

I give below a table comparing my observations on Natives of India with the figures quoted in European text-books :

	Powell for natives of India.	Saunders.*	Pedley.	Gray.	Mann.†
First Molar ...	6th to 7th	8th ...	6th .	7th ...	7th.
Central Incisor	7th ...	9th ...	7th ...	7th ...	8th.
Lateral ,,	8th to 9th	10th ...	8th ...	8th ...	9th.
Canine ...	10th to 13th.	13th ...	11th to 12th.	11th to 12th.	11th to 13th.
Anterior cuspid. Bi-	9th to 10th	11th ...	9th ...	9th ...	10th.
Posterior cuspid. Bi-	10th to 12th.	12th ...	10th ...	10th ...	11th to 15th.
Second Molar	11th to 12th.	13th to 15th.	12th ...	12th to 13th.	13th to 16th.
"Wisdom" ...	14th to 27th.	18th to 25th.	17th to 25th.	17th to 21st.	18th to 30th

* Taylor, Tidy and Lyon give the same figures. Taylor and Tidy acknowledge Saunders as their source.

† Vivian Poore gives exactly the same figures as Mann, but makes no acknowledgment.

In Natives of India a few exceptions may be found to my figures. These exceptions will be found on the precocious side. The cases in which teeth appear at later dates than those given will be rare indeed.

MEDICO-LEGAL NOTES.

BY PURNO CHANDER SINGH,

ASSISTANT-SURGEON,

Teacher in Temple Medical School, Patna.

Cases illustrating early appearance of signs of advanced decomposition of dead bodies in hot and rainy seasons.

(1) A Mahomedan female, aged 42 years, was poisoned with *dhatura*, she died at about noon of 9th May 1901. Her body was examined at 8-30 A.M. the next day, *i.e.*, twenty hours and a half after death. Signs of decomposition: Body muscular, swollen and emphysematous; face of dark bluish colour; bloody froth escaped from the nostrils and mouth. Several vesicles appeared on the swollen arms, neck and chest. Abdomen distended; escape of fæces through the anus; scalp discoloured. The brain was soft, pulpy, and could not be removed from the cranial cavity. The lungs were of dark bluish colour, vesicles appeared on their surfaces. The heart, the liver, the kidneys and the organs of generation were decomposed.

The temperature on the day of her death was 89°F.; maximum temperature, 105°F.; the minimum temperature, 79°F.; the wet bulb thermometer stood at 68°F.

(2) A Hindu male, aged 30 years, was severely assaulted by a *lathi*, and died between 5 and 6 P.M. on 21st October 1900. His body was examined 15 hours after death. Signs: Body stout and muscular; abdomen distended; frothy fluid issued from the nostrils and mouth. The brain was soft in consistence. The heart, the liver, and the kidneys were discoloured and softened; the intestines and the peritoneum were slightly decomposed.

The maximum temperature was 86.5 F.; the minimum 71.5 F.; the dry bulb thermometer showed 80°F. and the wet bulb 75°F.

(3) A Hindu male, aged 40 years, was beaten to death. He had several wounds and fractures on his body. He died on 30th May 1901 between 5 and 6 A.M. Autopsy at 3 A.M. on the next day, *i.e.*, 26 hours after death. *Post-mortem* appearances: Body stout, muscular, swollen and emphysematous; abdomen distended; vesication on the left thigh and leg; the brain was soft in consistence; the lungs, the heart, the liver and the kidneys discoloured and softened.

The temperature was 82°F.; the maximum, 86°F.; the minimum, 76°F.; and the wet bulb, 77°F.

(4) A Hindu male, aged 37 years, was severely assaulted and died between 5 and 6 A.M. on 30th May 1901. His body was examined 28 hours after. Signs: Body stout and emphysematous; fæces escaped from the anus; abdomen distended; a few bullæ appeared on the left thigh. The brain was soft in consistence. The lungs, the liver, the spleen and the kidneys were discoloured and softened.

The temperature was the same as mentioned in the previous case.

(5) A little girl, four years old, died between seven and eleven o'clock A.M., on 8th July 1898, from compound fracture of the skull, the result of *lathi* blows. *Post-mortem* examination was held at 9-30 A.M. on 9th July 1898, *i.e.*, at least twenty-six hours and a half after. Signs: Abdomen distended and of greenish colour; left side of the face of dark bluish colour. The brain was of soft consistence; a few small vesicles on the surface of both the lungs; the heart was discoloured and softened; vesicles appeared on the surface of the liver, which was of dark bluish colour; the kidneys decomposed.

The temperature was 89.5°F.; the maximum, 94.5°F.; the minimum, 81°F.; wet-bulb, 83.5°F.

(6) A Hindu male, aged 40 years, died at about 8 P.M. on 2nd July 1900, from fracture of the skull from *lathi* blows. Autopsy 37 hours after. Signs: Body swollen, discoloured and crepitant; face and both the arms of dark bluish colour; cuticle detached, and bullæ appeared on different parts of the body; eyes swollen; the tongue protruded; escape of fæces from the anus; abdomen distended; the hairs on the head easily detached; sanguineous fluid flowed from the nostrils; the superficial veins on the neck and

head prominent; the brain was soft and pulpy and of reddish colour. Both the lungs decomposed, blebs formed on their surfaces. The heart was soft in consistence. The mucous membrane of the stomach was of dark brown colour. The liver, the spleen, the kidneys and the generative organs were discoloured and softened.

The temperature on the day of death was 82°F.; the maximum, 92°F.; the minimum, 77°F., on the next day the temperature 84°F.; the maximum 95°F. and the minimum 81°F.

(7) A healthy Hindu woman, aged 50 years, committed suicide by taking opium. She died between 3 and 6 A.M. on 20th June 1901. Her body was examined at 10 A.M. on 21st June 1901, *i.e.*, at least 30 hours after. *Post-mortem* appearances: Body stout, muscular and emphysematous; abdomen distended, face swollen and of dark bluish colour; escape of sanguineous fluid from the nostrils, and of fæces from the anus. The brain was softened. The heart, the liver and the kidneys were discoloured and of soft consistence.

The temperature was 88°F.; the maximum, 103°F.; the minimum 82°F., and by the wet bulb thermometer 82°F.

(8) A Hindu male, 35 years old, quarrelled with another man and was assaulted. He died from acute peritonitis caused by violence on the abdomen at midnight on 15th March 1901. Autopsy 32 hours after death. Signs: Body swollen and crepitant; some blebs appeared on the abdomen; sanious frothy fluid issued from the nostrils and mouth; face swollen and of dark bluish colour; the superficial veins on the neck and face prominent; fæces escaped from the anus; abdomen distended; the living membrane of the trachea was of dusky red colour. The heart, the liver, the spleen and the kidneys were discoloured and softened. The organs of generation were swollen and decomposed.

The temperature was 69°F.; the maximum, 85.5°F.; the minimum, 57°F., and by the wet bulb, 57.5°F.

(9) A Hindu male, aged 50, was struck with a sword on the head and on other parts of the body; the skull was divided and the substance of the brain protruded. He died between 2 and 5 P.M. on 1st September 1900. Autopsy at 9 A.M. on 3rd September 1900, *i.e.*, at least 42 hours after death. *Post-mortem*: Appearances—Body swollen and emphysematous; abdomen distended; the superficial layers of the skin detached from the cutis on several parts of the body. The brain was softened and could not be removed from the cranial cavity; the surface of its left hemisphere was of greenish hue; bullæ appeared on the surface of the lungs; the heart, the peritoneum, the liver, the spleen, the kidneys and the organs of generation were decomposed.

The temperature on the day of death was 83°F.; the maximum, 88.3°F.; the minimum, 79.5°F.; the wet bulb, 80°F.; on the next day, the maximum, 89°F.

(10) A Mahomedan male, aged 30 years, was stabbed in the chest with a knife at about 10 P.M. on 21st April 1899. The heart and the lungs were wounded. He died the same night a few hours after. His body was examined at 7 A.M. on 23rd April 1899. Signs: Body stout and crepitant; abdomen distended; fecal matter escaped through the anus; bloody froth issued from the nostrils; the face was of dark bluish colour; the brain was very soft and could not be removed entire. The heart, the peritoneum, the liver and the kidneys were decomposed.

The average temperature on the day of death and on the next day was 84°F.; the average maximum, 98.5°F.

(11) A Hindu male, aged 45 years, was struck with a sword in different parts of his body. He had several incised wounds. He died on the afternoon of 1st September 1900 between 3 and 5 P.M. Autopsy at 9 A.M. on 3rd September 1900, *i.e.*, at least 41 hours after.

Signs: Body swollen and emphysematous, the face was of dark colour; blebs appeared in different parts of the body; the epidermis detached on several places; the tongue protruded—the superficial veins on the arms distinct; abdomen distended; the fæces escaped from the anus. The brain was very soft and could not be removed from the cranial cavity; vesication appeared on the surface of the lungs, which were discoloured. The heart, the liver, the spleen, the kidneys and the generative organs were decomposed.

The maximum temperature on the day of death was 88.3°F. and on the next day 89°F.; the dry bulb thermometer 83°F. and 84°F.; the wet bulb 80°F.

(12) A Hindu male, aged 22, was stabbed on the abdomen. The stomach and the intestines were wounded. He died at about midnight on 1st June 1899. His body was examined at 7 A.M. on 3rd June 1899, *i.e.*, 31 hours after. *Post-mortem* appearances: Body muscular, swollen and crepitant; the abdomen distended; blebs appeared in different parts of the body; sanguineous fluid issued from the nostrils; fæces escaped through the anus. The brain was very soft and pulpy, and could not be removed from its position. Several bullæ formed on the surface of the heart, the lungs, the liver, and the spleen, which were all discoloured and softened.

The temperature was 88.5°F.; the maximum, 107°F.; the minimum, 82°F.; the wet bulb, 83°F.

(13) A Hindu male, aged 35, was wounded on the neck; the right carotid vessels was divided. He died at about 9 P.M. on 2nd April 1898. Autopsy 34 hours after. Signs: Body muscular swollen and emphysematous; several blebs on the chest containing thin, sanguineous fluid; the cuticle detached at parts; the abdomen distended; fæces escaped from the anus; several bullæ appeared in the inner coat of the stomach. The scrotum was swollen and discoloured.

The temperature was 93° F.; maximum 104° F.; the minimum 73° F.; the wet bulb 69° F.

Remarks.--In these cases the earliest period of appearance of vesication on the surface of the body was *within* twenty hours and a half after death in the month of May, and within 31 hours in June, and that of decomposition of the internal organs, and of development of gaseous products, as manifested by the distension of the abdomen, or by the exudation of froth from the mouth and nostrils, was *within* fifteen hours in October. The shortest period for formation of gases recorded in cases observed in the Campbell Medical School, Calcutta, in 1883,* was sixteen hours and ten minutes in October, and of appearance of vesicles on the body 35 hours in July. The soft pulpy condition of the brain for which the organ could not be removed entire from the cranium occurred *within* twenty hours and a half in May, within 31 hours in June, 37 hours in July and 41 hours in September. All the signs of decomposition were really manifest earlier than the time noted, because they appeared *within*, and not exactly *at*, the hours mentioned. The circumstances which affect the progress of decomposition are of a variable character. Though it is difficult to determine the period of death from the progress of putrefaction, these observations may, however, prove a useful guide to infer the time of death.

II.

Two cases of suicidal cut-throat : severe injuries in one : transverse cuts in both.

(1). A Hindu male, aged 35 years, committed suicide in the court lock-up, Bankipore, on 17th July 1897, by cutting his throat with a knife. His body was examined the same day. Marks of injuries : a *transverse* incised wound in front of the neck, about five inches long and four inches broad, reaching down to the spine; the trachea was divided just below the cricoid cartilage; the œsophagus and the right carotid artery were cut through. The divided portions of the trachea were much retracted.

Such suicidal injuries from their situation, direction, and depth are not common.

(2) A pregnant Hindu female, aged 20 years, attempted to commit suicide by cutting her throat for severe agonising pains during delivery. She really died from rupture of the uterus. *Post-mortem* appearances : *transverse* cut in front of the neck below the Pomum Adami, 2½ inches long, the skin was divided. The uterus was enlarged and ruptured at the cervix anteriorly, causing a large aperture to allow the foetus to pass into the abdominal cavity, where it was lying with the back and buttocks anteriorly, enveloped in the membranes partly torn and resting on the chest over the uterus which was compressed; the direction of the rupture was

transverse; the lower segment encircling the neck of the foetus; the edges of the tear softened; infiltration of blood in the muscular fibres which looked gangrenous. The head of the foetus protruded through the vagina; the uterus was empty; the fundus contracted, lying above the pelvic cavity. The foetus was full grown.

The suicidal wound on the throat was *transverse* and not oblique.

III.

The length of time required for digestion of Indian food in the stomach and its medico-legal import.

The presence of undigested food, or absence of food, in the stomach, is sometimes a great criterion, in medico-legal cases, for judging the time at which a murder was committed, or death occurred. Thus material help may be obtained by the judicial officers in arriving at a judgment in criminal cases in which the time of death has an important bearing on the question of the guilt or innocence of accused persons. Medical witnesses are often asked in judicial courts as to the nature and condition of the contents of the stomach and on the length of time required for digestion of food.

The people of Bengal and Behar ordinarily take two or three meals a day, consisting of rice, *dâl* (pulses), wheaten flour, vegetables, fish or meat, the latter two are luxuries amongst the poorer classes. Rice forms the bulk of their food. The quantity of boiled rice taken by an adult in each meal varies from 24 ounces to 48 ounces (the weight of a given quantity of raw rice becomes about three times greater when cooked), of cooked *dâl* 12 to 18 ounces, of vegetable curries 6 to 8 ounces. They drink a good quantity of cold water during or immediately after meals, which averages at least 16 ounces, except during hot weather when it is more. The length of time requisite for digestion in the stomach of such an Indian diet and for complete emptying of the stomach, has not been ascertained by observation, or on any authoritative basis. The average period required for the digestion of an ordinary European meal was estimated at from three to four hours from observations made by Dr. Beaumont in the case of Alexis St. Martin. But European and Indian diet differs greatly in quantity and quality, the former consisting mainly of nitrogenous substances, and the latter in a majority of cases almost entirely farinaceous. The solvent powers of the gastric juice are chiefly exerted upon nitrogenous substances and its action is comparatively slight upon starchy and saccharine matters. The rapidity of digestion varies according to the quantity of food taken and the amount of fluids drunk. The Indians generally consume a large quantity of farinaceous food and drink largely of cold water, which, by lowering the temperature of the stomach and diluting

* See below p. 255.—ED., I. M. G.

the gastric juice, is prejudicial to digestion. Hence the time required for complete gastric digestion of Indian diet may exceed that for European diet. It may be contended that starchy food requires less time for digestion than the nitrogenous. This may be true when the quantity of it is small as in European diet. An idea of the time necessary for complete digestion (gastric) of an ordinary Indian diet may be formed from the following observations made after death in some cases, and during life in others:—

A.—*Presence of food in the stomach noted during post-mortem examinations.*

(1) A healthy man, aged 35 years, took his morning meal (stale rice and *dāl*) between 7 and 8 A.M., and went out to work in his rice-field. There he quarrelled with another man who gave him blows and kicks at about 10 A.M. on 3rd February 1902. He died the same day at about 2 P.M. from rupture of the spleen. *Post-mortem* examination held on the next day disclosed the presence in the stomach of a large mass of undigested and partially digested rice and *dāl*, and in the duodenum thick, white, glairy fluid and several bits of rice. The man was alive for about six hours after taking his meal and four hours after rupture of the spleen. The process of digestion might have been suspended or retarded by internal hæmorrhage, but his farinaceous food was not digested even in less time than that required for digestion of European diet, *i.e.*, in two hours after his meals and before he met with violence.

(2) A Hindu male, aged 22, after his usual evening meal between 8 and 9 P.M., took some opium to commit suicide. He died next morning between 5 and 6 A.M. *Post-mortem* examination was held the same day. The stomach was full of undigested rice, *i.e.*, about nine hours after food.

Digestion was in this case probably in abeyance during coma.

(3) A Mahomedan male, aged 28, a lunatic, took his meal between 10 and 11 o'clock A.M., on 22nd January 1902, which consisted of rice, *dāl* and vegetables. He got an epileptic fit at about 2 P.M. the same day and was unconscious till he died between 5 and 6 o'clock P.M. on 23rd January 1902. During the period of unconsciousness he could not swallow medicines or liquid nourishment. *Post-mortem* examination showed that the stomach contained a large mass of partially digested and undigested rice and *dāl* mixed with mucus. (More than half of the cavity of the stomach was full.)

The food remained in the stomach for nearly 30 hours without undergoing digestion. The digestion was in suspension owing to insensibility. His food was not even digested in four hours before the attack of the epileptic fit.

(4). A stout, healthy, Hindu male, took his evening meal at about 10 P.M. and was beaten to death between 5 and 6 o'clock in the morning of 30th May 1901. The stomach contained, as disclosed by *post-mortem* examination, a small mass of undigested rice, about one ounce in weight, and a few bits of potato rind.

The food was not *completely* digested in seven hours.

B.—*Observations on the washings of the stomach of healthy men a few hours after their meals.*

(1) A Hindu male, aged 25 years, a cook by profession, took his meals consisting of boiled rice 48 oz., cooked *dāl* including the water in which *dāl* was boiled, 16 oz., and vegetables 4 oz. at 12-15 P.M. on 15th January 1902. His stomach was washed out with an India-rubber œsophageal tube at 3-15 P.M., *i.e.*, three hours after meal. About half an ounce of undigested rice was withdrawn. The openings of the tube were blocked up with particles of undigested rice. The tube was not re-introduced. On 18th January 1902 at 11-10 A.M. he took rice 48 oz., *dāl* 12 oz., vegetables 8 oz., and drank 16 oz. of water. The stomach-tube was passed at 3-15 P.M., *i.e.*, 4 hours and 5 minutes after. About an ounce of undigested rice was brought out. The tube was twice introduced. On 20th January 1902 he was fed at 11-32 A.M., with 48 oz. rice, 8 oz. *dāl*, 8 oz. vegetables, and 16 oz. water. The stomach was washed out at 4-45 P.M., *i.e.*, 5 hours and 13 minutes after meal. Entire and broken rice grains, numbering 250, flowed out with the washings. The openings in the tube were blocked up with rice. He consumed on 24th January 1902 at 10-50 A.M., 48 oz. rice, 8 oz. *dāl*, vegetables 4 oz., and water 16 oz. The tube was used at 5-15 P.M., *i.e.*, 5 hours, 25 minutes after. Undigested rice grains, about 200 in number, flowed out with the water. The openings of the tube were filled with rice. The tube was not passed a second time. On 25th January 1902 at 9-25 A.M., the man took the same quantity of food as on the previous day. At 4-50 P.M., *i.e.*, 7 hours, 25 minutes after, the stomach was washed out. A few entire and broken grains of rice and a soft pulpy mass of it mixed with mucus flowed out. The tube openings were blocked up.

(2) A tall, stout, Hindu male, 32 years old, was fed at 11-32 A.M. on 20th January 1902, with rice 48 oz., *dāl* 8 oz., vegetables 8 oz., and water 16 oz. At 4-34 P.M., *i.e.*, 5 hours, 2 minutes after, entire and broken rice, about 200 in number, was found in the washings of the stomach. The openings of the tube were blocked up with particles of rice. The tube was not re-introduced.

(3) A healthy, Hindu male, a mason, took his food at 12 A.M., on 30th January 1902, consisting

of rice 2lb. 2 oz., *dāl* 9 oz., vegetables 4 oz., and water 12 oz. The stomach was washed out at 3-20 P.M., *i.e.*, 3 hours and 20 minutes after. About an ounce of undigested rice was found in the washings. He was fed at 11 A.M., on 3rd February 1902, with rice 34 oz., *dāl* 9 oz., vegetables 4 oz., and water 16 oz. At 5-5 P.M., *i.e.*, 6 hours, 5 minutes after, the stomach washings contained about 2 drachms of undigested rice. On 12th February 1902 at 10-30 A.M., he took *chappattis* made of 16 oz. *attah* (coarse wheaten flour), *dāl* 9 oz., vegetables 5 oz., and water 16 oz. At 5-5 P.M., *i.e.*, 6 hours, 35 minutes after, his stomach was washed out. Soft bits of vegetables, and a small, soft lump of semi-digested *chappatti* came out with water. He took at 10-30 A.M., on 19th February 1902, rice 35oz., *dāl* 9 oz., vegetables 4 oz., and water 16 oz. The tube was used at 4-45 P.M., *i.e.*, 6 hours and 15 minutes after. A few bits of entire and broken rice flowed out with water.

(4) A healthy Hindu male, aged 25, took, at 12 A.M., on 30th January 1902, rice 2 lb. 2 oz., *dāl* 9 oz., vegetables 4 oz., and water 16 oz. The stomach was washed out 3 hours and 25 minutes after. During introduction of the tube the man vomited and brought up about two ounces of undigested rice. The same quantity of food was given to him on 3rd February 1902 at 11 A.M. The washing was commenced at 5-10 P.M., *i.e.*, 6 hours and 10 minutes after meal. Two drachms of undigested rice were found. The openings in the tube were blocked up. During its reintroduction he vomited and brought up 3 drachms of rice.

(5) A Hindu male, aged 22, took on 12th February 1902 at 10-30 A.M. *chappattis* made of 16 oz. *attah*, *dāl* 9 oz., vegetables 5 oz., and water 16 oz. The stomach was washed out 6 hours and 40 minutes after meal. Four small bits of semi-digested *chappatti* flowed out. The man vomited a few bits. When the tube was withdrawn, its openings were found blocked up.

(6) A Hindu male, 20 years old, was fed with *chappattis* of 16 oz. of *attah*, *dāl* 4 oz., vegetables 4 oz., and water 12 oz., at 11-45 A.M. on 7th February 1902. The stomach was washed out at 4-15 P.M., *i.e.*, 4 hours, 30 minutes after. Two large and a few small soft lumps of *chappatti* and water came out.

(7) A Mahomedan male, aged 20 years, took at 10-30 A.M., on 19th February 1902, 35 oz. rice, 9 oz. *dāl*, 4 oz. vegetables, and 16 oz. water. The tube was passed at 4-52 P.M., *i.e.*, 6 hours and 22 minutes after. A few entire grains of rice, about one drachm, flowed out. The openings of the tube were found blocked up when it was withdrawn.

Remarks.—The men did not take any food between the hours of their meals and that of the washing of their stomachs. In all cases a little more than a pint of warm water was

passed into the stomach. When the tube was withdrawn, its openings were seen blocked up with particles of food. This evidently showed that more food existed in the stomach than what was withdrawn. The blocking up of the tube with food grains no doubt prevented their further exit. The appearance of even a small quantity of undigested food in the washings of the stomach *seven hours and twenty-five minutes after meals* was sufficient to demonstrate that food was not *completely* digested, and the stomach was *not empty*, in that period.

IV.—Homicidal wounds ending in tails.

—It is said that the presence of a scratch, *i.e.*, a tail at one or both ends of an incised wound sometimes indicates that it was fabricated, *i.e.*, inflicted with a person's consent or self-inflicted. But such scratches have been found in wounds inflicted by hostile hands or in homicidal wounds.

(1) A man, aged 32, was severely wounded in several parts of his body. He had an incised wound, transverse in direction, about 5 inches long, on the left side of the neck; the hyoid bone, and the thyro-hyoid membranes were cut, and the pharynx opened. It had a *scratch* at its outer end. Another incised wound on the left side of the chest below the nipple, transverse, 5 inches long; the cartilage of the seventh rib was divided, the thoracic cavity was opened and the sternum partially divided; a *tail* at its inner end, 2½ inches long. Beside these he had cuts on the hands and on other parts of the body.

(2) A well-to-do elderly Mahomedan male, a Nawab, was murdered in broad daylight while he was asleep. He had an incised wound on the right shoulder, almost vertical in direction, about 4 inches long, the clavicle was divided; a *tail* at each end of the wound. Another vertical superficial cut on the right wrist, 2½ inches long; a *scratch* at its lower end. Besides these he had three severe wounds on the head, in which the skull and the substance of the brain were divided, severe cuts on the hands and on other parts of the body.

(3) A healthy, young man, aged about 30 years, was killed in a riot amongst some villagers. He had an incised wound behind the left shoulder, 4 inches long, vertical in direction; the muscles and the acromion process of the scapula were divided; a *scratch* at each end of the wound. Another transverse incised wound on the right side of the back, 3½ inches long, the skin was divided; a *scratch* at each end. Also he had a large incised wound on the thigh, in which the femoral vessels were divided, and severe cuts in other parts of the body.

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