not so violently.

The treatment consisted principally in administering hot brandy and water occasionally, and placing the patient in a warm bed.

No. 88.—Case of poisoning by Cucurbita Lagenaria Kinna Thumria. A medical pupil was told that the seeds and pulp of the Cucurbita Lagenaria infused in milk would cure syphilis. He drank a mixture of 4 ounces of the seeds with 8 ounces of milk and it one hour he was fully purged and vomited with severe collapse, hand and feet cold, face pinched, eyes sunk, no pulse at wrist, great pain in stomach, he died in 4 hours. This cucurbitaceous plant is never used for food as it is known to be poisonous like elaterium.

No. 89.—In a case reported by Dr. A. Taylor from Amritsur in 1871. Four persons were stated to have been sick after eating some Morinda. Two men purged once, and one had dilated pupils. Oily matter which irritated the skin was extracted from the Morinda.

CROTON SEEDS.

No. 90.—Case reported by Dr. Moir of Meerut in 1870. A Musalman, aged 30, was stated by the police to have taken some croton seeds. He suffered from purging and vomiting, weak pulse, dry tongue, thirst, restlessness and pains at pit of stomach, he died 52 hours after admission. On *post mortem* examination the stomach was found to be much inflamed, and several patches of ulceration and one large slough, 2 inches by 1¾ near the pylorus were seen. The intestines were much congested with a slough equal to a 4 anna piece in the jejunum. The lungs, kidneys and liver were congested, the other organs healthy.

POISONING BY CROTON SEEDS.

No. 91.—*Case No.* 179 *of* 1867, *at Dharmsala.*—A wife confessed to having administered 4 croton seeds to her husband who was attacked with vomiting and purging, and died 43 hours after the second dose. Some seeds of croton were found in the woman's possession. The wife was condemned to

death, and the man who supplied the seeds to transportation for life, (see case No. 38 of 1867, *Punjab Record.*)

No. 92.—*Case No.* 133 *of* 1880, *from Ludhiana.*—A man after taking food was attacked by violent purging and died. The stomach and intestines were intensely congested with small yellow particles supposed to be arsenic. Both lungs, the liver and left kidney were much congested, the right kidney was atrophied. Croton seeds were found in the stomach and also in some sweetmeats (Hulwa) which he had eaten.

No. 93.—*Jatropha multifida coral plant or plysic nut.*—Case by A. Porter, M.D., p. 142, *Indian Medical Gazette for* 1881. Three European children ate one or two seeds each, in two hours time they were restless, and then vomited and purged once or twice with collapse. Salvolatile and iced water were given, vomiting and purging ceased in eight hours, and they recovered.

Plumbago Rosea.—*Lal chitra.*—This plant is known to be an excessively irritant poison, but very little is recorded concerning the symptoms which it produces when taken internally, externally it acts as a vesicant.

It appears to act as a powerful acrid producing pain and tenderness in the stomach with vomiting, great thirst and frequently purging.

It is frequently used to procure abortion by applying it to the vagina and uterus, in this case it produces great inflammation, often extending to the peritoneum, and death. Externally it blisters the part to which it is applied, this may extend to sloughing and produce death by exhaustion.

Treatment.—Vomiting will usually occur from the action of the drug, and should be promoted by administering warm water freely. Subsequently mucilaginous drinks may be given, and if the patient is very weak a little sharab, half a chittack, beat up with sugar and an egg is very useful, or failing this milk may be given with water. If the poison is applied externally the parts should be well washed and oil rubbed over them.

No. 94.—*Case*—Transactions of the Physical Society of Bombay; paper by Dr. J. Mill :—

On December 16th, 1861, a man poured over the face of a sleeping native with whom he had quarrelled a liquid said to have been prepared from the roots of the Plumbago rosea, and Semecarpus anacardium but this also contained some blistering flies and sulphate of copper. Six days afterwards he was seen by Dr. Mill who described the whole of the face, neck, and left side of the chest as being covered by a deep black slough, the pain was very great, the next day the slough separated and the man appeared better, but 35 days after the injury he died from exhaustion.

Daphne Muckonata Gandhira Gundlena.—This is the root and stem of a shrub growing in the hills which acts as a powerful irritant. It is recognized by the peculiar woody tissue which forms the inner bark, and which is composed of white long fibres easily separable from the wood. These fibres are sometimes used for making paper. It produces a peculiar acrid taste in the mouth, and afterwards vomiting and death from inflammation of the stomach, but its other symptoms are not well known.

The Daphne Mezereum in Europe causes dryness and heat in the throat, increased salivation, pain in the abdomen, vomiting and purging with fever, the stools are sometimes mixed with blood, occasionally there is also giddiness with imperfect vision and dilated pupils, and frequently there is great pain in passing urine.

Convulsions and death may occur. A little girl died after eating twelve berries of daphne.

The treatment would be the same as for lal chitra. The *post mortem* appearances are not certainly known.

THE LESS COMMON NEUROTIC POISONS.

Camphor.—*Kaphur.*—This solid oil is in large doses poisonous, sometimes it produces langour, giddiness, dimness of sight, noise in ears, partial paralysis, convulsions and coma, a feeling of anxiety, delirium, occasionally very violent, with subsequent

sleepiness and insensibility, the distinguishing symptom is that the breath gives out the odour of the drug. The skin is generally hot, the pulse quick, the face flushed, and the pupils dilated. It has very rarely produced death.

Treatment.—The stomach pump should be used; rum (sharab) or ether should be given, and hot blankets applied to the body. Emetics should be given such as mustard and water, as soon as possible, the rest of the treatment should be similar to that for opium. Castor oil should be administered about three hours after the poison has been taken.

No. 95.—A railway employé at Benares swallowed two pieces of camphor each about the size of a nutmeg, in 10 minutes he felt extreme heat, giddiness, intoxication, he reeled when walking, and fell down, then had two epileptic fits. On recovery, he complained of heat in stomach and oesophagus, loss of control of voluntary motions, and feeling of intoxication.

No. 96.—*Case No.* 15 *of* 1869 *of Umballa.*—A man died suddenly:—the symptoms were not recorded, but on *post mortem* examination the stomach was found to be highly congested in patches radiating from a centre. Lumps of camphor were found in the stomach.

No. 97.—A boy was killed by 360 grains of camphor, but recovery occurred from a dose of 270 grains in another case.

Detection.—It can be separated from mixtures by agitation with chloroform or alcohol, from the latter it is separated by adding water, from the former by spontaneous evaporation. It is recognized by its odour, its burning with a bright white flame and its solubility in alcohol.

Hyoscyamus Niger Henbane,—*Khorasani ajwan.*—This plant which has been occasionally taken in poisonous doses in England, produces symptoms similar to those of datura, thus it causes giddiness, an appearance of intoxication, sleepiness, dilated pupils, either partial or complete blindness, together with dryness and a feeling of tightness in the throat—these symptoms are followed by delirium, sometimes violent, ending occa-

sionally in insensibility and death ; more rarely, as in poisoning by datura, there is no delirium but merely insensibility.

There is only in a few cases vomiting or pain in the stomach. Once or twice a rash has been seen on the skin.

Treatment.—The same as for datura, which it resembles in every respect. Emetics should always be given early, especially mustard and water as already described, and subsequently sharab, if the patient is weak, or cold affusion used if he is insensible. The stomach pump would be very useful if it could be obtained and employed.

CASE OF POISONING BY HYOSCYAMUS MUTICUS.

No. 98.—Report of a case of poisoning by Hyoscyamus Muticus from notes by J. Harrison, Esquire, Apothecary, Lahore:—

A Mahomedan, aged 20, was brought to the Anarkulli dispensary on February 25, 1864, by the police who reported that he was under the influence of a poisonous plant like the datura, a specimen of which they brought with him. On admission the patient was in a stupefied state, unable to walk or to stand steadily. He was muttering indistinctly and was catching at imaginary objects on the ground or in the air. His eyes were half closed, but the pupils were greatly dilated. The pulse was quick but weak, skin cool and moist, face much congested, speech indistinct and rambling, but he gave his name correctly.

An emetic of Ipecacuanha 20 grains with warm water was given, and the throat tickled with a feather. He vomited a greenish fluid, containing parts of the plant, the vomiting was repeated for two hours, and he gradually improved and fell asleep, and next morning was quite sensible. He stated that on the previous day he was without his usual dose of Bhang (Cannabis Indica,) and having heard that the plant brought by the police might be used instead, he ate two and a half leaves of a specimen which he found growing wild on an old brick kiln. About one hour afterwards he became intoxicated and remembered nothing more.

The plant proved to be the Hyoscyamus Muticus, found growing wild at Bodrika ansah near the Lahore Railway Station. It is distinguished from the ordinary Hyoscyamus Niger by its yellow flowers and leaves with long stalks.

Physalis flexuosa ' *Kakmari.*—A case of poisoning by this common weed occurred in Dera Ghazi Khan in September 1867.

No. 99.—*Case No.* 202.—A child said to be the offspring of a Hindu woman by a Musalman was found dead. There was a slight wound on the scalp, and the stomach and duodenum contained three seeds like those of the datura, but really being the seeds of the Physalis flexuosa probably given for the purpose of poisoning the child.

No. 100.—Another case from Simla in November 1865. Case No. 118, an English girl, aged 7, was suddenly attacked by vomiting and insensibility with convulsions; when seen she was quite unconscious, the pupils widely dilated and insensible to light, continued tetanic spasms of muscles of face and extremities, but the tongue was not bitten, and there was no lockjaw. The face and lips were livid, veins distended. The child died 20 minutes afterwards. On *post mortem* examination the brain and its membranes were congested, and the stomach contained peculiar seeds like datura, but being really the seeds of the Physalis flexuosa, a plant of which grew near the house.

The symptoms differed from those of datura in the absence of delirium and the presence of convulsions, also in the rapid death.

Treatment.—The same as for datura.

Detection is the same as for datura, but the seeds are much smaller and with deep circular pits, the embryo is curved spirally like the capsicum, the cotyledons directed opposite to the radicle.

Hydrocyanic acid has rarely been used in India as a poison, but one of its compounds, the cyanide of potassium was taken at Kurrachee by a European. The symptoms were complete insensibility, pulse almost imperceptible, breathing slow, pupils dilated and rapid death.

The cyanide of potassium is now in common use by photographers and electro-platers, and this salt has actually been made in Lahore by natives so that an accident from this deadly poison might easily occur.

The same poisonous acid is found in bitter almonds, amygdalus communis, variety amara called the "karwa badam," and in the cerasus lauro cerasus, which is said to grow in Afghanistan : it is also stated to be contained in water distilled from the leaves of the common acacia.

Loquat seeds (Eriobotriya javanica) contain sufficient hydrocyanic acid to prove poisonous. A child in France nearly died from eating three or four of them.

A Surgeon at Peshawar prescribed hydrobromic acid for his wife, the *compounder* by mistake sent hydrocyanic acid, and death occurred very rapidly.

Symptoms.—At first salivation with constriction of the throat, nausea and occasionally vomiting, then difficulty of breathing, constriction of chest, giddiness and convulsions, like epilepsy.

The ordinary effects of cyanide of potassium are insensibility always coming on rapidly, with dilated pupils, and almost imperceptible pulse, the respiration is usually slow, and there are often convulsions with foaming at the mouth ; death takes place usually within an hour from the time that the poison is taken.

The respiration is peculiar, the inspiration short, and the expiration prolonged with a long interval before breathing again, so that the patient appears to be on the point of suffocation. The skin is pale or livid, eyes staring, pupils dilated, mouth covered with foam, breath smelling of the poison, the pulse is at first quick and small, afterwards is imperceptible. Involuntary evacuations occur and paralysis with stoppage of respiration and death.

The *post mortem* appearances are those of great congestion of the brain, and spinal chord, also frequently of the lungs. The stomach is sometimes much reddened, but at other times it is quite pale. The blood is dark and fluid.

The odour is best detected in the brain as that does not so soon putrefy as other organs.

Treatment.—The best plan is to pour cold water from a bhisti's mussuck over the head and the back, and to cause the vapour of ammonia to be inhaled by applying smelling salts, &c., to the nose. If any medical officer is present, a stomach pump may be used with advantage. It is seldom possible to administer any antidotes internally as the patient rapidly becomes insensible and cannot swallow. But if he is still conscious, 20 or 30 drops of solution of ammonia should be given internally and if possible mixed with a solution of sulphate of iron "kye," as well as given alone.

A brandy enema may be given or brandy injected under the skin. Artificial respiration should be used and the body kept warm by hot blankets.

DETECTION OF HYDROCYANIC ACID FROM DR. YOUNG'S LECTURES.

This acid is highly volatile and its vapour is extremely poisonous. If its presence is suspected in an organic liquid, the latter should be acidulated with dilute sulphuric acid and distilled, the distillate will contain the acid free from organic impurities and to it the following tests can be applied.

Test A. White test.—Silver nitrate gives a white precipitate of silver cyanide soluble in excess of potassium.

Test B. Blue test.—Add caustic soda to the acid distillate, sodic cyanide is formed, add to this an oxidised solution of ferrous sulphite containing some ferric sulphate, and warm. If the solution is not too alcaline, a precipitate is obtained consisting of hydrate of iron and Prussian blue, next add hydrochloric acid the hydrates of iron are dissolved and a curdy blue black precipitate of Prussian blue remains. If even the slightest trace of Prussic acid has been present in the original solution, a blue colour will be developed on the addition of hydrochloric acid.

Test C. Red or 1st vapour test, Liebig's.—Place the suspected liquid in a small beaker in a ring of a retort stand, acidulate with sulphuric acid and heat gently. In the middle of a white porce-

lain crucible cover large enough to cover the beaker, drop a drop of yellow ammonium sulphide. Invert it over the mouth of the beaker to which a gentle heat must now be applied ; prussic acid if present rises as vapour, and acts on the ammonium sulphide and forms ammonium sulphocyanide ; after three minutes remove the porcelain cover and hold it in the hand and evaporate the drop to dryness gently with a spirit lamp. The yellow colour of the ammonium sulphide disappears while doing so, and the spot becomes colourless ; then add one drop of ferric chloride, the development of a blood red colour indicates the presence of prussic acid.

Test D. 2nd Vapour test or Schonlee's test.—Take a piece of white filtering paper, moisten it with a little tincture of guiacum, and allow it to dry, again moisten it with a weak and almost colourless solution of cupric sulphate, then expose the paper to the vapour of the suspected fluid, applying a gentle heat, if hydrocyanic acid is present, a blue colour will be detected.

Test E. Odour test.—This is important; the odour of the vapour of hydrocyanic acid is very powerful, and resembles that of crushed bitter almonds, or their essential oil. In a *post mortem* examination it is most evident in the brain.

Solanum Nigrum.—Mukoh, urrub al salib. The leaves of this plant common about Lahore, and in England in the spring, where they have been eaten by mistake, and have proved poisonous, giving rise to the following symptoms :—a feeling of sickness followed by vomiting, pain in the belly, and intense thirst, the pupils are dilated with impaired vision, and there is sleep ending occasionally in death. Also headache, giddiness, dimness of vision, delirium, purging and convulsions.

The treatment would be the same as for datura or henbane.

Three children died from eating the berries of this plant.

Solanum dulcamara, another species known to be poisonous in Europe, and to produce similar symptoms is also found in the hills of India.

Tobacco.—Nicotiana tabacum, "tamaku." This substance although very common and extremely powerful, is seldom

employed as a poison, except for infanticide, one or two instances of which are on record, and no doubt very many others have occurred which have not been traced. But several cases have happened in England of death resulting from the use of this drug as a medicine, it is therefore rarely now employed as a remedy, but as is well known is extensively used for smoking, and the extent to which persons may become accustomed to this powerful drug is very remarkable. Only two cases are on record of persons being killed by smoking tobacco. It is still doubtful whether the habitual moderate use of tobacco injures the system, though it is probable at least that it does so, but at first it usually produces nausea, vomiting and great prostration.

Symptoms.—The first symptoms produced by an excessive dose of tobacco are headache, with a feeling of sickness going on to vomiting, attended with great weakness, loss of power in the limbs, and often fainting, the skin is cold and damp, the pulse feeble, the pupils dilated and insensible to light, there is sleepiness or actual stupor and frequently convulsions ending in death.

The smallest fatal dose,—30 grains.

The shortest interval before symptoms,—immediate.

The usual do. do. do., five to ten minutes.

The shortest period of death,—thirty five minutes.

The usual period,—one or two hours.

Post mortem appearances.—Great congestion of the membranes of the brain and dark fluid state of the blood.

Treatment.—Should vomiting not have occurred from the action of the drug, emetics may be used, but they will seldom be required and the mustard and water should be preferred. Frequent draughts of warm water may be given to promote the vomiting, but above all it is necessary to administer stimulants largely, such as brandy and water, or native sharab, about half a chittack every half hour—or, if solution of ammonia can be procured, this may be given in doses of thirty drops every quarter of an hour. Coffee has also been recommended. If the patient is insensible, it is of service to pour cold water on his head, but care

must be taken not to continue doing so if the skin becomes cold, but then to wrap him in dry warm clothes until the natural temperature returns and to administer stimulants if possible.

No. 101.—*Case No.* 44 *of* 1865.—An infant was taken from its mother in the morning, and returned at night but soon died. Portions of tobacco leaves were found in the stomach.

No. 102.—*Case No.* 127 *of* 1867, *Abbottabad.*—A female child of a woman who had left her husband was found dead: the stomach contained a quantity of green substance which proved so to be parts of tobacco leaves: the brain and lungs were congested.

Detection of tobacco.—The suspected substance is digested with water acidulated with sulphuric acid, at a low temperature filtered and agitated first with alcohol, which is distilled off and then with benzine. Afterwards it is rendered alkaline by ammonia and agitated with ether or chloroform as in Stas' process, this is separated and allowed to evaporate spontaneously. It leaves an oily fluid if tobacco was present with an alkaline reaction and a powerful odour, it is soluble in alcohol and ether, and forms a salt with oxalic acid soluble in alcohol. Chlorine colours it red or brown, the product is soluble in alcohol.

ALCOHOL.

Sharab, Rum, Brandy, Gin, &c.

This liquid occasionally produces death when taken in excessive doses. Most frequently it is drank voluntarily in such cases. As its effects may be mistaken for those caused by poisoning with opium or by injury to the head, it is necessary to describe them here, and also cases of drunkenness frequently require treatment even when death is not likely to occur.

Symptoms.—When alcohol is taken in moderate doses its first effect is that of exhilaration. The pulse is quickened, the face and eyes red and animated, and there is a great disposition to talk. If a little more is taken, the speech becomes indistinct and confused—and the movements of limbs are irregular. The pupils are usually dilated. The thoughts become irrational, and a condition of delirium is produced, this is followed by great

tendency to sleep during which the person perspires freely; and on the next day there is a great feeling of depression, langour and weakness with severe headache, and loss of appetite, great thirst and furred tongue. Sometimes vomiting occurs during the attack. The above condition is rarely fatal of itself, but persons suffering from it sometimes fall into water or dangerous places; and thus injure themselves or even produce death from not being able to extricate themselves. If, however, a large quantity of alcohol is taken at one time, the patient generally becomes suddenly quite insensible, sometimes, however, he may be roused partially, the pupils are usually dilated, the breathing slow and laborious, the face pale, and there is a strong smell of alcohol in the breath; convulsions rarely occur excepting in young persons.

The eyes are injected and staring, skin cold, mouth livid, pulse slow and small, respiration slow stertorous and intermittent, sometimes vomiting or involuntary evacuations occur.

Dr. Chevers suggests that many who die after taking alcohol are really choked by food which has been vomited being drawn into their air passages, while they are insensible. Occasionally also the person apparently recovers, but dies afterwards from œdema of the lungs or pneumonia occur.

The action of alcohol in large doses closely resembles that of opium in its symptoms, but it may be distinguished first by the smell of the breath being that of alcohol instead of opium; and secondly, by the pupils being generally dilated in poisoning by alcohol and usually contracted in poisoning by opium. Injuries to the head also produce symptoms similar to the effects of alcohol—and sometimes they occur in persons who are under the influence of this liquid; it is then almost impossible to distinguish which is the cause of the illness, and the only rule is that the head should be shaved and carefully examined for any bruise or cuts, and if any is found, this should be treated according to the ordinary rules of surgery, irrespective of the alcoholic poisoning. Sunstroke often resembles the symptoms produced by alcohol, and not unfrequently complicates cases where some alcohol has

been taken. It differs principally in the skin being intensely hot and dry, while in poisoning by alcohol it is usually moist and warm ; the insensibility is also often more intense, or else if partly sensible, the man although stupefied is not delirious, and if no alcohol is taken there will be of course no smell of it in the breath. But not unfrequently the two causes of injury are combined, thus a man after drinking a quantity of liquor lies down in the sun. Here it is often difficult to determine the exact cause, but the treatment fortunately is the same for both states.

The smallest fatal quantity two and half to five ounces.

The shortest interval before symptoms, five minutes.

The shortest interval before death seventy-five minutes.

The average period before death six to ten hours.

The longest interval six days.

Post mortem appearances.—The lining membrane of the stomach is usually intensley reddened, but sometimes it is quite pale, the smell of alcohol is very distinct as soon as the stomach is open.

The veins about the brain are ordinarily highly congested, and sometimes the smaller veins are broken by the pressure of the blood, which is then poured out forming a small clot.

T h lungs also are often much congested, and the blood dark and fluid.

Treatment.—In poisoning by alcohol emetics should be administered freely. Mustard or salt and warm water may be given, or the throat tickled with a feather, or the stomach pump used if it could be procured. If the patient is insensible, cold water should be poured from a height of about four feet on to his head, but care must be taken not to render his body and feet cold. If they become so, hot clothes or bottles should be applied. If ammonia is procurable, this may be administered in doses of fifteen drops every half hour or oftener. As solution of ammonia has been extensively distributed through the Punjab for the cure of snake bites it can generally be obtained.

The patient should be roused if possible, and artificial respiration used if necessary. Inhalation of nitrite of amyle is said to be useful.

No. 103.—*Case No.* 50 *of* 1870, *from Lahore.*—A man who came to Lahore drank a large quantity of country spirit, lay down to sleep, and was found dead in the morning. Alcohol was detected in the stomach, but no other poison.

No. 104.—*Case No.* 963 *of* 1885, *Rawalpindi.*—An infant showed symptoms of intoxication after partaking of Mellin's food, and on examination alcohol was detected in the food.

No. 105.—*Case No.* 416 *of* 1886, *of Lahore.*—A European loafer who had been drinking heavily was found dead in the Serai in May 1886. The lungs and stomach were intensely congested and alcohol was detected in the stomach.

No. 106.—*Case No.* 1167 *of* 1886, *Dera Ismail Khan.*—A man was found dead, with the stomach full of food and highly congested. Alcohol was found in the contents of the stomach.

Detection of Alcohol.—This is best done by distilling the substance to be examined after adding sodium carbonate. The fluid which comes over should be mixed with potassium carbonate or calcium chloride to retain the water and again distilled. It is best detected by its odour, and its turning a mixture of potassium bichromate and sulphuric acid green, or by adding liquor potassae and iodine, a yellow crystalline precipitate of iodoform with a peculiar odour separates.

Strychnos	Nux vomica	bark,	kuchela-ke-chil.
„	„ „	seeds,	kuchela-ki-bij.
„	Colubrina,		massada.
„	Ignatii,		papita.

Viscum,—the miseltoe, which sometimes grows on the strychnos tree in the hills is said to partake of its poisonous qualities, it is called kuchela-ka-melang. These substances are used for suicide as well as for murder in India, and are occasionally taken by accident in an overdose, as nux vomica is much used by natives for the cure of rheumatism and other diseases.

Nux vomica is rarely used as an intentional poison, as its bitter taste would arouse suspicion, but it is said to be taken as a medicine in some cases. It is occasionally given as an aphrodisiac.

No. 108.—In a case which was brought to the Medical College, Calcutta, in 1860, an old man put five of the seeds into a vessel of water and allowed it to stand all night long, the next morning he drank off the water, about half an hour afterwards he began to feel giddy and unable to stand, and at length he had a fit. About three hours after he was brought to the hospital, not having vomited, and the stomach pump was used ; as soon as the tube of this passed the throat a spasmodic attack was occasioned in which all his limbs became stiff and remained so for about three minutes ; after this ceased, the tube was conveyed into the stomach which was thoroughly cleaned out, and a dose of opium administered. There was no return of the fit, and the next day he was quite well. The above forms a good example of a very mild case of this form of poisoning. Usually when a larger dose has been taken, there is a bitter taste in the mouth followed by a feeling of giddiness coming on about a quarter of an hour after, sometimes with pain in the throat and stomach, and occasionally, but rarely, by vomiting. Afterwards there always occurs at an interval of from 20 minutes to an hour from the time of taking the poison, a feeling of inability to stand or move with sudden stiffness of the body, and twitching of the muscles followed by spasms affecting the whole body, which becomes rigid with the legs stretched out, sometimes the back is bent into the form of an arch resting on the head and heels only, and very frequently the jaw is fixed. This lasts for a space of time from half a minute to five minutes when the patient becomes again able to move ; but seems weak and anxious. Other similar fits recur often with increased severity, the breathing is impeded, and at length the patient dies either suddenly from total arrest of respiration in a fit, or more slowly from exhaustion. There is in general consciousness to the last, sometimes vomiting occurs but not often. Smallest fatal dose, grains 30; the least interval, 5 minutes ; the average interval half an hour; the shortest time of death, 20 minutes ; the average ditto, 2 hours.

Treatment.—Emetics must always be given as soon as possible, if medical aid is at hand the stomach pump may be used.

But its application will produce a spasmodic attack which will impede its introduction. Charcoal has been recommended and may be given with milk, and small doses of opium may prove serviceable as in the case related above. Strong infusion of tea or of catechu may be useful if taken in considerable quantity. And if the weakness is extreme, sharab or solution of Ammonia may be given.

Large and frequent doses of chloral or chloroform should be given or any narcotic available, as opium or Indian-hemp (churus).

If nothing else is available tobacco juice or infusion of tobacco may be used, or if suffocation appears probable tracheotomy should be performed. Nitrite of Amyl inhalations should be used.

Post mortem appearances.—Sometimes the contracted state of the limbs remains for several days after death, but this does not always occur, and it must be remembered that in every corpse rigidity of the limbs does happen at some time, and may be mistaken for the contraction caused by this poison. The stomach is often unchanged in appearance, but sometimes great congestion is seen—and occasionally parts of the seeds may be found on the lining membrane. Usually the brain and lungs are much congested, but the appearances are by no means characteristic of this poison. The spinal chord has also been found to be much congested, or sometimes ecchymosed or softened, but can be seldom examined in India.

Nux vomica seeds are said to be used commonly among poor people instead of spirit or toddy (B. Colaco, *Indian Medical Gazette* 1885, page 202), and occasionally an excess is taken and symptoms of poisoning occur. One man ate 4 seeds, and had marked opisthotonus in two hours time and died, though part was brought away by emetics.

No. 109.—In one case a man was poisoned with these seeds by his wife, who gave him the poison by the advice of a fakir as an aphrodisiac.

No. 110.—*Case No.* 48 *of* 1862, *Umballa.*—A man ate some sugar, soon after he complained of twitchings and spasms in the throat and limbs, he vomited and afterwards recovered, strychnia was detected in the sugar used.

No. 111.—*Case No.* 134 *of* 1869.—Several persons partook of food in which nux vomica seeds had been put, within a minute they complained of a bitter taste in the mouth, twitchings of the throat and giddiness and vomiting occurred, they subsequently suffered from cramps and twitching in the limbs, dimness of sight and weakness, but fell asleep two hours afterwards and then recovered. Nux vomica seeds and strychnia were found in the vomited matter.

No. 112.—*Case No.* 16 *of* 1882, *Punjab Record.*—A Police Mohurrir having powders of strychnia and quinine in the same desk gave five powders of strychnia by mistake for quinine to a Deputy Inspector who died after taking them, the Mohurrir was convicted of criminal negligence.

DETECTION OF STRYCHNIA.

The substance to be examined should be acidified by sulphuric acid and heated, then filtered and evaporated to dryness. The dry residue should be exhausted with boiling alcohol and this solution filtered and the alcohol distilled; the resulting aqueous solution should be shaken with petroleum ether, benzene, chloroform and amyl alcohol in turn, and each fluid separated; these remove impurities, but not the strychnia from its acid solution. This should again be mixed with chloroform, and then ammonia added in excess, the alkaloid strychnia will be set free, and at once be dissolved by the chloroform which should be evaporated spontaneously to dryness, the residue should be tested as follows:

Tests 1.—It is alkaline and intensely bitter in the smallest quantity.

2.—Sulphuric acid gives no colour alone, but

3.—If a small crystal of potassium bi-chromate is pushed through the mixture of sulphuric acid

and strychnia, it developes a beautiful but transient violet or purple colour.

4.—Similar colours are produced with potassium ferridcyanide, potassium permanganate, peroxide of lead or of manganese.

5.—Letheby's galvanic test.—Place the mixture of sulphuric acid and strychnia on a piece of platinum foil, connected with the positive pole of a battery, touch the mixture with the negative pole, and pass the current through it, a permanent violet colour forms.

6.—The physiological test consists in administering strychnia to a frog by applying the solution to the skin or injecting it beneath it. Tetanus is soon produced.

Dr. Ringer in the *Indian Medical Gazette* for 1870, p. 103, has shown that the Langur monkey can take as much as ten grains of strychnia without any ill-effect, but the common Bhundar, (Innus rhesus) is readily poisoned by it.

CANNABIS INDICA.

Various preparations of this substance are used as narcotics, but they rarely proved fatal alone. They are—Churrus, a resinous exudation ; Bang or Subji, the larger leaves ; Ganjah, the dried herb ; Majun, a confection made with Bang, sugar, ghee, &c.

The effects in moderate doses are described by Dr. O'Shaughnessy as being similar to those of alcohol, causing persons to talk freely and sometimes deliriously, and occasionally to fall into a peculiar state called catalepsy in which they are perfectly insensible, but have the power of maintaining their limbs in whatever position these may be placed by other persons, while they remain quite unconscious. Occasionally also a peculiar kind of insanity is produced in which the patient has

a great tendency to laugh and to rub the feet of others—and to make extravagant boasting of his power, wealth, &c. This is usually followed by sleep and return to the natural state.

Occasionally murderous assaults are practised by persons under the influence of Indian hemp (see *Indian Medical Gazette*, 1885, p. 220.)

No. 113.—Reported by Dr. B. Connell, case No. 108 of 1868, Dera Ghazi Khan. A man swallowed some drug and became insensible in two hours and vomited, seven hours afterwards he was brought to hospital in a confused state of mind, unable to stand or walk but easily roused by talking, but soon relapsing into a semi-comatose state; vomiting was produced, and the man recovered. Leaves of cannabis sativa were found in the vomited matter.

In a case at Umritsur in 1871 a sweetmeat was given to a man who became insensible after eating it, but recovered. The sweetmeat was found to contain majun a preparation of cannabis sativa.

No. 114.—At Umritsur in 1870, three persons became insensible after eating some bread prepared by the male prisoners in which some churus, a preparation of cannabis sativa was found, and he might have put churus into the bread by mistake. All recovered.

No. 115.—Dr. Penny at Delhi, in 1871, reports that on examining the body of a male Hindu he found 6 tolahs of pounded leaves of cannabis sativa.

No. 116.—In 1871, the Civil Surgeon, Umritsur, found a substance resembling Majun in a sweatmeat which caused intoxication in a man who was then robbed. The substance caused stupor in a dog.

No. 117.—Poisoning by Majun, (Indian hemp) reported by Dr. Cullen in the *Indian Medical Gazette* for 1868, p. 131. A Hindu woman and her daughter were brought to the hospital at Hoshungabad, both delirious from eating sweetmeats six hours previously. On admission the mother had dilated pupils, sensible to light, pulse feeble (90), she talked incoherently, could not stand

nor grasp anything, she vomited, and then fell asleep, and afterwards recovered.

The daughter was more affected, nearly comatose, with pupils dilated, and insensible to light, pulse 120 a minute, surface cold and breathing rather stertorous. Emetics of Sulphate of zinc were given and afterwards stimulants, she ceased to be insensible but talked incoherently, and then recovered. Majun is said to be made by boiling leaves of Cannabis indica in milk. The leaves were found in the vomited matter of both women.

Treatment.—Should a case of poisoning by this substance occur the treatment would be the same as in poisoning by opium. Emetics should be administered and cold water poured on the head.

Detection of the leaves of Indian hemp, Cannabis sativa.—The smallest fragment of these leaves may be detected by the microscopic examination of the hairs with which the leaves are covered. These hairs arise from a short base which is at right angles to the surface of the leaf but the greater part of the hair is again bent at right angles, in such a way as to lie parallel to the surface of the leaf, and have its point directed to the apex of the leaf. These hairs are unicellular, and all lie parallel to one another and close together. The hairs are thicker and stronger on the upper surface of the leaf and on the veins of the lower surface.

TERMINALIA BELLERICA.

Bahera, Belleric Myrobolam.

This is the fruit of a tree grown in the Punjab, and which is commonly sold in the bazaar.

No. 118.—A case of poisoning was recorded by C. Raddock in the Indian Annals for 1855, in which a boy aged seven, ate 30 of the kernels of this fruit; he afterwards fell asleep, and could not be awakened on the next morning, but appeared perfectly insensible with a warm skin, imperceptible pulse and pupils unchanged in size. The stomach pump was used, and he gradually improved, and was able to talk about 10 A.M., but he did not quite recover till the next night.

Two other boys ate a smaller quantity of the kernels, they suffered from headache and vomiting, but did not become insensible. These cases would prove that this drug besides its astringent properties also possesses a narcotic action, and as it is sometimes added to spirit in bazars in conjunction with the Chebalic myrobalam harar Terminalia Chebula and the embelic "Anola," Phyllanthus emblica, under the name of triphulla, so that it is possible that an accident might occur from the use of spirit so drugged.

The treatment would be the same as for poisoning by datura.

No. 119.—*Case No.* 11 *of* 1867 *of Pind Dadun Khan.*—Two men ate a curry containing seeds of the Bahera, they were attacked by vomiting and purging, cramps and cold extremities, one died, the other became insensible but recovered. Bahera seeds were found in the curry.

Gloriosa Superba.—Kurriari-ka-jer, Harrianah or Hurinah. The symptoms caused by this are little known, nor is the root often obtainable in the bazaars of Lahore, but it is said to be common in Oude. It is described by Lindlay as being a virulent acrid poison.

Dr. Warden in the *Indian Medical Gazette*, 1880, p. 253, gives details of cases some of which have appeared not to be caused by this poison.

No. 120.—Gloriosa Superba poisoning, reported by Hem Chunder Buttacharji in the *Indian Medical Gazette*, for 1872, p. 153. A woman ate some of the powdered root mixed with sweetmeats, within half an hour there were violent vomiting and severe pain in the stomach, spasms and contraction of the body, death occurred in four hours.

On *post mortem* examination the brain and its membranes were congested with extravasation of blood on the dura mater. The stomach was of a deep red colour and its mucus membrane inflamed, the liver and kidneys were congested, and the spleen like a pulpy mass of blood, the intestines were very much congested also,

Cocculus Indicus—*Kakmari, Heuber or Nitermala.*—The seeds are poisonous to all animals; they produce pain in the stomach, nausea, vomiting, tetanic convulsion, and insensibility, and sometimes delirium. They are used occasionally to poison fish, but these are generally unfit for food afterwards. Two cases of poisoning by this substance have occurred in Europe, in these there was violent pain in the abdomen with vomiting and purging, fever and delirium, the patients sunk from exhaustion.

Treatment.—Emetics or the use of the stomach pump and mucilaginous drinks.

Detection.—It contains picrotoxine a neutral non-nitrogenous substance separated like strychnine, but which is coloured bright yellow by sulphuric acid, and on addition of bichromate of potash purple.

On *post mortem* examination there was found inflammation of the lining membrane of the abdomen, and great congestion of the brain.

Nerium Odorum—Oleander.

Kunair Dafter—Gundira, Kurrubi.

The root of this plant is very poisonous so that it is a term of abuse to tell another person to eat it, and even the flowers are said to have produced death, the bark and leaves also have similar properties.

In Europe the symptoms caused by it have been as follows, great restlessness, a wildness and prominence of the eyes, dilated pupils, giddiness, slight convulsions, pain in the abdomen, vomiting and insensibility, in some cases death has occurred, but at present very little is known concerning the symptoms in India.

Treatment.—Emetics should always be given early, mustard and water being the most available. No antidote is known for this poison as its active principle has not yet been discovered, but the administration of tea, coffee, and stimulants has been recommended.

No. 121.—Dr. Chevers relates a case in which a man ate some kunair root with the intention of committing suicide, he vomited shortly afterwards and then became senseless with a very

slow pulse ; emetics were given which rendered him sensible for a time, but he afterwards again became unconscious and though the next morning he appeared somewhat better, yet two hours afterwards he died suddenly after making some exertion.

The principal *post mortem* appearances seen in animals have been great venous congestion especially of the stomach and intestines.

In experiments made by Orfila with this drug on dogs it was found that they always vomited, generally suffered from extreme weakness with convulsions and insensibility, and died after a short interval. The stomach was not usually found inflamed, but the lungs and brain were congested. It is stated by Ainslee that from the poisonous character of the root it is sometimes called the Haymaraca or hare-killer.

No. 122.—*Case No.* 15 *of* 1864, *Dharmsala.*—A man was attacked by vomiting and subsequently died, his wife confessed that she had given him Gundera leaves ; the stomach was not inflamed, but it contained leaves of the Nerium odorum, but both lungs and kidneys were inflamed.

No. 123.—*Indian Medical Gazette,* 1877, p. 319.—Dr. Murray states that a fakir in Agram recommended a dhobi to drink an infusion of two chittacks (4 ounces) of kunair root (Nerium odorum) to cure a guinea worm, soon after he was seized with vomiting and cramps, and in three hours he became insensible and cold, clammy sweats appeared, and rigid fingers. Purgatives were given. He lived for 5 days but died after removal from the dispensary.

No. 124.—Dwarka Nath Mookerjee in the *Indian Medical Gazette* for 1886, p. 258, reports a case of a Hindu who took about 48 grains of the bark of white kunair Nerium odorum for syphilis, half an hour afterwards he felt giddy, had to lie down and then had convulsions, the trunk and limbs became rigid and hands flexed with profuse perspiration. afterwards the jaws became clenched.

When seen five hours afterwards the jaws were firmly closed, trunk and limbs rigid, pulse feeble and slow—30 per minute. Emetics and purgatives were given and he gradually recovered.

DETECTION OF OLEANDER LEAVES.

The leaves can be easily recognised by the peculiar arrangement of their stomata on the under surface instead of being scattered all over the leaf, they are collected in small circular depressions or pits in the epidermis, these pits are full of unicellular hairs which project from the pits and form a fringe round the openings of the stomata.

Chemically it can be detected by exhausting the suspected substance with alcohol, then evaporating to dryness, and re-dissolving in water. To this solution acetate of lead is added which precipitates tannic acid and impurities, and then ammonia, which throws down Nerine or Oleander digitaline which can only be recognised by the physiological test of applying it to frogs when it causes irregular action, slowness, and at length stoppage of the hearts beats, thus producing death. This occurs more rapidly after hypodermic injection of the solution.

Calotropis *gigantea and procera.* Akk or Akund, Madar. In large doses, *i.e.*, grains xv. to xx. Pereira states that it produces full vomiting with much nausea, and in some cases purging. A case occurred in 1855 at Jounpore, N. A., N.-W. P., vol. 7, p. 133, in which a man named Lulloo murdered his own infant daughter according to the old custom of his tribe when unable to afford a suitable dowry, by pouring the milk of the Madar plant down its throat, from which it died. This is stated to have been a common mode of procedure formerly, especially among the Rajpoot tribes in the Allahabad district till it was stopped by the (late) Sir R. Montgomery.

The treatment in such a case would be to encourage vomiting by copious draughts of warm water, aad to give stimulants if weakness occurred. Castor oil is said to be very useful.

No. 125.—*Mudar juice, Jullundhar in* 1869.—The milk or gum of Mudar Calotropis poison was administered to an infant who vomited and was purged and died in 14 hours.

No. 126.—*Poisoning by Mudar Juice Calotropis procera.*—From Chief Court Reports No. 231 of 1879.

A woman deserted her husband, but returned in three years' time with an illegitimate child, she was so much reviled by the people of the place, that she endeavoured to poison herself by drinking Mudar juice, but this brought on violent vomiting and she recovered ; she then gave the juice as she afterwards confessed to the child who died. No poison could be detected, but she was sentenced to 7 years' imprisonment.

No test has yet been discovered for this poison.

ABRUS PRECATORIUS (safaid Gunch or rutti.) The white seeds of this climbing leguminous plant are by some supposed to be poisonous, and it is said that three are a mortal dose, but if swallowed whole they are without effect. But it is also stated that they are eaten in Egypt as an article of food though considered rather indigestible, but this is extensively used in sui or subcutaneous poisoning described in the next chapter.

No. 127.—A native Christian swallowed the powder of 40 seeds of the Abrus precatoruis by the advice of a hakim for a pain in the stomach, in two hours he suffered from purging and vomiting, and the next day he was collapsed, so weak that he could not speak though sensible, but there was no purging but vomiting and suppression of urine. Stimulants were given and he recovered.

ON A NEW MODE OF POISONING.

A new mode of poisoning has been used in some parts of the Punjab, principally for the destruction of cattle, but in a few cases for that of human beings also. This consists in the introduction of a poisonous solid, usually ratti seeds (Abrus precatorius), often mixed with arsenious acid, croton seeds or some other irritant, into the subcutaneous cellular tissue, in the form of a small hard conical solid called a "sui" made up into a thin needle-like shape, about 1 inch long and $\frac{1}{20}$th of an inch in diameter at its broadest part but gradually tapering to a very fine point like a needle. This pointed solid is fixed in a stick hollowed out at its end, and then driven through the skin of the being to be injured by a sudden thrust, while immediately afterwards the point is broken off

by a lateral movement of the stick and this end remains fixed under the skin.

At the time when the wound is inflicted, a slight pain as from a puncture or bite is felt, and a small quantity of blood oozes from the puncture, which can be seen if the part is closely examined, but very little further alteration occurs for several hours, excepting a burning pain in the part; after this time the injured part becomes hot, red, and inflamed, and swells very much; the swelling often closes or obscures the puncture. The swelling increases and gradually affects the surrounding tissues to a considerable distance from the wound; great irritative fever is produced, and sometimes an abcess is formed at the injured part, or occasionally in other places. The swelling and fever continue to increase, and at last in four or five days the sufferer dies, if the proper treatment is not used.

Treatment.—This is very simple; the punctured wound should be enlarged, and the foreign body in it removed; afterwards hot poultices should be applied to promote free suppuration, and the ordinary treatment for diffused cellular inflammation used. Mild purgatives at first, castor oil, hrind ka tel, or infusion of senna (sunna makki ka joshandah) should be given, afterwards preparations of iron, especially sulphate of iron (hira kasis) in doses of 1 or 2 rattis (2 to 4 grains) three times daily.

If there is much fever, salines may also be used as nitre "shora" salammoniac naushadar, &c., or if European medicines are available the tincture of sesquichloride of iron in doses of 20 to 30 minims, with Liquor ammonia acetatis 4 drachms every four hours will prove very useful. If there is much pain, opium should be given freely, and if the patient's strength fails, stimulants should be frequently administered as rum, brandy or native sharab. If the swelling continues to extend, the skin should be covered with a solution of nitrate of silver, or incisions made at different parts, and any foreign body found should be removed and examined carefully.

Examination of the needles.—These needles are generally white or whitish brown solids, about ½ an inch long, and $\frac{1}{20}$th of

an inch in diameter at their broadest end ; they are circular on section, and gradually taper to a fine point. They are very hard, but brittle.

When examined under the microscope they present a number of small cells evidently of vegetable tissue ; these cells have very thick walls and closely resemble the cells of the hard seeds of the "ratti" (Abrus precatorius), having processes of protoplasm penetrating the walls, of which the needles are commonly said to be made. The other substances found in these needles vary in different cases, in some arsenious acid is found, in other cases croton seeds or castor seeds, and in some mudar juice is said to exist, but this can scarcely be detected by any known test. Arsenic can be found by Reinsch's test, using pure copper foil, but only a minute quantity is present. The oily substances may be separated by acting on the crushed needle with ether, then filtering and evaporating the ether at ordinary temperatures, when the oil will be left if present as a yellowish liquid, which stains paper and irritates the skin, or mucous membrane of the lip.

This mode of poisoning is said to be mistaken for snake bites in some cases, and there is no doubt that the puncture and the pain produced resemble to some extent the bite of a snake ; however, in these cases there is only one puncture made while in snake bites, two or more wounds are often inflicted. But the subsequent symptoms entirely differ; in snake bites the ill-effects come on rapidly and soon destroy life, the patient is faint or insensible, while the wound rapidly swells up and blackens, and in particular death usually occurs in 6 or 10 hours after the bite, and almost always on the first day if the patient does not recover. While in the mode of poisoning above described of the symptoms are much slower, and death does not occur for three or four days, while either an abscess forms in the part, or suppuration occurs from the wound.

This mode of poisoning has not, as far as I can ascertain, been described in any work on Toxicology, though many persons had made experiments in which poisons have been inserted into wounds of the cellular tissue or skin.

Referring to these, Dr. Christison in his Treatise on Poisons, 4th Edition, p. 584, states :—

" When the poison on the other hand was applied to a recent wound of the leg, the animal commonly whined more or less, great languor soon followed, and death took place on the first or second day, without convulsions, or any other symptom of note. It was seldom that any morbid appearance could then be discovered in the bowels. But in every distance active inflammation was found in the wound extending up the limb, and even on to the trunk. Every part affected was gorged with blood and serum, and an eschar was found. The appearances in short were precisely those of diffused inflammation of the cellular tissue, when it proves fatal in the early stage."

Orfila also, in his Traité de Toxicologie, relates several experiments with gamboge colocynth helebore, and other acrid poisons, which were inserted into wounds, in these cases death occurred and the principal changes found after death were great inflammation of the injured part, but no alteration in the digestive organs.

But these irritants were employed in large doses, thus 20 grains of veratrum produced death in 7 hours, but 2 drachms of black helebore (Heleborus niger) did not cause death till 5 days after it was sprinkled over a wound, 2 drachms of powdered colocynth produced death in 36 hours, and 2 drachms and 48 grains of Gamboge introduced into a wound did not cause death till after 24 hours. These quantities, however, were much greater than could ever be introduced by means of poisoned needles, which must therefore prove fatal in some other way.

In " sui " poisoning it would appear that the seeds always employed, the Abrus precatorius, have some great and peculiar effect on the wounded being ; many efforts have been made to find some poisonous alkaloid in these seeds, but without any success. The effects of the seeds were then attributed to microscopic organisms called bacteria, but this was also disproved. Dr. Warden in the *Indian Medical Gazette* for 1884, p. 235, states that the poisonous principle is a nitrogenous substance called

abrine, strongly resembling the albumen found in snake poisoning, like which it produces great depression, drowsiness, fall of temperature and hœmorrhage, but unlike snake poisoning it never produces death in less than 24 hours.

Abrine apparently interferes with the production of the red corpuscles, and thus probably preparations of iron would prove the best antidotes with turpentine to prevent hœmorrhage.

In treating "sui" poisoning a free and immediate incision of all the structures round the wound should be made; the application of caustics is especially of no avail, but if any fragment of a "sui" is found, it should be carefully picked out and examined to see if the point is on it, if not, a further search for this should be made, as if any of the poison remains in the flesh its fatal effects may be produced when the poisonous material dissolves and is absorbed.

In the following case a man was poisoned by the method above described.

No. 128.—A mullah was suspected of improper conduct with a female pupil, whose father he determined to kill, and therefore prepared a "sui" or needle-like substance of ratti seeds, Abrus precatorius, mixed mudar juice, the milk of the Calotropis procera. He carried this in his pugri for several days till he met the father of the girl, with whom he had a violent quarrel, in which he struck the solid into the back of the girl's father.

The mullah was seized by three of the bystanders to whom he confessed what he had done; they saw a distinct puncture in the skin and something dark like a black stick in the wound, which they failed to extract. The man complained of a burning pain on the next day and the wound opened, and a white discharge came out, and on the third day, blood was seen with thick discharge, on the fourth day the man died. The wound was said to have enlarged before death to the size of the thumb and to be discharging blood. The Civil Surgeon on *post mortem* examination could not find the wound, but the body was then much putrefied. The mullah, however, was sentenced to be hanged.

This case was proved by the symptoms, and the confession of the culprit, as nothing was found after death.

No. 129.—Cases of sui poisoning in men, 1882 by Dr. Warden in *Indian Medical Gazette*, p. 289. In 1871 a man was murdered by a sutang or "sui" being driven into his side. Another man was wounded by a sui while asleep and died of lockjaw; a third man was wounded with a sui, but escaped death by the affected part being excised. This man's cousin also died from the effect of a sui being driven into his chest.

Case from the Bengal Police Report for December 1880:

No. 130.—A case occurred at Bankipore in which a wound was inflicted about ¾ths of an inch deep into the skin and muscles of the right chest, the wound appears to have been incised and two small hard black substances extracted; but the patient died of tetanus.

No. 131.—Dr. Center in his report for 1873 gives a full case of sui poisoning:—

A man when sleeping was awakened by two blows on the neck and saw his assailant retreating. Two substances a little larger than a barley corn were found in the bed. On returning from work he complained of pain in the neck, and two punctures were seen, and a small solid similar to those in the bed was picked out of one wound. He was taken to Rawalpindi and examined by Dr. Ince, who stated that there was a swelling in the right side of the neck with two small punctures about 2 inches apart. He was sensible, but suffering from severe pain in the neck, difficulty in swallowing and high fever. The swelling and pain in the neck rapidly increased; erysipelas supervened and he died three days after being stabbed.

On *post mortem* examination there was much swelling of the neck and right side of the chest, and the skin had a livid appearance. On cutting into the swelling, much blood was found effused and the products of inflammation. The right lung was much inflamed, and adherent with bands of lymph. The other organs were healthy, but the spleen was enlarged.

The three black substances were examined by Dr. Center and recognised as parts of "sui." Microscopically they resembled ratti seeds, and when inserted below the skin of a dog, the animal died in 50 hours, and on *post mortem* examination, diffused cellular inflammation extending from the puncture along part of one side of the body was found. Part of another sui was injected with water below the skin of the thigh of a full grown cat, and it caused death in less than 24 hours, though only ·7 of a grain was used. On *post mortem* examination rigor mortis was well marked, and the pupils were dilated; there was slight congestion of the subcutaneous tissues and muscles for some distance round the puncture.

Both pleuræ contained bloody serum more on the right side; the whole of the right lung was of a claret colour from intense congestion, but the left lung was normal. Both sides of the heart were dilated with blood, coagulated on the right side. The peritoneum contained bloody serum and the intestines were congested in patches and contained bloody mucus at the congested parts. The kidneys were congested.

From these experiments it appears that freshly pounded seeds injected proved fatal in 24 hours without much inflammation, while after the insertion of a "sui" death did not occur till 48 to 56 hours, and inflammatory action was very distinct; this shows that the "suis" contain a poison which readily destroys life when in fine division so as to be more quickly absorbed.

Microscopical examination of the seed of Abrus precatorius from Dr. Warden's description in the *Indian Medical Gazette* for 1882, p. 287, *et. seq.*:—

"The greater part of the seed is made up of the thick cotyledons composed of large cells with extremely thick walls and granular protoplasm including numerous oil globules (but no starch). The most remarkable structural feature consists of numerous perforations penetrating the entire thickness of the cell wall, and forming a system of canals occupied by processes of the protoplasm of the cell, this forming a continuous system of channels and cavities occupied by a more or less continuously rami-

fied mass of protoplasm. The integument or testa is cartilaginous, with on the outside a layer of thick walled columnar cells arranged in a radiant manner and containing the bright scarlet or white colour, each cell is dilated at its free end into a number of cuneate segments surrounding a pore leading into the interior of the cell in many cases, so that on the surface they form rosettes with a central pore.

Next is a third stratum of small cells with thick walls and irregular sinuous outline. Next a thick stratum of large thin walled cells ; 4 a thin stratum of small thin walled cells ; 5 a stratum of elongated thin walled cells; 6 a stratum of thick cells two or three layers deep ; 7 a single row of minute thin walled cells of more or less cubical structure. Next is the tegument or inner covering consisting of a stratum of thick walled cells with dense yellow granular contents and a stratum of thickened cells with no trace of cavities.

The weight of each seed varied from 1·75 to 1·97 grains; it is usually considered to be 2 grains or a rutti exactly but is really rather less than this.

No. 131.—*Case of cattle poisoning by "Sui" insertion, Kasur, December 4th,* 1868.—The Assistant Commissioner forwards a specimen of a poison which is said to be largely used to poison cattle. It was stated to be inserted under the skin by means of a pointed stick and to cause the body to swell. A small quantity of the substance was found in the body of a dead bullock and a large amount on the person of the accused. The substance when examined was found to contain many large thick walled cells, resembling those of the Abrus precatorius ratti and also human hairs chopped small, but no other poison was detected.

No. 132.—Another case was sent from the Civil Surgeon of Gurdaspur, dated December 3rd, 1868.—At the request of the Assistant Commissioner he forwarded a small conical solid said to contain poison and to be used for destroying cattle by being forcibly thrust into the foot of a cow, belonging to another person just where the fleshy part joins the hoof, but this was discovered

almost immediately and the foreign substance was extracted. No ill-effects followed, but the substance was sent for analysis.

The substance was examined, both chemically and microscopically, and thick walled cells resembling those of the Abrus precatorius seeds were found (Report No. 350 of December 17 1868), but no other poison was detected. This is one of the earliest instances of the microscope being used to detect the seeds of Abrus precatorius or ratti.

No. 133.—*Gujranwála, May* 6, 1869.—The Civil Surgeon forwarded a stick, about 26 inches long, and ½ an inch wide, having some black glutinous substance covering about 2 inches of the smaller pointed end. It was stated by the District Superintendent of Police that the stick was to destroy cattle by inflicting wounds on them with it.

It was carefully examined and an acrid vegetable oil resembling Croton oil was found on the stick.

This case differs from the others in as much as a conical solid was not employed, but a smooth wooden stick coated with an acrid vegetable preparation. Similar sticks are said to be used in other cases, by thrusting them into the sexual organs of courses, but in these cases the wound itself may cause death, though some irritant is usually added.

No. 134.—*Umballa, Case No.* 207, *dated May* 31*st*, 1869.—The District Superintendent of Police of Umballa forwarded two conical solids, which he called pills, for examination, and stated that these pills were used to destroy cattle. They were forced into the beast's body with the instrument sent. This consisted of a piece of stick about 10 inches long, having a hollow receptacle at one end, in which the thickest part of the conical solid could be enclosed. The solids themselves contained a small amount of arsenious acid which was detected by chemical examination, and the same thick walled cells were seen as in other cases which were probably those of the ratti, Abrus precatorius. This is an important case, as it exemplifies the use of arsenic in this mode of poisoning.

No. 135.—*Lahore, October* 20, 1869.—The Civil Surgeon forwarded two nails or rather conical solids which were supposed to be poisoned "suis." These were found to be composed of vegetable cellular tissue, resembling closely the cells of the seeds of the Abrus precatorius or ratti and also the Croton tiglium or jumalgota seeds as shown by the oil contained in some of them.

No. 136.—*Jullundur, February* 26, 1860, *case No.* 19.—The Civil Surgeon forwarded, for examination, a substance found on the person of a sweeper, which is said to be used to destroy cattle by putting it into a wound or cut.

The substance was a conical solid, which contained cells resembling those of the seeds of the Abrus precatorius, suffaid ratti, and of the Croton tiglium or jamalgota seeds.

No. 137.—*Rawalpindi, May* 14, 1870.—The Civil Surgeon forwarded a conical solid which was said to have been used to destroy cattle; in this solid, the seeds of the Abrus precatorius were detected by the microscopical appearances of the cells, but no arsenious and nor any other poison was found in them.

No. 138.—*Jullundur, February* 26, 1871.—The Civil Surgeon forwarded a conical solid said to be used to destroy cattle by introducing it under the skin. This was found to contain portions of the seeds of the Abrus precatorius and of the Croton tiglium jumalgota on microscopical examination.

The above cases show that this mode of destroying cattle is widely known in the Punjab, and is employed in many different districts, while it is also shown that in some cases at least, the same procedure has been employed to destroy human beings.

It is most probable that this mode of poisoning will never prove a common crime since its effects are produced very slowly, and death does not occur for many days, but it is necessary that Surgeons should be on their guard and not confound such cases with snake bites which they somewhat resemble.

ON CATTLE POISONING.

Cattle are generally poisoned in the Punjab, for their hides, which it is the custom to consider the perquisite of the low castes, who skin the dead animals and bury them, and who then sell the hide to the agents of tanners, or skin merchants. Sometimes, however, the cattle are poisoned from revenge or spite.

It is generally believed that the poisoning is instigated, and the means perhaps supplied by the agents of the tanners, especially as one of the substances most used for poisoning, white arsenic, is also employed in preparing skins; and the hides of animals which have died rapidly from poisoning, when in good health, are much more valuable for the purpose of tanning than the skins of those which have succumbed to a lingering disease among the herds of those races who do not kill cattle. Besides which the poisoner is usually able to pick out the best animal in the herd for killing, while disease more often affects the inferior ones with skins of less value.

The only way to prevent the injury which is done by the poisoning of cattle would be, for proprietors to insist that the hides of such animals as die suddenly or under suspicious circumstances be cut into slips before burial, or otherwise disposing of their bodies.

This was done in an English Army marching through a district, where cattle poisoning occurred commonly, and the mortality among the transport cattle rapidly diminished after this precaution was taken.

Dr. Center in the annual report of the Chemical Examiner for 1879 writes as follows:—"As with human poisoning the methods commonly used to poison cattle are restricted—two are most ordinarily employed, *viz.*, arsenical poisoning by the mouth and subcutaneous poisoning by 'suis' or needles.

"In arsenical poisoning, white arsenic is usually employed, mixed with dough, and made into a ball wrapped round with leaves of grass or of some cereal plant."

It might be added that the dough is often formed into the shape of a maize cobb roughly, and that yellow sulphuret of arsenic is often used so as to imitate the yellow color of the Indian corn more closely.

Almost an equally common way is to bore a hole into the centre of a head of Indian corn, fill it up with arsenic and close the opening with dough. The arsenic is also occasionally inserted into a turnip, or other tuberous root that cattle will eat. Yellow arsenic was employed in about one-tenth of the cases examined.

The hides of cattle killed by arsenic are considered better than the ordinary ones, perhaps this is a refinement in the trade, but it would probably be the case, because the poison diffused through the skin is antiseptic, and would probably make the hide keep better. It also acts especially on the skin during life, and is used to improve the coats of animals as a medicine. This might perhaps partly account for the more frequent use of arsenic and the neglect of aconite, which seems to be rarely employed in the Punjab for cattle poisoning.

The chief reason for the more general use of arsenic is however that the Chamars or Mehturs who receive the skins as a reward for burying the animals are the purveyors for the leather workers who use arsenic in their trade.

The skins also of poisoned animals will usually be better than those which die of disease or old age, as the poisoner would probably choose the best looking animal to kill, whether he does so from ill-will to the owner, or simply to obtain the skin to sell.

In some instances other poisons are used, as aconite root or nux vomica seeds or croton seeds, but arsenic usually is employed in four out of five cases.

Pounded glass or chopped human hairs are sometimes found in balls of dough, but these would probably be quite harmless to cattle whose stomachs often contain hair and pebbles.

Symptoms.—When arsenic is given to cattle in large quantity by the mouth, the animal soon becomes weak and drowsy, it

foams at the mouth, and presents symptoms of gastro-enteritis with severe colicy pains, high temperature, quick pulse and usually diarrhœa, the motions often contain blood, but vomiting does not occur, gradually collapse and death take place.

2. "*Sui*" *poisoning—subcutaneous introduction of poison.*—This is the next most common mode of poisoning animals; it consists in introducing under the skin usually in the neck of flank of the animal, of one or more conical bodies called "suis" or needles, made of the pounded seeds of the "rutti," (Abrus precatorius) sometimes mixed with Arsenic, Croton seeds, Aconite root, or Mudar juice (Calotropis), but very often without any admixture. The vegetable albumen or "abrine" contained in the seed appears to act as a ferment on the blood as well as a local irritant and to cause death in two to four days.

Dr. Center states in his annual report :—The "suis" are kept by the poisoner wrapped up in cotton in a hollow reed. When about to be used one is fixed in a cavity at the end of the reed or of a hollow stick, and is sometimes secured by dough. It is then struck forcibly into the skin or the more easily penetrable parts about the rectum or mouth. From the marks on portions of the hides sent for examination more than one blow may be required to effect penetration, as several marks have been seen on buffaloes' skin where complete penetration had not taken place, but when penetration occurs from a quarter to half an inch of the solid "sui" breaks off and remains in the wound.

Sometimes an iron needle or cobblers' awl is used to make the puncture and then the "sui" introduced. After being poisoned in this way the animal appears distressed, it limps in moving if the sui has been inserted near a limb, and often the place where the sui is can be felt under the skin as a small hard lump till it softens. The spot also is easily recognised by the animal shrinking with pain when it is pressed, but there is no discharge from it. In the interval before it has softened and become active the animal may be saved if a free incision is made into the skin, and the wound thoroughly scraped and washed out so as to remove every trace of the sui. If any part of the sui is

seen it should be carefully separated and examined to see if it contains the point, otherwise a further search should be made in the wound.

In one instance this operation was performed six hours after the insertion of the sui, and the animal recovered, the wound ending as an inflamed suppurating sore.

If this is not done the swelling increases, the animal becomes languid, lies down, and ceases to eat, sometimes diarrhœa occurs; and a bloody fluid exudes from the rectum, it is feverish with hot skin and quick pulse, and at length dies from exhaustion.

Dr. Center in his report for 1880 states that "when a police officer goes to examine a poisoned animal he should first carefully look for punctures in the skin. In the case of buffaloes these are readily made out on account of the sparseness of the hairs, but in cows it is more difficult, the skin should be thoroughly washed and every part examined from the outside first, then the skin should be shaved, when the punctures will be more easily seen, especially as the skin around will appear red and inflamed, and a reddish watery liquid will ooze out of the tissue below. If any white or dark solid body is seen, this should be carefully separated and sent for examination.

There is no chemical test known for the Abrus seeds, but the microscopic appearance of the cells is peculiar, they have very thick walls through which processes of the protoplasm pass from the interior of one cell to that of the next one.

Sometimes arsenic can be detected in the "sui" or needle by Reinsch's test already described, or croton seeds by washing the solids with ether, and allowing this to separate spontaneously, if croton seeds are present an oil is left, which irritates the skin and purges small animals.

Another mode of poisoning which is more rarely used is to make an incision into the skin, and insert a lump of white arsenic, this sets up violent inflammation which soon causes death.

Other methods are to place a poisonous paste on the point of a stick about one foot and a half long, and then to push this through one of the openings of the body, as the rectum, vagina

or more rarely the mouth. The stick is often notched so as to retain the paste better.

Croton seed paste is often used for this purpose. Rutti seeds, Abrus precatorius, and aconite roots are also used and sometimes arsenic is mixed with the other ingredients. If the stick is thrust up the rectum or the vagina it may kill by setting up peritonitis, or if it is thrust into the throat through the mouth, it may destroy life by injuring or causing inflammation of the lungs, and thus producing suffocation, but even when none of these ill-effects are produced, it may still kill more slowly by the absorption of the poison and its subsequent effects.

In other cases cotton wool saturated with mudar juice, the milky fluid from the Calotropis procera is used, this is either put into the vagina or rectum by the fingers or is fastened on a pointed and notched stick and thus thrust into those parts.

Hence if a police officer should not find any evidence of "sui" poisoning in a dead animal, he should cause the mouth, rectum and vagina to be carefully examined, and any substance found in them should be carefully packed up and sent in for examination. Dr. Center also suggests that the field or place where the animal was attacked should be searched carefully for a pointed or notched stick, as the poisoner would generally throw it away, after using it, and as traces of the posion could generally be detected on the stick, this may prove an important piece of evidence.

If no poison is found either beneath the skin or in the openings of the body, the stomach should be opened, and about one pound of its contents, and one pound of the tissues of the stomach, also one pound weight of the liver should be put up in separate clean vessels and properly sealed. The liver should always be in a distinct vessel, but the stomach tissues and its contents may be sent in the same vessel if necessary.

Arsenic is generally in very large quantity in the contents of the stomach if there is any present. The use of the liver being sent is to prevent fictitious cases, in which arsenic has

been added to the substances sent after death, for in an animal really poisoned by arsenic, the liver contains absorbed arsenic diffused through its tissues, so that even if arsenic were added to the vessel containing the liver after death, it would be easily detected by seeing the white powder, or by washing the pieces of liver and then examining them. In genuine cases the liver would show the presence of arsenic on chemical examination though none could be detected by sight.

The contents of the stomach may be mixed with water in an earthen vessel and allowed to stand, the lighter portions of food will float away while the sand, seeds and all the arsenic will sink to the bottom.

The crime of cattle poisoning appears to be very common in the Punjab as is shown by the following table :—

Year.	Cases for examination.	Poison detected.
1878	243	123
1879	273	154
1880	279	148
1881	338	169
1882	352	178
1883	362	191
1884	428	203
1885	468	258
1886	568	361
Total ...	3,311	1,685

From which it would appear that the practice is decidedly increasing. It is probable that many cases referred for examination when the poison was not detected were instances of "sui" poison, in which the needle was not found.

Dr. Center remarks in his annual report :—

"Like the thags, the cattle poisoners are a criminal and predatory class following their pursuits with nefarious ingenuity, and by hereditary methods. Ruin is suddenly brought on many an honest and hard working farmer merely for the paltry value of a few hides by these pests of society. If any means could be devised by Government for suppressing or diminishing this kind of crime as has been done with the thags, it would be a great boon to the agricultural community."

No. 139.—*Case No.* 984 *of* 1886, *Rawalpindi.*—A cow refused food, foam came from the mouth, and diarrhœa occurred, arsenic was found in the stomach.

No. 140.—*Case No.* 602 *of* 1879, *Gurdaspur.*—A cow began to suffer from swelling of the belly, foam and water coming from the mouth in large quantities and it died in 12 hours after the appearance of symptoms ; arsenic was found in the stomach.

No. 141.—*Case No.* 162 *of* 1885.—A bull dog, five years old, was suddenly attacked with shivering and giddiness, the body became stiff, blood oozed out of his nose and mouth, and in half an hour he died. Aconite was detected in the contents of the stomach.

No. 142.—*Case No.* 1029 *of* 1886, *of Gujrat.*—A mare refused food, foamed at the mouth, was restless and trembled, and at length died, arsenic was found in the stomach.

No. 143.—*Case No.* 893 *of* 1883, *Kohat.*—A buffalo was attacked by shivering and unable to stand, water flowed from its mouth and it passed blood in its motion, and died in 24 hours. Powdered sulphide of arsenic was found in the evacuations.

ON CRIMINAL ABORTION BY MEANS OF POISONS.

Criminal abortion is sometimes effected by mechanical means only, as by severe pressure on the abdomen, or by thrusting pointed instruments into the sexual organs, but these proceedings more frequently kill the woman than bring on abortion.

Those persons, therefore, who are accustomed to procure miscarriages usually employ some form of poison to effect their purpose. Either the poison may be given by the mouth only, or it may be inserted into the sexual organs, and thirdly both of these proceedings may be used at once.

By the mouth deadly poisons as arsenic or corrosive sublimate are sometimes used, but these often destroy the patient without effecting their purpose.

At other times powerful purgatives are employed such as croton seeds, (jumalgota), aloes (subr) Ipomoea hederacea (kaladanna), calomel (ruskapur), gamboge, (ossareh rewand), and other irritants, but these frequently cause inflammation of the bowels and yet fail to produce abortion.

A third sort of remedies are more or less stimulating drugs which are believed to bring on abortion, but which most frequently fail ; such are assafœtida (hing), alum (phitkari) garlic (lausun), carrot seed, daucus carota, (gajur ki bij), cardamums (elachi) Elettaria cardamonum.

The other mode of bringing on abortion is much more likely to produce its required effect, but at the same time it usually sets up more or less inflammation of the womb and sometimes of the peritoneum and thus causes death. It is also more likely to be detected if a *post mortem* examination is held, as the finding of any foreign body in the sexual organs will naturally lead to a suspicion of criminal attempts and a thorough investigation.

Several different methods are employed to this part, sometimes a stick of some poisonous plant is inserted with more or less force into the sexual organs, thus combining the mechanical action with the poisoning one ; the Plumbago rosea (lal chitra) already described is the plant usually employed, but akk (Calotropis procera) is sometimes used. This generally causes a wound as well as great local inflammation, and often peritonitis. In other cases a stick is inserted but is surrounded at its point with cotton wool so as not to wound the parts, this is called a butti or candle, but the cotton wool is mixed with some poisonous substance. In some cases white or yellow arsenic was used

in others sulphate of copper with a vegetable paste very often of croton seeds pounded was employed, or the juice of the mudar (Calotropis procera), or the pulp of rutti seeds (Abrus precatorius) or capsicum (lal mirch). Strong alkalies are also used as sujji mutti, impure carbonate of soda; joukhar, impure carbonate of potash; and chunam, lime. Another way is to make the substance into a soft paste, mix it with cotton wool or cut hairs, form it into a solid, and push it up the sexual parts with the finger, in these cases no mechanical injury is produced, but the substance used is so irritating as to excite violent inflammation. The solids are generally about 1½ inches long and half an inch thick.

An interesting paper on criminal abortion in the Punjab was written by Assistant Surgeon Dulip Singh, in the *Indian Medical Gazette* for 1885.

He states that abortion is produced in various ways :—

1*st*.—Croton seeds or aloes given internally produces violent vomiting, and purging, and if this is accompanied with brisk friction over the abdomen, abortion will often result.

2*ndly*.—A batti is applied to the mouth of the womb. This is composed of a thin stick the end of which is wrapped round with cotton wool dipped first in spirit sharab, and then in a powder composed of impure carbonate of soda, sujji mutti, quick lime, chunam, aloes (elwa), nutmeg (jaephul). Additional layers of cotton soaked in spirit and the same powders, are wound round it, till it is just large enough to enter the mouth of the womb, where it is left for a quarter of an hour, then taken out and another layer applied, and this is continued until the mouth of the womb is so dilated that two or three fingers can be inserted, the membranes are then pierced and abortion usually occurs, especially if friction over the abdomen is also continued.

This method, however, often causes severe inflammation of the womb and upper part of the passages.

3*rdly*.—A batti is made in the same way with cotton and spirit, and dipped into a powder composed as follows :—

Ghagar bel or Bindal Luffa echinata, 60 grains jamalgota, croton seeds, 4 grains; joukhar, carbonate of potash, 60 grains; aloes, elwa, 60 grains.

Three battis are inserted in turns each for one quarter of an hour, the others being left in. This causes the mouth of the uterus to dilate sufficiently to allow the membranes being pierced and then abortion occurs. In some cases decoction of sahungena bark (Moringa pterygosperma) a powerful irritant is given internally at the same time.

4*thly*.—A decoction of bindal fruit (Luffa echinata) made by taking 180 grains of the fruit, and boiling it in one point of water, then drinking the liquid, it causes nausea, vomiting great depression and dilation of the mouth of the womb and sometimes abortion results.

5*thly*.—A piece of white arsenic is fixed at the end of a batti and applied against the mouth of the womb, this causes severe inflammation and often an ulcer of the womb or upper part of the passage and sometimes abortion results.

6*thly*.—The oil of bhiladur (Semecarpus anacardium,) is applied to the mouth of the womb on a plug of cotton wool, this causes intense inflammation and often expulsion of the contents of the uterus.

The last two methods are very dangerous and are seldom used.

To show the frequency of abortion in the Punjab, Dulip Singh states that he was aware of 15 cases which occurred in two months among a population of 4,000 persons. This is at the rate of 2·2 per cent. per annum.

In many cases a parcel of drugs is sent by the police, and the Surgeon is asked to state if any of them could cause abortion. Any drug in the form of a stick even a twig of chiretta could do so mechanically by being thrust into the mouth of the womb, but it is better to ascertain the drugs if possible, and to describe the properties of each one.

No. 144.—*Case No.* 449 *of* 1884, *Jullundur*.—Seven seeds of bhilawar (Semecarpus anacardium) were found in a packet con-

nected with a case in which a young woman was reported to have died from the effects of an attempt to produce abortion, a large quantity of pipal leaves (Ficus religiosa) smeared with a paste was found in the rectum which was much inflamed, the vagina and uterus were congested and the latter was twice the natural size but empty.

In case No. 694 of 1886, sulphate of copper was found on a stick. This is liable to cause abortion, if it is thrust into the mouth of the womb.

HINDUSTANI INDEX.

LIST OF POISONS.

English Name.	Page.	Native Name.	Scientific Name.	Locality.	Action.	Remarks.
Sulphuric acid ...	137	Gandak ka tezab ...	Acid sulphuric ...	Punjab ...	Corrosive acrid ...	Rarely used.
Nitric acid	139	Shora ka tezab ...	Acid nitric	Do. ...	Do. do. ...	Never known to be used.
Hydrochloric acid ...	139	Namuk ka tezab ...	Acid hydrochloric.	Do. ...	Do. do. ...	Do. do.
Soda carbonate ...	145	Sajji matti ...	Sodii carbonas ...	Do. ...	Do. do. ...	Do. do.
Potash do. ...	*ib.*	Jaokhar	Potassii carbonas	Do. ...	Do. do. ...	Do. do.
Lime caustic ...	*ib.*	Chuna	Calx	Do. ...	Do. do. ...	Do. do.
Sulphate of iron ...		Kye or heera kasis	Iron sulphate ...	Do. ...	Simple acrid ...	Do. do.
Oxide of zinc ...	154	Missi	Zinci oxydum ...	Do. ...	Do. do. ...	Do. do.
Sulphate of zinc ...	*ib.*	Safaid tutia ...	Zinci sulphas ...	Do. ...	Do. do. ...	Do. do.
Suphate of copper ...	148	Nila tutia nil bang	Cupri sulphas ...	Do. ...	Do. do. ...	Sometimes used.
Acetate of copper ...	*ib.*	Zangal, zangar pitar	Cupri Acetas ...	Do. ...	Do. do. ...	Do. do.
Sulphuret of antimony	155	Surma	Antimonii tersulphuretum	Do. ...	Do. do. ...	Do. do.
Oxide of lead ...	151	Murda sung ...	Plumbi oxidum ...	Do. ...	Acrid	Do. do.
Minium	*ib.*	Sandur	Plumbi peroxidum	Do. ...	Do. ...	Do. do.
Carbonate of Lead	*ib.*	Saffaida	Plumbi carbonas ...	Do. ...	Do. ...	Do. do.
Arsenious acid white	78	Sankhia safaid ...	Acid arseniosum ...	Do. ...	Acrid poison ...	Very often used for murder.
or		Sumbulkar	Do. do.	Do. ...	Do. do. ...	Do. do.
White arsenic ...	*ib.*	Sumbul safaid ...	Do. do.	Do. ...	Do. do. ...	Do. do.
Do. do. vitreous	*ib.*	Sankhi bilouri ...	Do. do.	Do. ...	Do. do. ...	Do. do.
Do. mixed with sulphuret of arsenic	*ib.*	Sankhia pili ...	Do. do.	Do. ...	Do. do. ...	Do. do.

LIST OF POISONS—CONTINUED.

English Name.	Page.	Native Name.	Scientific Name.	Locality.	Action.	Remarks.
Orpiment with arsenious acid ...	78	Sankhia gulabi ...	Acid Arseniosum ...	Punjab ...	Acrid poison ...	Very often used.
Realgar with suboxide of arsenic and arsenious acid ...	*ib.*	Sankhia kala ...	Do. do.	Do. ...	Do. do.	Do. do.
Realgar	*ib.*	Mansil	Arsenici bisulphuretum	Do. ...	Do. do.	Do. do.
Do.	*ib.*	Hartal surrakh ...	Do. do.	Do. ...	Do. do.	Do. do.
Do. fused ...	*ib.*	Naushadar kani ...	Do. do.	Do. ...	Do. do.	Do. do.
Orpiment	*ib.*	Hartal pili, harryawal	Arsenici tersulphuretum	Do. ...	Corrosive poison ...	Do. do.
Cinnabar	144	Shingraf	Hydrargyri sulphuretum	Do ...	Do. do.	Seldom used.
Corrosive sublimate	141	Dar chikna ...	Hydrargyri chloridum	Do. ...	Do. do.	Do. do.
Do. with calomel	*ib.*	Ruskapur	Do. do.	Do. ...	Do. do.	Do. do.

LIST OF POISONS—CONTINUED.

Scientific Name.	Page.	Native Name.	Locality.	Action.	Remarks.
Aconitum ferox ..	130	Mitha bish ...	Hill districts ...	Acronarcotic ...	Often used as a poison.
Do. luridum ...	*ib.*	Mitha zahar.			
Do. napellus ...	*ib.*	Mishri bish.			
	ib.	Ate singya.			
	ib.	Mitha talia.			
Clematis gouriana ...	...	Long talia and zahar mohra ...	Dera Doon ...	Acrid purgative ...	Rarely used.
Ranunculus lœtus ...	...	.....	.....	Acrid.	
Do. sceleratus	...	Suraj thal ...	Punjab ...	Do.	
Do. arvensis ...	...	.....	.....	Do. ...	Produces blisters and ulcers.
Actæa spicata ...	...	.....	Hills ...	Do.	
Anamirta cocculus ...	184	Kakmari ...	.....	Acronarcotic ...	Causes vomiting, purging, delirium and death, also is used to destroy fish.
Enryale ferox ...	...	Phul makhana ...	Bengal ...	Acrid ...	Seeds edible after roasting.
Opium ...	119	Afiun, afim ...	Do. ...	Narcotic ...	Often used for suicide.
Meconopsis aculeata ...	...	Sher khaskhas ...	Hills ...	Do.	Roots are poisonous.
Argemone mexicana ...	...	Shialkanta ...	Punjab ...	Do.	A doubtful poison, but called Fico del Inferno said to be powerfully narcotic and emetic.

LIST OF POISONS—CONTINUED.

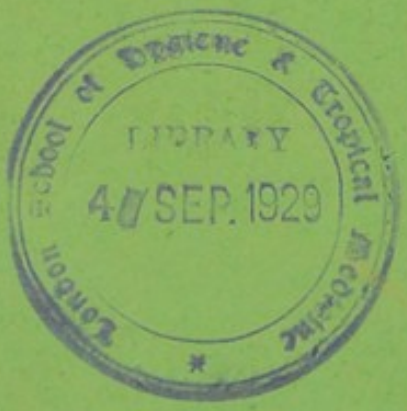
Scientific Name.	Page.	Native Name.	Locality.	Action.	Remarks.
Melia Azedarach ...	...	Drek ...	Punjab ...	Narcotic ...	Berries have caused insensibility and death to an English girl.
Do. do. ...	...	Bukain.			
Melia Azedirachta ...	...	Nim ...	Do. ...	Do. ...	Berries said to be poisonous.
Walsura piscidia ...	...	Wallarsi ...	Hills ...	Do. ...	Intoxicates and poisons fish.
Vitis carnosa ...	...	Kasar ...	Do. ...	Acrid,	
Vitis setosa ...	...	Harmal ...	Decan ...	Do.	
Peganum Harmala ...	...	Ispand ...	Punjab ...	Narcotic ...	Seeds reported to be narcotic supposed to be the "mole" of the Greeks.
Zanthoxylon alatum ...	...	Tezbal ...	.....	Do. ...	Seeds used to intoxicate fish.
Garcinia morella ...	160	Osara rewand ...	.....	Acrid, purgative.	
Do. do. ...	*ib*	Dampel ...	.....	Do.	
Lathyrus Aphaca ...	...	Gorakalan ...	Punjab	Narcotic ...	Ripe seeds are poisonous.
Lathyrus sativus ...	...	Kisari dal ...	Do. ...	Do. ...	Constant use produces paralysis.
Phaseolus radiatus ...	...	Mung ...	Do.		
Mucuna pruriens ...	...	Kiwach ...	Do. ...	Acrid ...	Hairs of pod produce great irritation; relieved by oil.
Indigofera tinctoria ...	...	Nil ...	Punjab ...	Do.	
Cœsalpinia pulcherrima ...	...	Gul turai ...	Do. ...	Do.	
Abrus precatorious ...	...	Rutti ...	Do. ...	Do.	

Adenanthera pavonina...	...	Rakat chandan	...	Punjab	...	...	...	Seeds said to be poisonous.
Prunus undulata ...	...	...		Hills	...	Acrid		
Prunus Amygdalus ...	169	Karwa badam	...	Cabul	...	Do.		Peach kernels contain prussic acid.
Prunus Persica ...	...	Aru	...	Punjab	...	Do.		
Ammania baccifera ...	...	Dadmari	...		...	Acrid	...	Also the flowers.
Lagerstroema reginae ...	...	Jarul	...	Punjab	...	...		Produces painful blisters.
Bryonia laciniosa ...	...	...			...	...		
Luffa amara ...	160	Kurila toria	...		...	Acrid purgative	...	Seeds said to be poisonous.
Citrullus Colocynthis ...	160	Henzil	...	Punjab	...	Do. do.	...	
Cucumis trigonus ..	160	Indrayan bishlombah	...		...	Do. do.		
Cucumis indicus ...	160	Karaila	...		...	Do. do.		
Cucumis sativus ...	160	Pahari indrain	...	Hills	...	Do. do.	...	Seeds are poisonous.
Tricosanthes palmata...	160	Makal indrain	...		...	Do. do.	...	Produces symptoms resembling cholera.
Lagenaria vulgaris ...	160	Belaschora tombi	...		...	Do. do.		
Luffa echinata ...	160	Bindal	...	Punjab	...	Do. do.	...	Used for abortion.
Momordica dioica ...	160	Gagarvail	...	Do.	...	Do. do.	...	Do. do.
Anacardium occidentale	...	Hidgeli badam	...	Bengal	...	Acrid	...	The stalk of the fruit is excessively irritant.
Semecarpus Anacardium	...	Balataka billawar or Bhila.						
Premna ovalifolia, ...	...	Ayar	...	Do.	...	Do.	...	Juice of fruit very irritant.
Rhododendron arboreum	...	Bourang bras	...	Hills	...	Narcotic	...	Said to destroy goats.
Terminalia belerica ...	182	Bahera	...	Do.	...	Do.		
Randia dumetorum ...	...	Mainphall	...	Punjab	...	Do.	...	Intoxicates fish.
Salvadora persica ...	...	Pelu	...	Do.	...	Acrid	...	The root is said to raise blisters.
Anagalis arvensis cœrulea.	...	Joukmora	...	Do.				
Convolvolus scammonium.	...	Sakmonia	...	Do.	...	Do.		
Solanum nigrum ...	171	Urrab-ul-salib	...	Do.	...	Acrid purgative.		
Solanum dulcamara. ...	...	...		Do.	...	Narcotic.	...	

LIST OF POISONS—CONCLUDED.

Scientific Name.	Page.	Native Name.	Locality.	Action.	Remarks.
Solanum Melongena ...	...	Brinjal Baingan ...	Punjab ...	Acrid ...	The oil from the seed is said to be poisonous.
Withania somnifera ...	168	Usgand or kagnang ...	Do. ...	Acronarcotic.	
Hyoscyamus niger ...	166	Khorasani ajwain ...	Do. ...	Do. ...	Very often employed as a poison.
Datura alba ...	104	Safaid dhatura ...	Do. ...	Do.	
Datura fastuosa ...	104	Kala dhatura Jouz,-marzil ...	Do. ...	Do. ...	Ditto.
Nicotiana tabacum ...	171	Tamaku ...	Do. ...	Sedature.	
Nerium odorum ...	184	Kanair ...	Do. ...	Acronarcotic ...	Used for infanticide.
Cerbera manghas ...	...	Zard Kanaug ...	Do. ...	Acrid ...	Seeds very poisonous.
Thevetia neriifolia ...	...	...	Do. ...	Do. ...	Juice very acrid and piosonous.
Strychnos Nux vomica	176	Kuchela ...	Do. ...	Acronarcotic	All parts of the tree poisonous.
Strychnos colubrina ...	176	Kuchela luta massada ...	Do.	Do. ...	Ditto.
Strychnos Ignatii ...	176	Papeeta ...	Do.	Do. ...	Ditto.
Calotropis gigantea ...	186	Ak Akand ...	Do.	Acrid.	
Calotropis procera ...	...	or Madar ...	Do.	Do.	
Euphorbia officinarun...	160	Afarbiun ...	Do.	Acrid purgative.	Milk violently emetic.
Euphorbia tirucalli ...	160	Lanka sij, or tohur ...	Do.		
Euphorbia ligularia ...	160	Mansa sij ...	Do.		
Euphorbia thymifolia...	160		Do.		
Euphorbia verrucosa ...	160	Kachnoo ...	Do.		
Croton tiglium ...	160	Jamalgota ...	Do. ...	Acrid purgative. ...	Seeds innoxious when roasted.
Ricinus palma christi	160	Harend arend bedanjeer	Hills ...	Do. do. ...	
Buxus nenpalensis ...	...	Shamshado ...	Do. ...		Leaves poisonous to camels.

Excœcaria agallocha	...	...	Ugooro	...	Deccan	...	Acrid	...	Juice said to destroy the eyes.
Excœcaria canettia	...	...	Canetti	...	Do.		Do.		
Clutia collina	...	...	Kadishen	...	Bengal	...	Do.		Seeds very poisonous.
Jatropha curcas	...	160	Bagberenda	...	Punjab.				
Jatropha manihot	...	...				...	Narcotic	...	Contains a volatile poison.
Tragia involucrata	...	...	Bichatti	...		...	Acrid	...	Hairs irritate violently.
Sapium indicum	...	...	Harrua	...		...	Do.	...	Juice of fruit very poisonous.
Hura crepitans	...	...							
Andrachne trifolia	...	...							
Fluggia virosa	...	...	Dhani			...		...	Said to destroy fish.
Securidaca obovata	...	...		...		...		...	Do. do.
Daphne mucronata	...	165	Gandhira	...	Hills	...	Acrid.		
Plumbago rosea	...	164	Lal Chitra	...		...	Do.		
Ficus toxicaria	...	...		...		...	Acrid.		
Urtica heterophylla	...	...	Bechu Awa	...	Hills	...	Do.	...	Hairs are very irritant.
Cannabis indica	...	180	Ganjah bang subji	...	Punjab	...	Narcotic.		
Cinnamonum camphora		165	Cafur	...	South of India	...	Do.		
Taxus baccata	...	...	Brahmi or Abhal	...	Hills	...	Acrid	...	Leaves very poisonous.
Juniperus communis	...	...	Huber	...		...		...	Fruits.
Crinum asiaticum	...	...	Sakhdarshan	...		...	Do.	...	A violent emetic.
Gloriosa superba	...	183	Kurriari kajer Nunangleah Nangleah Nig Lourrie...			...	Do.	...	Produces great pain and salivation.
Colocasia esculenta	...	...		...		...		...	
Arum orixense	...	...	Gat kaul gat kuchu	...		...	Do.		
Colchicum illyrium	...	...	Seorinjebar	...		...	Acrid purgative.		
Narcissus tazetta	...	...	Nargis	...	Punjab.				
Mylabris chicorei	...	157	Telini makhi	...	Do.		Acrid.		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