nary cough mixture with antimonial wine and chlorate of potash was ordered. She was able to partake of liquid food, which was freely supplied to her. After this there was nothing special to note for a few days, except that the area of dulness was extending in the left lung.

On November 3rd the temperature was 99°; pulse 110. The temperature had been about 100–101° since the morning of October 29th. The patient seemed to me at this stage to have passed the most dangerous point in her illness, and was able to speak, consequently I began making all the inquiries I could regarding this, to me, unprecedented form of systemic relief. Since then I have often thought of the case, and chiefly in connexion with what we term now the old practice of bloodletting in acute diseases. The remarkable change which followed the hæmorrhage from the nose on the night of the 28th was, as I have said, unprecedented as far as my experience is concerned. The body temperature fell about 5° in a very short time, and there was complete relief from pain.

I should mention, with regard to this patient, that she is one of those who never perspire—"at all events nothing to speak of," to use her own words, even in summer weather. The relief occurring in the way it did seemed to me but a pronounced illustration of the physical law, which is to the effect that a body expelling some of its component matter loses heat thereby and becomes cold, and that, no doubt, in proportion to the rapidity of the expulsion and the quantity of the loss. In this case there must have been a condition of extreme tension of the bloodvessels, and the portion of the contents which performed the part of expelling the other portions lost heat thereby and became cooled, but the expelling power pervaded the whole system; that being so, general cooling of the whole system followed. I do not know how the practice of systematic bloodletting arose in medicine, and if I did this would not be the place to attempt any historic account of it. There can, however, be no doubt, on the principle of there being nothing new under the sun, that cases like the one I am describing happen in all countries, and fall under the observations of medical practitioners; consequently it occurs to me, thinking over the question of general bloodletting with the light shed upon it by this case, that our predecessors, noticing the relief following spontaneous bleeding—but noticing also the exhaustion produced by excess, as in this instance—argued that, if moderate bleeding were resorted to, and that at a spot where it could be controlled, the evil effects of spontaneous bleeding would be avoided and the good only secured. At the beginning a few selected cases ending favourably would be a sufficient inducement for the adoption of the practice generally without reference to special selection. Thus it may fairly be presumed that a practice, originating from a good and judicious act, subsequently degenerated into a scandal and an injury to mankind, falling into such a depth of degradation as richly to deserve the scathing satires of Le Sage, as exhibited in his character of Dr. Sangrado, besides that of many other observers; from the consideration of which it may of a truth be asserted that degeneration is ever more fertile than evolution in the formation of varieties.

The spontaneous bleeding was the first point of interest in the case to which I wish to draw attention, and I would observe that it occurred on the third day of the illness. Usually in this district relief in such cases comes later, about the fifth day, and in the form of diaphoresis. As an example of this, I shall refer to another case of inflammation of the lungs which I had to attend about the same time, that of a Mrs. T—, aged about twenty-six years, suffering from over-lactation. On the evening of December 1st the temperature of her body was over 105°, with the usual symptoms of acute pneumonia. On the morning of the 2nd, being the fifth day of the illness, epistaxis began, and she saturated three pocket-handkerchiefs very soon, then diarrhoea with copious watery stools followed. The breasts, which had been distended, discharged about a quart of milk, according to her attendant's account. Her skin had not been particularly dry, but there was not much perspiration. The temperature fell very soon to 100°. Next day it was at normal. In this case the heated vascular tension found relief through more than one outlet, and in consequence there was no special prostration.

But to return to Mrs. M—'s case and show how it fared with the implicated lung and the uterine contents. In the course of a few days the pulmonary dulness indicating hepatisation extended over the whole of the left side with

blowing-sound respiration and no crepitus audible. I was not able to detect any until about a fortnight after the commencement of the illness, when resorption was taking place. The laboured character of the breathing lasted for several days after the epistaxis crisis, and then became normal. The next point of interest was the effect of the illness upon the uterus and what it contained. On November 5th the patient complained of some discomfort rather than pain in the lower part of the abdomen, and there was tenderness on pressure, leading one to infer that there would be miscarriage before long. The pulse continued quick, always over 100, at times as high as 120. The temperature remained between 99·4° and 101°. It never went down to normal. These conditions left no doubt on my mind that the fetus in utero was dead. Still the pain and tenderness about the womb were at times very little complained of, but more so at others, and opiates were given for their relief. In spite of all, the patient was visibly improving, taking food fairly well and feeling tolerably cheerful. On November 29th some liquor amnii escaped, and it smelt offensively the attendant told me. I examined per vaginam and found the os uteri dilated to about the size of a fourpenny piece filled by a clot or something feeling like it. Next day regular uterine pains set in and the contents of the womb were expelled about three o'clock in the afternoon. The expelled substance consisted of twin boys, about the fourth month of uterine existence, attached to one placenta. All had a macerated appearance, but did not smell badly, not so bad, by all accounts, as the water which had escaped the day before. The fetuses had been dead for a long time, it was evident, I believe from the time of the epistaxis, thirty-three days before. These dead bodies had remained in the uterus all that time, and caused not one alarming symptom or anything calling for interference, bearing out an observation I often heard Mr. Lister make more than twenty years ago—namely, that living tissue possesses antiseptic power capable of delaying putrefaction for a long time. At the same time, there is no doubt, these bodies and their appendages kept up a certain amount of blood poisoning as indicated by the pulse and increased temperature. The patient suffered for a while from metritis, but in a few weeks this passed away and the lung affected completely recovered, but it was some months before she regained her usual state of health.

The histories of these two cases of acute pneumonia possess still another feature of interest, in that they both tend to confirm the view that the disease is of zymotic nature, belonging to the preventable order. For example, Mrs. M—'s house, although internally in good sanitary condition, was situated in close proximity to a bad-smelling privy, the smell from which pervaded her house both before the accession of the illness and at the commencement of it.

Mrs. T—, like many country labouring people, had potatoes stored in her bedroom, and the decay smell from these struck one at once on entering the room. The sanitary condition of her house in other respects was fairly good, both inside and out.

Wellington, Somerset.

STATISTICS OF TETANUS IN THE MEDICAL COLLEGE HOSPITAL, CALCUTTA.¹

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THE frequency of tetanus in Bengal, as evidenced by the records of the Medical College Hospital—which represent fairly a very large section of the prevailing diseases which come under observation throughout this Presidency,—and its participation in augmenting the mortality in surgical operations, as further demonstrated by reference to the practice of surgeons connected with this largest of Indian hospitals, make a brief summary of their experiences worthy of our notice, not only as being interesting, but instructive. The notes on tetanus in the Medical College Hospital, which I am about to record, consist of an analysis of a tabulated statement of cases kindly placed at my disposal by Dr. McLeod and some jottings from other medical and surgical records of this hospital. During the ten years from

¹ Read before the Calcutta Medical Society.

1869 to 1879 there were 280 cases of tetanus admitted into the Medical College Hospital, in all of which the well-marked symptoms of the disease were more or less fully developed at the time of their admission into the wards. Of these 212 died. Irrespective of these 280 cases, 23 others occurred in the surgical wards, following operative interference of various kinds, and all of these terminated fatally. Of the former series of cases, 159 were of the idiopathic variety, the subjects being 93 males and 66 females, of whom 53 of the former and 58 of the latter died. Of the traumatic form there were 121 cases, 67 males with 64 deaths, and 54 females with 37 deaths.

With regard to age and race: in infants up to fourteen days old there were 34 cases, of which 13 were natives and 21 Europeans, with 29 deaths in all. From one to five years, 5 cases, 4 natives and 1 European, with 3 deaths; from five to fifteen years, 23 cases, 20 natives and 3 Europeans, with 11 deaths; from fifteen to forty-five years, 195 cases, 175 natives and 20 Europeans, with 154 deaths; from forty-five years and upwards, 23 cases, 21 natives and 2 Europeans, with 15 deaths.

With regard to season: during the winter months—namely, November, December, January, and February, this series shows 96 cases admitted, 38 from traumatic and 58 from idiopathic tetanus, with 80 deaths. The early summer months—March, April, and May—give a total of 71 cases admitted, 28 traumatic and 43 idiopathic, with 44 deaths. The months of the monsoon, or rainy season—namely, June to October inclusive—show 113 cases, 53 traumatic and 60 idiopathic, with 88 deaths. The minimum of admissions was in July and the maximum in December.

With regard to the etiology of this series of 280 cases, I have been able to trace the history of 117 of the idiopathic, and in 94 of the traumatic to note the nature of the injuries giving rise to the disease. The various causes, with the number of casualties from each, are as follows:

1. Exposure to cold and wet	47
2. Menstruation, pregnancy, and abortion	29
3. In infants under fourteen days old	23
4. In persons suffering from fever, dysentery, general debility, and privation, in whom there is no distinct history of exposure	24
5. Injuries	94

Nature of Injury.

(a) Wounds of all varieties	35
(b) Machine injuries	23
(c) Contusions	13
(d) Burns and scalds	6
(e) Compound fractures	17

The duration of the disease will be ascertained from the following record of 212 fatal cases:—

	Cases fatal.
Within two days	88
From two to five days	41
From five to ten days	26
From ten to twenty-two days	23
Above twenty-two days	34

With regard to treatment, the records give evidence of trial of every known remedy, but the plan notably in use in all the medical and obstetric wards has been by free purgation and the administration of such anodynes and antispasmodics as chloral, morphia, and atropia, given by the mouth and subcutaneously, opium in combination with ammonia, Indian hemp, belladonna, potassium bromide, and Calabar bean. Opium-smoking has been largely tried in the obstetric wards. Quinine and other preparations of cinchona found place in the chronic cases. In the surgical wards, the removal of irritant particles, stretching of nerves, and amputation have been resorted to for the relief of the traumatic form, in addition to the already named medicinal means.

Results.—There were 68 cures in 280 cases, or 14·16 per cent. Of these 53 were among the idiopathic and 15 among the traumatic. In subjects under fourteen days old, the recoveries were in the proportion of 1 to every 6 cases; from one to five years, 1 in every 2·5 cases; from five to fifteen years, 1 in every 2 cases; from fifteen to thirty-five years, 1 in every 5 cases; from thirty-five to forty-five years, 1 in every 6 cases; from forty-five years upwards, 1 in every 3·28 cases. After revising the notes in forty-six of the cases in which recovery took place, I do not find one in which

success can be attributed to any single remedy, or any individual plan of treatment, though in most of them chloral and cannabis indica were more largely used than other drugs. The practice in which surgical operations were performed for the relief of the sufferer has been attended with most unfavourable results. In two cases the sciatic nerve was stretched for tetanus arising from wounds of the foot, in one instance the median was subjected to the same operation for disease originating in a comminuted fracture of the thumb, and in neither of these cases did abatement of the spasms or other improvement in the patient's condition attend the procedure. Amputation of the hand in two cases, of the forearm in three, and of the leg in two, was resorted to without effect.

The second series of 23 fatal cases comprises those arising after surgical operations in the wards during the years from 1869 to 1879. There were altogether during this period 2148 major operations performed in the Medical College Hospital, with 402 fatal results from all causes, among which 23, or 5·7 per cent., are attributable to tetanus, and occurred in the following instances:—

	Cases.
Excision of scrotal tumours	8
Amputation of foot and leg	7
Amputation of hand and arm	6
Excision of simple tumours	2

These statistics serve to illustrate certain facts in connexion with the general characteristics of tetanus in Bengal: how it affects the varied population, how the disorder is altered in its virulence, and the frequency of its occurrence with special reference to age, sex, and season, how it influences the results of surgery, and in what direction the efforts towards alleviation have tended. Thus we find that trismus nascentium occurs more frequently among the children of Europeans than among those of natives, for out of 34 cases 21 were Europeans, and this observation is all the more striking when we consider the comparatively small proportion the European element is among the vast native population of Bengal. Referring still to infantile tetanus, we find that it is indefinitely written about as being of the idiopathic variety; if, however, it is held that the source of irritation lies in any abnormal changes in the ligatured and divided umbilicus, then it is truly traumatic. In Mahomedan and Jewish infants in this country, however, there is no doubt in many instances as to the disease being traumatic, even though the umbilicus be free from complication. With these religious persuasions the custom is to circumcise an infant on the eighth day, and in many instances tetanic symptoms supervene upon this procedure. Thus I find in nine of the infants affected the penis was the focus of irritation to the nervous system, and in two cases the application of anodyne poultices to this part resulted in allaying the acuteness of the symptoms and in finally curing the little patients.

In adults tetanus seems equally dispersed among Europeans and natives; males were more affected than females, and in infants and adults the disease was more frequent than in children and persons over forty-five years. In women idiopathic tetanus is very frequently associated with the puerperal period and with menstruation, for in 52 females affected, 29 were either menstruating or they had just been confined at full term, or they had aborted. The majority of cases occur in the winter months, and though no season enjoys a perfect immunity, least of the cases are noted in midsummer, the maximum being in December and the minimum in July.

The general death-rate in tetanus, as shown by the statistics of the years from 1869 to 1879, is 75·7 per cent.; in the idiopathic it was 69·7, and in the traumatic so high as 83·4 per cent. The disease is certainly most fatal in the early stage, almost one-third of the cases dying within the first two days of the attack, whereas recovery may almost as surely be prognosticated after the disease has passed the fifteenth day.

Of injuries resulting in tetanus, those by machinery, compound fractures, and punctured wounds have yielded the largest proportion of cases.

The appearance of tetanus in operation cases has been attended with the most deplorable results, as in 23 cases which occurred not one recovered. It appears that operations upon the scrotum, involving much interference with the testis or cord, are peculiarly prone to the supervention of tetanus. Thus in five out of eight cases, in which elephantoid

growths were removed from the scrotal region, castration seemed necessary and was accomplished, and in all these tetanic symptoms were manifested. Another case in point was in the radical cure of hernia by Wood's operation; here the patient died of tetanus, and it was found on post-mortem examination that the spermatic cord was strangulated in the wire suture used in approximating the pillars of the abdominal ring and obliterating the canal.

Our treatment, though aiming principally at removal of the cause and the subsequent tranquillising of the nervous system, seems to border much on the domain of empiricism; for when one analyses the treatment one is compelled to confess ignorance as to the part which any single remedy may have exerted upon a fortunate occurrence, and to say that the cure seemed accidental. However this may be, the success in the treatment of tetanus in the Medical College Hospital during the years from 1869 to 1879 is even more favourable than books on the subject would lead us to surmise; and if any drugs are to be relied on favour is decidedly on the side of chloral, opium in the form of morphia, and opium-smoking. Unfortunately, nerve-stretching has not been attended with the same success in tetanus as in the case published by M. Paul Vogt, nor even with the partial relief reported as occurring in two cases which came under the treatment of Dr. Ebenezer Watson of Glasgow. Amputation has not afforded any satisfactory results, nor has division of nerve-trunks been attempted as a *dernier ressort*.

ON THE INCREASE OF CARBONIC ACID IN THE ATMOSPHERE.

AN ATTEMPT TO DETERMINE THE PERIOD WHEN THE AIR WILL BE IRRESPIRABLE.

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THE question of how long our coal-fields will last has been frequently discussed, and astronomers have endeavoured to determine the life of the sun, but the important question of how long the atmosphere will continue to be respirable has not, I believe, ever been considered. We are taught that plants, by absorbing the carbonic acid formed in breathing and combustion, &c., prevent the atmosphere becoming overcharged with this gas. Doubtless, in bygone ages, when the earth was almost covered with trees, and combustion was confined to the burning of wood, this was correct, but little consideration is required to show that this is now no longer true. We have every evidence that in primeval ages the atmosphere abounded in carbonic acid; this abundance of carbonic acid, together with the high temperature, caused very luxuriant vegetation, which rapidly fixed the carbon of the carbonic acid, giving out the oxygen. As ages rolled on this carbon, abstracted from the atmosphere, was gradually stored up in the bowels of the earth as coal, and thus the excess of carbonic acid in the atmosphere became decreased until the latter became capable of supporting the lower forms of animal life. With the development of the higher forms of life commenced the accumulation again of carbonic acid in the air, but until the birth of man this would have very little effect. With the birth of man a very great influence is brought to bear. Man is the only animal capable of making a fire; but even his influence, so long as he continued to burn only wood, would not be very great in poisoning the air, but when he commenced to give back to the atmosphere the millions of tons of carbonic acid slowly abstracted from the air, and stored up through countless ages, he rapidly tends to bring back the atmosphere to its original condition. It appeared to me that it would be very interesting to endeavour to make some guess as to the influence on the atmosphere of the enormous quantities of carbonic acid which are thus yearly added to it. Not only is this a question very interesting from a speculative point of view, but if the consumption of coal continues to increase as it has done during the last twenty years, it will soon become a question of practical importance.

To make the subject as clear as possible I will first consider the sources of carbonic acid, and balance against them the influences which tend to decrease the amount in the air.

The sources of carbonic acid are—(1) Animal respiration; (2) decay of wood plants, &c.; (3) manufactures, as burning of limestone, fermentation, &c.; (4) craters of volcanoes and caverns; (5) combustion. The first of these—viz, respiration, can have little permanent influence, for the animal only gives back to the atmosphere what has previously been absorbed by the plants on which the animal feeds. Decay also only gives back what has been previously abstracted. In the burning of limestone, also, we only return what the animals, from the shells of which the limestone is built up, have previously absorbed. The amount given out by volcanoes, &c., is too small to require notice. We have therefore only left to consider the carbonic acid evolved by combustion. The influences which tend to decrease the carbonic acid are—(1) Absorption by vegetation; (2) solution in water from which it is absorbed by shell animals in building up their shells, but we have balanced this in the burning of limestone, so we have only the influence of vegetation to consider. All cereals, grass as food, can have no permanent influence, as the carbonic acid is given back to the atmosphere by respiration. All animals also give back in their decay what they have previously stored up. The same applies to shrubs and trees, for more wood is being destroyed by burning and decay than is being formed by growth, so we see that vegetation, instead of storing up carbonic acid, is now actually increasing the amount in the atmosphere, and thus the whole of the carbonic acid given off by the combustion of coal and coal products, as petroleum, &c., is permanently added to the atmosphere.

In answer to a question Sir Henry Bessemer very courteously informs me that the amount of coal annually consumed throughout the world cannot be short of 400 million tons; this gives 336 million tons of carbon, which equals 1232 million tons of carbonic acid annually to the atmosphere, and thus a billion tons will be added in from 700 to 800 years, which will increase the amount of carbonic acid in the air from three billions, which it at present contains (the total weight of the atmosphere being 5210 billion tons) to four billions. But as the amount of coal annually consumed is rapidly increasing, probably in a single century a difference will be made which cannot fail to have a great influence on vegetation, and probably on the health of man; and there can be no doubt the air will be quite irrespirable long before the total known coal contained in the world is consumed. Professor Rogers estimates the amount of coal in America and Europe, in round figures, at ten billion tons; adding to this that of China and the rest of the world we get between twenty billion and thirty billion tons, which is equal to between sixty billion tons and ninety billion tons of carbonic acid. Even the lesser of these figures gives an increase of carbonic acid in the air equal to twenty times the amount it at present contains—i.e., it will increase it from .04, as at present, to .8 per cent. Dr. Angus Smith found that feebleness of the circulation was induced by breathing an atmosphere containing 0.15 per cent. when only breathed for a short time, and a much lesser quantity than this lessens the elimination of the carbonic acid from the blood, and thus produces headache, and from its retarding nutrition induces debility and other diseases. Taking these figures as correct, we see that the air will be incapable of supporting life, even when only one-sixth part of the coal known at present is consumed, and as the amount of coal is probably double this, there can be little doubt that the air will be irrespirable before one-tenth part of the available coal is consumed.

Carlisle.

ON A CASE OF SARCOMA; PETECHIAL ERUPTION; DEATH.

By L. W. MARSHALL, M.D. ABERD.,
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I AM led to publish the following case in consequence of its peculiar termination, and because I am told by my friend Dr. Goodhart that one or two similar cases have been observed at Guy's, the cause of the rash being, as yet, not very clear.

Ada R—, aged twelve years and nine months, was admitted under my care April 13th of this year. She then complained of pain in her right thigh and back and was believed to be suffering from hip disease. On examination