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PART I.

ORIGINAL COMMUNICATIONS.

ART. III.—*Medico-Legal Notes from India.*^a By W. J. BUCHANAN, B.A., M.B., B.Ch., D.P.H., M.D. (Univ. Dubl.); Major, Indian Medical Service; Inspector-General of Prisons in Bengal; and Editor, *Indian Medical Gazette*.

It is proposed in the present thesis to collect some notes from my own observations and inquiries on certain aspects of Medical Jurisprudence in India, which differ in many respects from European, and especially English, experience.

Medical Jurisprudence is a subject of great importance to the European who practices medicine in India. If he is a member of the Indian Medical Service he will probably soon go into "civil employ," and when thus employed he will be the chief medical authority for a very large district, with a population of not less than a million inhabitants, and will be called to give his opinion on all questions of legal medicine that may arise in this large area.

The first subject which I propose here to deal with is POISONING—a very common crime in the east.

There is probably no country in the world that affords anything like the amount of toxicological material that India

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does. Every year more than ten thousand cases are referred to the Government analysts, or chemical examiners, as these officers are called in India ; and in one Calcutta hospital not less than 150 cases of poisoning are treated every year.

Broadly speaking, the poisons most employed for criminal purposes are arsenic, chiefly for homicide ; opium chiefly for suicide and for infanticide ; and datura for drugging with a view to robbery.

ARSENIC.

There are many reasons why arsenic should be the chief poison used for homicide. In the first place, it is easy to be obtained everywhere ; secondly, the acute effects of the poison so much resemble an attack of Asiatic cholera that suspicion is less likely to arise, especially if it happens that cholera is at all prevalent in the neighbourhood at the time.

All forms of arsenic may be used for criminal purposes, but white arsenic, arsenious oxide (As_2O_3), is the form most commonly employed. Its colour is white ; it has but little taste when mixed with sugar, sweetmeats, bread or rice, in which vehicles it is usually administered. As has been said white arsenic is easily purchased in every bazaar, as it has its legitimate uses—*e.g.*, as a preservative of wooden posts against the attacks of white ants, in the making of leather, and in curing hides and skins. It is also largely used for destroying vermin, and as a medicine in the treatment of syphilis, and in the more chronic forms of the malarial fevers. White arsenic is called in the vernacular languages *somul*, or *sumbhul*, and is largely imported from Hong Kong and Persia. On account of the difficulties of enforcement, and in spite of considerable medical agitation in its favour, there is no Sale of Poisons Act in many parts of India, and indeed the experience of the Province of Bombay, where such an Act was passed nearly forty years ago, is scarcely in favour of such legislation. By this Act the sale of arsenic was regulated by licence, and it was ordered that when pounded white arsenic was sold to the public it must be coloured with soot, indigo, or Prussian blue. That this enactment has been totally inoperative from a medico-legal point of view is clear from the statement of the Bombay Government Analyst that in the past 32 years there has not been met a single case in which

the arsenic used for criminal purposes has been found coloured as directed in the Act.

The sulphides of arsenic are less commonly used for the purposes of crime in India. Moreover, as they are commonly impure—in the state purchasable in the bazaar—and mixed with arsenious oxide, it is probable that their poisonous activity is largely due to the latter substance. It is curious, however, that a very large proportion of the cases in which the sulphides have been used have been suicidal.

In other instances arsenious oxide has been found mixed with the sulphates of iron and copper and with the sulphide of mercury.

An important point in the criminal use of this drug, and one which often leads to its detection, is the enormous dose usually administered by the criminal to the victim. I have examined a case in which the quantity was so great that I was able to scrape it off the walls of the stomach with a knife.

The motives which lead to the use of arsenic for homicidal purposes are chiefly revenge and sexual passion. Husband poisoning is commonly effected by the use of arsenic, and in some cases it is certain that the powerful drug was only used as a “love philtre,” or as an aphrodisiac, and with no criminal intent. It is also an undoubted fact that in times of cholera prevalence arsenic is used as a means of getting rid of an enemy or a rival, in the many disputes which the land hunger of the Bengal peasant leads him to be involved.

Arsenic is less commonly used as an abortifacient, and usually with disastrous results. In such cases it is commonly applied as a mass of paste to the os uteri.

This poison is but seldom used for suicidal purposes, but when so used it is in very large doses; as much as 300 grains have been recovered in such a case, though, as said above, the mere fact of such enormous doses by no means negatives a homicidal view of the case.

Of course cases of accidental poisoning are not infrequent, owing to the common use of arsenic in the arts, and as a medicine. I have had charge of one case in which a native gentleman who suffered much from fever, and could or would not take quinine, accidentally poisoned himself by the continued use of Fowler's solution in very large doses (40 to 80 minims).

Arsenic is also very largely used as a cattle poison, though in the United Provinces its place is taken by the use of dried snake poison inserted under the skin on a piece of sharpened iron or wood.

The symptoms of acute arsenic poisoning are too well known to be here treated of, but certain noteworthy facts are to be mentioned.

In a few rare cases where death from shock has resulted the stomach has shown no signs of congestion, and has even contained a large quantity of solid and liquid food, vomiting not having occurred.

In a series of 191 cases of arsenic poisoning four have been recorded in which death took place within two hours, and in none of these was any appearance of congestion found. It would appear as if more than two hours contact were required to produce the appearances of congestion.

Endocardial lividity is also an appearance to be looked for. In a series of 33 Indian cases in which it was searched for it was present in eight.

As the decomposition of dead bodies is very rapid in a hot climate it is important to remember that the so-called anti-septic action of arsenic is confined only to the stomach and intestines, the other organs being as subject to rapid decomposition as in death from any other cause. Perforation of the stomach in arsenic poisoning is rare, but a few cases have been recorded in India.

The so-called "nervous cases" of arsenic poisoning are of importance, as they may be very misleading. As an example may be quoted the case of a man, aged thirty, to whom a poisonous dose of arsenic was given. He suffered from giddiness, faintness, coma, and suffused conjunctivæ, but had no vomiting or diarrhœa, and he recovered. In another case all the usual symptoms of irritant poisoning were present except purging.

The onset of symptoms in acute arsenic poisoning is generally rapid—that is, within half an hour. Bedford, an authority on Indian poisoning, gives 18 to 20 hours as the average period which elapses before death, and states that 82 per cent. of cases die within the first 24 hours. On the other hand, cases are on record in which symptoms did not appear for 14 hours, and death in the case of a single lethal dose has been delayed

as long as nine days ; and even longer intervals are recorded in European text-books. In some such cases the delay has been explained by the fulness of the stomach, by sleep, or by intoxication by opium or alcohol. In one case, however, recently recorded in India, where all such causes could be eliminated, no symptoms appeared for 14 hours. Another remarkable case is worthy of mention, where, in Bombay, a Parsee recovered after having swallowed "two masses" of arsenious oxide ; he passed, per rectum, no less than 105 grains. His only symptoms were slight diarrhœa, drowsiness and headache.

Arsenic is not invariably fatal, even when taken in poisonous doses, for in eight consecutive cases treated at the Calcutta Medical College Hospital five recovered.

OPIUM.

The next most important poison in Indian Medical Jurisprudence is opium. It is calculated that 40 per cent. of Indian poisonings are due to this drug.

Opium is but seldom used for homicide or for robbing ; it is the drug *par excellence* for suicide. It is also not rarely used for infanticide, and is not uncommonly the cause of the accidental deaths of children from its too frequent use to keep babies quiet. Moreover, owing to the frequency of the opium-eating habit, the drug may easily get into the hands of children with often serious results.

Poisoning by opium is frequently met with in hospital practice. In 193 consecutive cases of poison treated at the Calcutta College Hospital there were no less than 165 due to opium, and of these 42 per cent. died. This high percentage, in spite of a most complete and ever-ready system of treatment, points to the fact that most of them were cases of determined suicide, where large doses were taken late at night, and the victims were found in an advanced state of poisoning in the morning.

In the above 165 cases crude bazaar opium was used, except in one, where the tincture of opium was used. I may note, in passing, that the large experience of the Calcutta Medical College Hospital is not in favour of atropin as an antidote in such cases.

The symptoms of opium poisoning are well known, but it is less recognised that vomiting and diarrhoea are sometimes present; and tetanus and lock-jaw symptoms have been observed in the case of children poisoned with opium, and the occurrence of such might well mislead the medical attendant.

Opium is usually swallowed, but in some parts of India suicide has been attempted by the introduction of opium into the vagina.

It is seldom possible to find out the exact quantity taken. Taylor has recorded a case of fatal issue from four grains, and this is usually regarded as a lethal dose. On the other hand recovery has taken place after even very large doses. A curious case has lately been published where seven grains of opium were taken along with croton oil. The symptoms were entirely those of an excessive dose of the oil, and as severe as if no opium has been taken.

Opium and its preparations are ingredients of a large number of so-called patent and quack remedies, hence poisoning from it may in this way often accidentally occur. One of the most important patent preparations containing opium is chlorodyne, which is so largely used as a domestic remedy in India that a similar preparation has recently become official in the British Pharmacopœia. Owing to the amount of morphin in chlorodyne it is generally assumed that in cases of poisoning the pupils would be contracted. As a matter of fact, however, it has been recently pointed out by Powell, the Police Surgeon of Bombay, that in five recent cases met with by him the pupils were found widely dilated, owing to the not inconsiderable quantity of hydrocyanic acid used in these preparations.

DATURA POISONING.

The use of datura is in a special degree an Indian method of poisoning. The seeds are chiefly used, and are derived from the white and black varieties of the plant (*D. alba* and *fastuosa*), which are everywhere common in India.

The symptoms of datura poisoning are very similar to those of belladonna. It is very seldom used for homicidal purposes; but owing to a widespread belief among the natives that it is merely intoxicating a fatal issue sometimes results from its too liberal use.

Datura is usually given to produce a sufficient degree of insensibility to facilitate robbery and theft. The story told by the victims is almost always the same. It is to the effect that a party of villagers are travelling along a road; towards evening they are met by another party of presumed travellers. One or more of the new arrivals are dressed as Brahmins, or men of high and holy caste. They make themselves agreeable, and before dark the whole party settles down to camp out for the night. One of the robbers proposes that as he is a Brahmin he will do them the honour of cooking for the whole party. The compliment implied is too great to admit of any refusal, and the supposed Brahmin sets about preparing the evening meal of rice and pulses. In cooking he easily manages to add a quantity of *datura* seeds to the mess prepared for his victims. About half an hour after the food has been eaten the symptoms of poisoning appear, and soon result in a state of stupor and coma, during which the victims are helpless, and easily robbed. When they come to their senses a few hours later the robbers are far away, and with them the valuables of the deceived travellers.

In certain cases a decoction of the *datura* seeds is used, on the drinking of which the symptoms come on almost immediately. About 100 seeds are sufficient for even a fatal issue, so that a lesser number will suffice to produce the necessary stupor and delirium. The seeds of *datura* have a strong naked-eye resemblance to *capsicum* seeds, so much used in native cookery, hence the appearance of the poisonous seeds is not noticed.

The medical expert can, however, easily distinguish the *datura* seeds from those of *capsicum*. First, because of the peculiar ear-shaped marking on section, and secondly because a solution of the seed of *datura*, even in an extreme dilution, will dilate the pupil of a rabbit or dog. Bedford has also recently pointed out that the testa of the *datura* seed has a quite peculiar microscopic appearance.

This form of poisoning for robbery has, to an almost complete extent, taken the place of the strangling method of the Indian thugs or road robbers of an older time. *Datura* poisoning is now almost altogether in the hand of professionals, and such are to be found all over India. Quite recently a gang

was discovered at the Howrah Railway Station in Calcutta. They were headed by a native policeman, and they confined their operations to the watching of and following parties of native travellers alighting at lonely out-of-the-way roadside stations.

Other poisons are used in India in very much the same way as they are in other countries, and their use presents no peculiarities deserving of special mention here.

THE COCAÏN HABIT IN INDIA.

It is a suggestive and somewhat remarkable fact that within the last five years the practice of eating cocaïn has become widely prevalent in many parts of India—in fact to such an extent as to necessitate special legal measures for the control of the sale of this useful drug. I have elsewhere published a study of the cocaïn habit as practised among the juvenile criminal classes in Calcutta. The drug is usually taken for its euphoric effects, mixed with the *pan* and *betel*, so commonly used as a masticatory by the natives of India. The cocaïn is usually eaten in the form of the hydrochloride, as used in ophthalmic practice. The dose is generally about one grain, and is repeated as often as the *habitué* is able to buy this expensive drug. It produces a temporary feeling of satisfaction and well-being, but is soon followed by a reaction which calls for a repetition of the drug. Though I have seen individuals who claimed to be in the habit of eating as much as half a drachm a day, yet I am bound to say that in not less than 100 cases where, on admission to prison for some crime, the drug was immediately and certainly stopped the symptoms of abstinence were but slightly marked, and beyond a temporary depression and a hollow feeling in the abdomen there was but little complained of. One distinguishing sign of the cocaïn eater (at least when it is eaten along with lime *pan* and *betel*) is an ebony blackness of the teeth, especially on their posterior aspects. This sign I have not seen mentioned anywhere before I first pointed it out.

The recent introduction of the cocaïn habit suggests the view that if the efforts of the well-meaning opponents of what is called the “opium traffic” were successful a new drug or

narcotic would soon replace the use of opium, with results at least as serious.

The practice of CAMPHOR EATING has recently been reported as not uncommon in some native girls' schools in Calcutta. Giddiness and excitement followed by a deep sleep result from its excessive use.

RUPTURE OF THE SPLEEN.

This is an injury which is comparatively very rare in England, and, consequently, has received but scanty attention from writers on Medical Jurisprudence in the British Isles. The reverse, however, is the case in India, where rupture of the spleen is extremely common, and is constantly appearing in the law courts as the cause of death. In fact so common is it that in the case of the sudden death of a native it might often be safely presumed that the cause was rupture of the spleen. In the majority of those unfortunate cases in which a European is charged with having caused the death of a native by a blow or a kick, it is almost invariably the fact that the spleen was ruptured from a degree of violence which would have had no effect on a healthy person. Indeed, recently, a hostile newspaper went so far as to state that it did not believe in the existence of such an injury as rupture of the spleen—a statement based, I need hardly say, on the most absolute ignorance of the whole subject.

Rupture of the spleen, therefore, is a matter of the very greatest importance to the medical man practising in India, or in any other malarious country.

We have no statistics on a large scale as to the exact degree of the prevalence of enlargement of the spleen among the people of India ; but such as have been compiled go to show its very considerable prevalence. Indeed till recently an enumeration of the proportion of enlarged spleens in any community was used as a test of the malarial endemicity of any locality.

In the European, the books on anatomy tell us, the spleen weighs from 5 to 7 ounces. This is for Europeans whose average weight is usually taken at 150 lb. The average weight of the native of Bengal is, as the result of some 28,000 weighments collected by me, about 110 lb. only ; but in them

I have found the spleen to weigh on the average ten ounces (average of 314 careful weighments). The spleen as found *post mortem*, however, is usually more than this ; the largest I have ever weighed was 64 oz.—that is, weightier than an ordinary enlarged liver. Moreover, many larger spleens than this have been found.

It is obvious, therefore, that a large spongy organ such as a spleen in this condition, taking up much more than its proper place in the abdomen, is peculiarly liable to external injury, which—owing to its friability and the large quantity of contained blood—must almost always be fatal.

In an admirable article recently published, Dr. D. G. Crawford has analysed in a very thorough way a series of 304 cases of ruptured spleen. These 304 cases were all taken from records of *post-mortem* examinations made for medico-legal purposes ; and out of over 9,000 such records examined the number of cases of ruptured spleen amounted to not less than 3 per cent. of the whole. Moreover, out of the total 9,000 cases the spleen is noted as enlarged in no less than 37 per cent. of cases, and in some districts well over 50 per cent. of the spleens are recorded as enlarged. This means that more than one-half of the persons whose bodies come to be examined for the purposes of justice have enlarged spleens.

Following Crawford, we may further discuss this question under several headings :—

Age and Sex.—Examination of statistics shows that there is but little difference in the liability to this injury between men and women ; and as regards age, nearly two-thirds were adults—that is, persons of an age most likely to be engaged in fights and quarrels.

CAUSE OF RUPTURED SPLEEN.

In the 304 cases, omitting 57 in which the cause is recorded as unknown, and a few from miscellaneous causes to be mentioned below, we find 102 due to blows from sticks, 62 due to blows of the fists or from kicks, 22 from falls, chiefly from trees ; 2 from pressure on the body (a familiar form of torture), 23 as part of a murderous assault, and 20 from being run over, or from a heavy weight falling on the body.

The miscellaneous causes recorded are various, but of

importance, as showing what a slight degree of injury may lead to this fatal condition. Among these causes was one from a clod of earth thrown and striking the left side; others from the blow of a shoe, or a wooden stool, or the prod of a cow's horn; others were from being knocked down (not run over) by a horse, the blow of a fall to the ground or the kick of a horse.

The following case may also be quoted:—A European gentleman slipped on the floor of his bathroom and died in a few minutes; at the autopsy the spleen was found to be ruptured and to weigh 19 oz. Even this simple fall caused no less than four lines of rupture.

James has recorded the case of a shepherd boy who, while indulging in horseplay with another youth, fell and died in three hours. The spleen was found to weigh 22 oz., and to be ruptured in two places on the lower surface. In another case a Punjabi boy died after a blow which was ascertained to have been on the right side. The spleen was found enlarged, with a rupture $1\frac{1}{2}$ inches long on the inner surface.

James has also recorded another remarkable case of what he calls "spontaneous rupture" of this organ, in the person of a Punjabi, who, while conducting his own case in a law court fell down suddenly. Not the slightest evidence could be obtained that he struck anything as he fell, but at the autopsy it was found that the spleen was much enlarged, weighing no less than 3 lb. 13 oz., and to be ruptured for six inches along its inner surface.

Such cases are sufficient to show that even the slightest violence is enough to cause rupture of the spleen when that organ is diseased or enlarged.

THE SITE OF RUPTURE.

Of 262 cases where the site of the rupture has been noted, we find that 133 were on the inner surface, 55 on the outer surface, and 116 either on two surfaces or were irregular. Of 304 cases, 225 were single ruptures and 79 were multiple. It appears, therefore, that the inner surface is by far the most commonly ruptured, and it is said that on this aspect the spleen capsule is the thinnest.

In all the above cases the spleen is recorded as more or less

enlarged ; but I have records of 8 cases in which at the autopsy that organ is recorded as not enlarged. In these cases either the injury has been severe or multiple, as in a murderous assault, or after being run over. It is, perhaps, worth noting that in five of these eight cases the stomach is noted as having been found full, and in only one case is it said that the stomach was empty. Crawford, however, who has investigated this point, is of opinion that there can be found no very definite connection between rupture of the spleen and a state of fulness of the stomach.

COMPLICATIONS.

Of course, in cases of great violence it is natural to expect damage to other organs, but an analysis of Crawford's figures shows that in only 32 cases (10 per cent.) was any other organ than the spleen ruptured. In 19 of these 32 the liver was also ruptured.

THE PERIOD OF SURVIVAL AFTER RUPTURE.

This is often a most important legal question. I may quote a few cases bearing on this point. In Russell's *Malaria : its Causes and Effects*, a good case is related, where a man received a severe injury to the spleen and recovered ; but the injury to the spleen was confirmed some years after, when a *post-mortem* examination happened to take place on his body. I have been able to collect only seven cases of survival for considerable periods after undoubted rupture of the spleen, and many years ago I published one such case.

In four cases the victims survived just over 24 hours, in one case for five days, in two cases for four days, in another case for $2\frac{1}{2}$ days, in another a "few days," in another for three days. The longest period of survival that I have been able to find is that of a man admitted to a Calcutta hospital with a rupture of the spleen, and he remained there for seventeen days, and the injury was confirmed *post mortem*.

In some cases the period of survival is passed in unconsciousness, but in others there can be no doubt that the patient may be able to speak, or make a dying declaration, &c.—points often of the greatest legal importance.

The question, too, may arise as to the possibility of a man

with ruptured spleen being able to arise and walk a certain distance. This point is not often noted in recorded cases, but in reading them nothing is often found which makes such impossible; and doubt is set at rest by the following case, published in 1867 by Dr. Hutchinson, in which an old man after having been severely beaten by a bamboo, walked to his home, a distance of about half a mile, and there died almost immediately. The *post-mortem* examination showed that the seventh and eighth ribs on each side had been fractured. The spleen was also ruptured, and also the liver.

It is worth adding that a case has recently been published (*Indian Medical Gazette*, Nov., 1903, p. 417) in which at an autopsy on a sepoy, aged twenty-four, there was found a total congenital absence of the spleen, along with a transposition of all the abdominal and thoracic viscera.

THE RAPID FORMATION OF ADIPOCERE IN WARM CLIMATES.

As regards the formation of adipocere in dead bodies which have lain in damp places, the experience of the medical jurist in India is different from that recorded by European experience.

It is well known that the great authority, Casper, has laid it down that the formation of adipocere is not likely to occur to any great extent in less than three or four months in the case of submerged bodies, and in six months in bodies in moist earth.

This is the opinion which is taught in most European textbooks; but such a view seems to be based only on the experience of cold or temperate climates. Indian experience, on the other hand, is to the effect that saponification, or the formation of adipocere, may take place in a very short time in damp and hot climates, such as that of Bengal is.

Some years ago, Mackenzie, then Police Surgeon of Calcutta, published eight cases, and I have been able to collect two more bearing on this question.

The ten cases are, briefly, as follow:—

1. A body was found in an advanced state of saponification on removal from a tank, where it had lain for “several days.”
2. The body of a groom, exhumed from a damp Mahomedan burial-ground four days and four hours after inter-

ment, was found to be in an advanced state of saponification.

3. A Chinawoman disinterred 76 hours after burial was also found in an advanced state of saponification.

4. A Bengali was drowned in the River Hughli; the body was recovered after three days, and the internal organs were found saponified.

5. The body of a European, two days in the water, was examined, and all the external portions of the body were found to be saponified.

6. The body of a European sailor was recovered from the river eight days and ten hours after drowning. The external parts, the heart, liver and spleen, were found saponified.

7. The body of a sailor recovered from the river on the fifteenth day was found to be in an advanced state of saponification.

8. The body of a European youth was recovered after having been in the river seven days; it was in an advanced state of saponification.

To the above eight cases of Mackenzie I may add two more recent ones:—

9. D. M. Moir's case.—A body was exhumed after having lain in a damp grave, at the depth of three feet, on the side of a lake. The body was so much saponified that Moir was able to completely confirm the previous *post-mortem* examination. The soil in which the grave had been dug was damp, being saturated with the rain of the previous three months' monsoon.

10. The tenth case is recorded by Dr. R. S. Ashe. The body was that of a boy, aged nine, exhumed four days after burial. The skin of the abdomen, chest, and extremities was found to be mottled and waxy looking, and free from offensive odour. Portions were sent to the chemical examiner, Calcutta, who reported that "partial saponification had taken place in the tissues." This opinion was also confirmed by the Professor of Pathology at the Medical College, to whom the specimens were also submitted for opinion.

In view of the above ten cases it is scarcely possible to hold to the European view that a long period of weeks and months is necessary for the formation of adipocere.

THE PERIOD REQUIRED FOR THE DIGESTION OF INDIAN FOODS.

This is a subject on which but few observations or experiments have been recorded. It is, however, easily understood that the presence or absence of food from the stomach of a body found dead may be of legal importance. The following observations of Dr. P. C. Singh, of Patna, have been compiled and published at my request.

It must be premised that the ordinary food of the native of Bengal consists of rice and pulses. It is of considerable bulk—about 24 oz. of cooked rice (8 oz. of dry rice), 12 oz. of cooked pulses, and not less than a pint of water being taken at each meal. It appears that this bulky quantity of food is not so quickly got rid of by the stomach as the more concentrated food of the European. Therefore any opinion given, which is based upon experiments on European foods, is apt to be misleading.

The following observations were made on bodies sent in for medico-legal examination :—

1. A Hindu, aged thirty-five, took food at 8 a.m. He was severely assaulted at ten o'clock (two hours later), and died at 2 p.m. from the effects of ruptured spleen. At the autopsy a large mass of undigested rice and pulse was found in the stomach. Death had taken place six hours after the last meal; but it is possible that the process of digestion may have been interrupted by the shock and hæmorrhage at ten o'clock.

2. A young man took food at 11 p.m.; he had an epileptic fit at 2 a.m., and died at 5 p.m. the next day. The stomach was found half full of undigested rice.

3. A man took his evening meal at 10 p.m., went to sleep soon after, was murdered in his bed at 5 a.m. (*i.e.*, 7 hours after taking food). A small mass of undigested rice and potato was found, so that stomach digestion was not completed even in seven hours.

The following experimental observations were made by washing out the stomachs of healthy persons at fixed periods after taking food :—

1. Large meal of pulses, rice and vegetables at 12 noon; stomach washed out after three hours, some undigested rice remained.

2. Same person, another day; stomach washed out after four hours; one ounce of undigested rice was recovered.

3. Same person, another day; after five hours some undigested rice flowed out from tube (250 grains counted), and so up to seven hours, when even then some undigested grains of rice remained in the stomach.

4. A similar experiment on another man; some 200 grains of rice, undigested, were found on washing out after five hours.

5. Similar experiment; two drachms of undigested rice were found after six hours.

6. Same person, fed on rice and chapatti (a sort of unleavened bread in the form universally used by up-country natives); after six hours some rice and a piece of the chapatti were found undigested.

In two similar experiments pieces of the chapatti, undigested, were found in the stomach after so long intervals as six hours and thirty minutes, and after six hours and forty minutes.

These experiments and observations seem to show that some portion of a meal of rice, pulses, &c., may be found undigested even six or seven hours after the taking of food.

A NOTE ON THE VALUE OF SOME *POST-MORTEM* APPEARANCES OF DROWNING.

In all countries deaths from drowning are very common, and this is especially the case in the country of the Gangetic Delta, where, during the rainy season, the country is to a large extent flooded, and communication is largely by means of boats. Consequently, accidental deaths from drowning are very common. It is also a favourite method of suicide, and much more rarely used for homicide.

The *post-mortem* appearances, in addition to those of apnoea, or asphyxia, are froth in the mouth and nostrils, water or mud in the stomach or intestines, mud sand and floating matter in the lungs and windpipe, &c., &c.

When several of these signs are present the decision as to the cause of death is not difficult; but more usually the medical jurist has to depend upon the presence of asphyxia and one or more of the signs above mentioned.

The history of the cases may be of value; on the other hand it may be misleading, as it is not an uncommon practice in

India to throw the bodies of persons done to death in various ways into rivers or tanks, either in the hope of hiding the body, or to create a supposition of accidental drowning.

Two signs of asphyxia are of special value—viz., an accumulation of fluid in the pleural sacs, and the staining of the endocardium of the right side of the heart.

When an individual dies from asphyxia produced by any cause (and in India one has always to be on the look out for signs of opium poisoning), the vessels of the lung are distended with blood, and the lung tissue is filled with a watery fluid, derived by transudation from the distended capillaries. In the asphyxia caused by drowning the quantity of fluid is increased by the water aspirated during the third stage of drowning, and when this stage is prolonged a very large amount of fluid is drawn into the lungs, hence if the body is opened soon after death the lungs are large, “ballooned,” and sodden, and blood and watery fluid pour forth on section. If, however, the examination is made after putrefaction has set in, the fluid will have transuded and accumulated in the pleural sacs, which may be sufficient to make the lungs float up and project on the thorax being opened.

The stained condition of the endocardium of the right ventricle indicates that this cavity was full of blood after death, and its discoloured state is in marked contrast to the yellowish colour of the left ventricle.

These signs, however, only point to death from asphyxia; they do not show the cause of that condition, hence the importance of the history of the case, and the presence of fluid, mud, &c., in other organs.

The following table is compiled from carefully made notes by Gibbons, the Police Surgeon of Calcutta, on 157 bodies in which death occurred from drowning :—

			Fluid.		Mud.
Air passages	..	..	12.7	..	15.9
„ „ and stomach	..	..	13.4	..	10.0
„ „ stomach and intestines			5.0	..	3.8
Air passages and intestines	..	..	1.2	..	.6
Stomach	..	..	.6	..	5.0
Intestines	..	..	1.2	..	.6
Stomach and intestines		..	1.2	..	1.9

In 25 per cent. of this series neither fluid nor mud was found inside the body, and mud was found in either the air passages or the digestive tract in 37 per cent. of cases. Here, again, the condition of the body at the time of examination is of importance, and it was found that in 55 fresh bodies either fluid or mud, or both, were found either in the air passages, stomach or intestines. In 25 slightly decomposed bodies there was found neither fluid or mud in six, or in nearly one-third of the cases. In 81 highly decomposed bodies no signs were found in 47 upon which a diagnosis of the cause of death could be made with certainty, and in 34 of these neither mud nor fluid was found.

These facts illustrate the difficulties of the medical jurist in India, who has often to endeavour to form his opinion as to the cause of death on a body highly decomposed, and in which the internal organs are both putrid and pultaceous. In many such cases, however, the two signs of asphyxia above mentioned—viz., accumulation of fluid in the pleural sacs and the staining of the endocardium of the right ventricle—will be found, and if found the inquiry is narrowed. In such a case if there is a history of the body having been found in water, and if poisoning or hanging can be excluded, the opinion that death took place from drowning can be given with some confidence.

ART. IV.—*The Diagnosis of Perforation in Typhoid Fever.* By
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OF all the complications of typhoid fever none demands earlier recognition, if the patient's life is to be saved, than the occurrence of perforation. The advance in surgical technique during the past decade has, in this respect, enormously increased the responsibility of the physician. Twenty years ago he could do little more than be guided by traditions hallowed by time and authority, and follow Heister, who, writing in 1739 on perforation of the bowel, could only advise that the patient be kept quiet, that he be urged to eat