ART. IV.—*Observations on Traumatic Fever and the Treatment of Wounds by the Antiseptic Method.* By ROBERT M'DONNELL, M.D., F.R.S.; one of the Surgeons to Dr. Steevens' Hospital.

THE fevers which come on in consequence of wounds more or less severe demand the most constant attention of the surgeon. To shun the dangers arising from them, possibly to prevent their occurrence altogether, is one of the most desired objects of the practitioner; to study with care the precise circumstances which give rise to them is one of the worthiest aims of science. Within comparatively recent days much has been done in each direction. The researches of Billroth, Weber, and others have tended to elucidate the causes of the phenomena of wound-fever; the practice introduced by Lister has tended to prevent its occurrence and disarm it of its dangers. To lay before my readers an analysis of the observations and experiments of the former, and some of my own experience as regards the latter, is my object in the following pages.

In the year 1702, Musitanus explained traumatic fever as being a commotion excited in the system by the absorption of the putrid matter of wounds; Roser more recently adopted the same view, and added many arguments of great value in support of an analogous theory of traumatic and septic fevers, so that by degrees many surgeons adapted their practice to this hypothesis of infection by putrescent substances. In December, 1866, Maisonneuve presented to the Academy of Sciences an exposition of the theory of surgical intoxications, in which, comparing traumatic fever with the other febrile affections consequent on wounds, he came to regard all these accidents as "the result of poisoning due to the introduction into the torrent of the circulation of toxic substances produced by the organism itself." I shall presently examine briefly some of the other theories put forth in explanation of the febrile symptoms following on wounds; for the present let me say that there is no theory with which the facts of clinical observation, as well as of physiological experiment, harmonize so well as the foregoing. According to it simple traumatic fever, secondary fever, and the still worse forms of putrid, purulent fever (pyemia, septico-pyemia, &c.), seem to be but different varieties of the same sort of infection; an infection or poison resulting from inflammation, suppuration, or decomposition, and generated within the organism itself. It must

follow as an obvious deduction from this theory that if we can prevent the occurrence of the inflammation, suppuration, or decomposition, which generates the poison, we prevent the occurrence of the fever.

SYMPTOMS, COURSE, AND TERMINATION OF SIMPLE TRAUMATIC FEVER.

First, what are the symptoms of simple uncomplicated traumatic fever? What course does it usually run? When, and how does it terminate? It seems strange that although in almost all our surgical text-books we find pages devoted to inflammatory and suppurative fever, we find no definite reply to these elementary questions. Perhaps they are best answered by giving a case in illustration.

James Andrews, aged seventeen years, was admitted to Dr. Steevens' Hospital, on May 12th, 1868, having at nine o'clock in the morning received an extensive scald on the back of left leg (1st, 2nd, and, to some slight extent, the third degree of Dupuytren). The scald was treated with linimentum calcis. The patient was well enough to leave hospital on June 1st.

The fever which accompanied this accident ran the following course:—

Day after Injury	Pulse	Respiration	Temperature		OBSERVATIONS
			Morning	Evening	
1st day,	120	30	102	102	Tongue red and dry.
2nd „	116	28	101	102½	Do. do.
3rd „	116	28	100½	102½	Tongue moist.
4th „	120	28	102	101½	
5th „	110	26	100½	100	Suppuration.
6th „	104	24	99 °	99½	
7th „	100	24	98½	98½	Suppuration profuse.
8th „	90	18	98½	98½	
9th „	84	18	98½	98½	

Billroth has observed upwards of a thousand such cases, and from them has established the ordinary types of traumatic fever as

met with in individuals who up to the moment of the accident have been in the enjoyment of their ordinary health.

A primary and important fact to establish is that fever is not a *necessary* consequence of every severe wound or operation. It may be absolutely wanting in some cases. Neither the seat nor the extent of the lesion enables one to predict the intensity or even the occurrence of the fever.

The appearance of the fever after operation or accidental wound is usually rapid; it appears to be exceptional for its onset to be announced by rigor. Possibly the cold stage may be merged in the period of depression or shock, although it is found that in cases where there has been considerable collapse the fever does not supervene early. As a rule the fever appears on the first or second day after the injury. In 87 per cent. of Billroth's cases within the first two days. The highest point of temperature or fastigium is generally reached on the first or second day; it ordinarily varies between 100° and 103° F., and only in rare cases mounts to 104°, a point which it very seldom passes. The mere fact of the temperature mounting to 104° Fahr. does not of itself lead to any important prognostication; provided it be transient this high temperature does not portend anything serious. It is a different matter if it persists; if it is prolonged beyond a couple of days it almost certainly indicates that mischief is brewing; either an extension of the inflammation or some new inflammation supervenes.

The subsidence of the fever commences after an augmentation of temperature; it goes on rapidly, sometimes without critical phenomena, by resolution, sometimes by a sort of crisis, diarrhea, &c., but sweating, augmentation of the urinary deposits, are rare as critical phenomena.

The increased temperature is the symptom of traumatic fever to which, as compared with other symptoms, most importance must be assigned; the frequency of the pulse, and acceleration of the respiration are usually proportioned to it. The nervous and gastric symptoms vary much in different individuals; they do not seem to be so much in relation with the fever itself as its complications.

The total duration of the traumatic fever may be said to be from two to seven days. When it is prolonged beyond seven days, we may dread the appearance of some complication; the fever then ceases to be simple traumatic fever; it is at least a new form called secondary fever.

The following case illustrates one of simple traumatic passing into secondary fever:—

Julia Doyle, aged thirty, admitted February 7th, left arm mangled by machinery; also large lacerated flap wound of abdomen; amputation above elbow; subsequent sloughing of flap on abdomen. Discharged on May 2nd.

Day after Injury	Pulse	Respiration	Temperature	OBSERVATIONS
1st day,	124	29	...	
2nd ,,	140	34	101°	
3rd ,,	140	34	102 $\frac{1}{2}$	
4th ,,	140	32	101 $\frac{3}{4}$	
5th ,,	120	30	100 $\frac{4}{5}$	
6th ,,	120	28	99 $\frac{3}{4}$	Tongue very dry.
7th ,,	110	25	101	Do. do.
8th ,,	112	25	100 $\frac{4}{5}$	Do. do.
9th ,,	114	25	101	Do. do.
10th ,,	120	28	102	Flap on abdomen sloughing
11th ,,	120	28	102 $\frac{1}{3}$	Tongue moist.
12th ,,	124	30	102 $\frac{2}{3}$	
13th ,,	120	28	102 $\frac{1}{3}$	
14th ,,	120	28	101	
15th ,,	116	28	102	
16th ,,	112	26	101	
17th ,,	112	26	101	Sloughs separated, leaving large suppurative surface
18th ,,	124	30	102 $\frac{2}{3}$	
19th ,,	124	30	102 $\frac{1}{5}$	
20th ,,	112	28	101 $\frac{2}{3}$	
21st ,,	108	25	100	

The secondary fever, which is obviously identical with the suppurative fever of some authors, is, properly speaking, a not infrequent

complication of traumatic fever; it occurs in about one-third of the cases, and is apt to take place in subjects debilitated by severe nervous shock, by hemorrhage, or by copious suppuration. The probable causes of it are the retention of pus or of some products of decomposition; or perhaps the extension of inflammation from the wound to neighbouring parts. Simple retention of urine or of fecal matters may occasion some exacerbation of the fever.

At all events, this so-called secondary fever is an intermediate link connecting simple traumatic fever with the graver forms of purulent infection (septicemia, pyemia, &c.)

EXPERIMENTAL RESEARCHES.

Many experiments have been from time to time undertaken in the hope of solving some of the problems connected with purulent infection. The researches of Lee, Bennett, Ducrest, and Castelnau, Sédillot, and others, are well known. The experimental observations of Billroth and Weber have, in my judgment, greater value than any that have preceded them, and the closely similar results which they have obtained give great weight to their conclusions.

The memoir of Billroth has been translated almost *in extenso* in the *Archives Generales de Médecine* for 1865. The observations of Weber have appeared in the *Deutsche Klinik*. I shall attempt to give a brief *résumé* of their experiments, which are numerous, and have been performed with much care.

From Hunter's time up to the present, many observations have been made on the temperature of inflamed parts, and I may add that a good deal of difference of opinion has existed upon this subject. Indeed, Billroth and Weber were not themselves found to be exactly in accord upon this question.

Weber has, however, more recently repeated the beautiful experiments of Simon and Montgomery, made with the assistance of the thermo-electric apparatus and galvanometer, and has obtained results identical with theirs. These results also show a very remarkable degree of constancy, thus in thirty-six out of thirty-nine cases, the temperature of the inflamed parts was found to be elevated in some degree. Weber and Simon, therefore, coincide in establishing the following propositions:—

1st. Inflamed parts are warmer than the corresponding healthy parts.

2nd. The arterial blood going to inflamed parts is not so warm as these parts themselves.

3rd. The venous blood coming from inflamed parts is less warm than these parts, yet it is warmer than the arterial blood, and warmer also than the venous blood of the symmetrical healthy part.

Hence, it appears that wounds as centres of inflammation possess a temperature more elevated than healthy parts; that in fact there is going on in parts subject to inflammation, an active combustion or oxygenation, causing a slight increase of temperature of the blood; yet it is quite certain that this increase is not sufficient to account for the amount of heat developed as an accompaniment of traumatic fever. To explain this some other cause must be sought for.

Billroth and Weber have instituted a series of experiments, upon the effects produced by the introduction into the organism of a variety of substances such as the different products of suppuration, various septic substances, and blood. Some of these substances, when injected, either subcutaneously or into the veins, are found to excite inflammation either local or in the viscera; such are designated as *phlogogenic* substances or inflammation-excitors; whilst those, on the other hand, which cause an increase of temperature without exciting inflammatory action, are named *pyrogenic* substances or fever-excitors.

In a first series of experiments, Billroth injected beneath the skin or into the veins of dogs fresh or altered pus; these researches showed that the injection of such liquids always caused a constant increase of temperature, the highest degree being reached twenty-two, twenty-five, or twenty-eight hours after a simple injection. These purulent matters, when injected, likewise produce a local inflammation, generally giving rise to abscess, sometimes to gangrene of the skin.

In these experiments it is true that both local inflammation and fever resulted from the injections; yet the increase of temperature does not appear to be attributable to the local inflammation or to arise as a consequence of it, for the injection of the purulent matters into the blood gave rise to increase of temperature before any local inflammation was excited.

Billroth's next step was, in a second series of experiments, to try to determine which of the constituents of pus may be that to which we should really attribute the fever-exciting property. In order to decide this question he selected various substances found in pus undergoing decomposition; with these he made injections both

subcutaneously and into the veins. In this way he investigated the properties of sulphuretted hydrogen, bi-sulphuret of carbon, sulphuret of ammonium, carbonate of ammonia, leucine. As regards local effects the following results were obtained:—Sulphuretted hydrogen and bi-sulphuret of carbon do not give rise to any local inflammation; sulphuret of ammonium causes suppuration with fever; carbonate of ammonia produces very intense local effects followed by fever.

As regards temperature, sulphuretted hydrogen does not induce any change; bi-sulphuret of carbon caused a considerable augmentation of heat; sulphuret of ammonium produced no immediate effect on the temperature. But leucine in three experiments excited an increase of heat so considerable that the thermometer stood at 104° Fahr. Carbonate of ammonia gave very remarkable results, entirely different from all the other substances; injections of it were always followed by a lowering of temperature proportionate to the quantity injected.

This phenomenon is unquestionably one of great interest, especially when we consider its bearings on the symptoms of uremia.

As regards the constitutional disturbance which it excites, Billroth has found that perfectly fresh pus acts even more energetically than desiccated or putrid pus.

Weber has verified many of the foregoing results, and even confirmed many points still doubtful. Thus he has found that pus, the filtered serum of pus, sulphuretted hydrogen, and various products of exudation, are of a phlogogenic nature, that is, excite inflammation. Besides every one of these substances is likewise pyrogenic, that is, they excite a fever and cause an augmentation of temperature not dependent on the local inflammation. He has found also that not only carbonate of ammonia, but likewise butyric acid causes a remarkable lowering of temperature. Weber has also discovered the important fact that not only does the pus of one animal, when injected into the veins of a second, excite fever, but the pus of an animal when injected into its own veins is followed by an intense febrile excitement in this same animal. He has likewise shown that the blood itself, under certain conditions, may excite fever; in fact when the blood of a dog attacked with fever is injected into the veins of a healthy dog, this animal is attacked with fever. The blood bears with it the ingredients which excite the fever, and each fresh injection causes an exacerbation of the febrile condition.

Weber has not limited himself to the study of the temperature

and the phenomena of inflammation; he has likewise made observations on the variations of weight in his various experiments, and has brought to light some most interesting results; comparing the loss of weight of animals affected by fever in consequence of injections of putrescent matters, with the loss of weight resulting from simple inanition, he has established the important fact, that fever produces a loss of weight about twice as great as that due to absolute starvation. According to the experiments of Bidder and Schmidt (made in order to test the accuracy of Weber's results), a cat deprived of food lost, in the first six days, 2.97 per cent. of its own weight; a cat, in which fever had been excited by the injection of sulphuretted hydrogen, lost in two days 3.7 per cent. of its own weight, that is to say, 0.73 per cent. more than in the case of simple inanition. A dog, into whose pleural cavity pus had been injected, lost 2.8 per cent. of his own weight every day; whilst Bischoff and Voit have observed that a healthy dog kept fasting for six days lost only 1.28 per cent. of his own weight daily. It is clear, therefore, that the loss of weight occurring as a result of fever is not a mere consequence of loss of appetite and diminished nutrition, but a consequence of the augmented process of combustion excited by the ferment which, acting on the blood, has called the fever into existence.

Dr. R. Schneider,^a of Königsberg, has lately published some very valuable observations on this subject, made upon patients in his surgical clinique. His facts are derived from a comparison of patients affected with traumatic fever with persons not suffering from fever; the latter class of cases were patients who happened to be in hospital, but on account of accidents or complaints unaccompanied by traumatic fever. He admits that, in spite of every trouble and care which he could take, his results are not absolutely free from error; indeed it is obvious that where, as in some cases, the entire bed and bedding had to be weighed along with the patient, exact scientific accuracy could hardly be obtained. Yet it is clear from his tables that he took great pains to obtain as correct results as possible. His general conclusions are:—

1st. The results of those researches which are purely physiological (that is those made on individuals free from fever), agree with the results of other observers, and show that in the human economy there is no absolutely constant relation each day between the income

^a Untersuchungen über das Körpergewicht während des Wundfiebers: von Dr. R. Schneider: Archiv für Klinische Chirurgie von Langenbeck. 1869. P. 131.

and expenditure; yet that these on the whole bear a fixed relation to each other, although varying in different individuals.

2nd. During one day's complete abstinence from food no real difference was observed in the materials given off.

3rd. A diminution of weight takes place in consequence of traumatic fever. This does not always advance steadily and at equal rate to the end of the fever, but during the progress of the illness, particularly towards the later period of it, is subject to slight variations. After the fever subsides the weight commences to increase, and if it has not been of an intense kind the original weight of the body may be attained in one week. A longer time is needed if the fever has been intense, or of long duration.

4th. If secondary fever comes on, the weight of the body falls off again, even although it previously began to increase.

5th. In patients suffering from traumatic fever as well as in those free from fever, there are daily variations; as a rule the minimum weight is observed in the forenoon and the maximum after supper.

6th. In case of traumatic the loss of weight is usually greatest on the first day. It amounts to $\frac{3}{4}$, or 1 or even 2 per cent. of the weight of the body, when there has not been any considerable loss of blood either at or after the operation; the loss of weight is more marked if there has been much hemorrhage; if the fever runs high in consequence of any complication, such, for instance, as erysipelas, the loss may amount to 3 per cent.

7th. In consequence of traumatic fever, there is a less quantity of nutriment taken into the economy, but likewise the outgoings are diminished. As regards the latter there is a striking difference between those which may be called the perceptible and the imperceptible; thus, whilst the first (especially the quantity of the urine) diminish absolutely as well as relatively, the perspiration undergoes a considerable augmentation.

8th. In pyemia a great loss of weight takes place, from 3 to 4 per cent. of the weight of the body daily.

9th. The percentage of urea in the urine keeps pace with the progress of the fever: the largest elimination of this material follows some time after the highest degree of temperature. A more violent degree of fever does not usually cause a more marked elimination of urea, but through individual influences a large elimination of this substance may take place even when the fever is slight.

The theory that the various phenomena observed in the fever

following surgical operations are due to the so-called apocoptic plethora (that is, to the condition of plethora due to the relative augmentation of the mass of the blood in comparison with the weight of the body, which is lessened by the sudden removal of an important portion or a limb), is not now generally accepted. Nevertheless an observation made by Weber has some value, inasmuch as it seems to be a positive refutation of any such idea, proving, in fact, that no such plethora actually occurs. Before performing an operation upon a dog Weber measured with a manometer the tension of the circulation. Before the operation the tension, as measured in the carotid, oscillated between 33 and 71 millimetres. The right femoral artery was then tied; the pressure oscillated between 35 and 73. During amputation of the right thigh it was not higher than between 30 and 40. When the remaining arteries were tied the pressure was from 44 to 53, and then gradually became fixed at between 34 and 48. Thus, *before the operation*, the mean of the oscillations was about 38 millimetres, with a maximum of tension of 73 millimetres; *after the operation* the mean of the oscillations was not more than 14, with a maximum tension of 48 millimetres.

Much discussion has taken place upon the part played by the nerves and their irritation in the increase of temperature, which is so prominent a feature in traumatic fever and traumatic reaction. It is a subject well deserving of further research. We know that the temperature of the ear and side of the head is augmented after division of the cervical sympathetic nerves: in this case more blood circulates in the part in consequence of the paralysis of the muscular coats of the blood vessels; and although comparatively hotter than the symmetrical portion of the body, yet the temperature does not exceed that which is the normal heat of the blood in internal parts. In some injuries of the spine, however, the case is different. Sir B. Brodie has recorded a case of fracture of the spine in which the temperature rose to 111° F., when the bulb of the thermometer was placed between the scrotum and the thigh. A case has been lately reported by my colleague, Dr. Edward Hamilton, in which the temperature was found to be 106° in the axilla; in another instance, in a patient of my own in Dr. Steevens' Hospital, the thermometer stood at 104° in the axilla. Here there is an absolute increase in the temperature of the blood running far above the normal temperature of that fluid in any part of the body; and the question naturally arises, to what is this increase owing? Is it due

to an irritation of the nerves arising from the part of the spinal cord engaged in the injury? or is it a secondary effect,—the nervous irritation causing, in the first instance, a disturbance in the functions of some organ (as suppose the liver) which, when thus excited, secretes some morbid material, and this acting through the blood as a phlogogenic matter produces fever heat? These are questions which science has still to answer. One problem in connexion with this interesting subject has been solved by the experiments of Breuer and Chrobak.* They proposed to themselves to investigate how far it was possible to excite traumatic fever by injuries or operations upon parts in which all nervous communication was interrupted by severance of the nerves. The experiments were made upon dogs; the sciatic, obturator, and crural nerves were cut across at their exit from the pelvis, and portions of them resected. The filaments of the sympathetic were also divided, so far as was possible. The leg and foot were thus deprived of communication with the nervous centres. The wounds were allowed to heal, and the further experiments were not undertaken for from four to eight weeks later. Wounds were then inflicted upon the enervated parts of these animals, and, for the sake of accurate comparison, traumatic fever was likewise excited upon healthy animals by the infliction of wounds as nearly as possible similar. There was a close analogy in the results obtained upon these two sets of animals. In the case of the paralysed dogs the temperature rose upon the second day after the injury to over 105° F.

From this series of experiments MM. Breuer and Chrobak have been led to the conclusions that the fever accompanying traumatic inflammations is independent of the action of the nervous system.

Dr. B. W. Foster has drawn attention to the fact that in diabetes the temperature is always below the natural standard, the depression usually varying from one to three degrees. In cases of recent origin the temperature ranges between 96° and 97·5° F., never mounting to or going beyond the normal standard, except from some disturbing cause. In more advanced cases the temperature is nearly always below 97°, and occasionally falls as low as 94·5°. Whether this depression of temperature may be due to the saccharine matter circulating in the blood is a question concerning which I am not aware that any precise experiments have been made.

* Zur Lehre von Wundfieber.

I have myself observed that after lesions of the medulla oblongata, made in order to induce artificial diabetes, there follows a marked depression of temperature. The normal temperature observed when the bulb of the thermometer is introduced some inches into the rectum of a rabbit is 104° to 105° ; after puncturing the medulla oblongata (or spinal cord high up) the temperature falls sometimes to 96° or 97° . How far this lowering of temperature is to be regarded as the converse of the increase observed in some other injuries of the spine, is also a subject for further investigation. I would merely observe that there is nothing contradictory in supposing that injuries of different parts of the nervous centres may thus secondarily be followed, one by increase, another by diminution of temperature; a disturbance of the functions of the lung, liver, or other organ, being followed in the one case by the formation of some material, which, passing into the circulation, acts as a fever exciter, as sulphuret of carbon, or in another as a heat depresser, as carbonate of ammonia.

Without discussing further the various theories, mechanical, zymotic, septic, &c., which have each had able men among their advocates, let me say that the septic theory is that which is at present in the ascendant, as being that which gives the simplest explanation of the symptoms of traumatic fever and purulent infection: it is that which has given birth to the antiseptic method of treating wounds, or that known as Lister's method.

A considerable amount of evidence has now been accumulated from various practitioners upon the subject of the treatment of wounds by Lister's method. Although, as regards this as upon most similar topics, there is some diversity of opinion, yet it must, upon the whole, be singularly gratifying to the distinguished surgeon who has done so much to establish the antiseptic treatment of wounds to find how strong the testimony of independent observers is in favour of his practice. A valuable contribution upon the subject has already appeared in the pages of this journal. It would, I conceive, be tiresome and unnecessary to enter fully into the details of cases in which I have myself had experience of it. The success which I have witnessed as attendant upon it leads me to form a very high estimate of its merits. Indeed my opinion, as formed from the results which I have met with, may be expressed in very few words. It is briefly this: That the torsion of arteries combined with antiseptic dressing carefully applied, and with due attention to details, leaves little to be desired as regards the treat-

ment of wounds. This department of surgery would seem almost to have attained by these means the highest degree of perfection of which it is capable.

Under its influence the wound itself heals rapidly, kindly, and with little or no suppuration; while the traumatic fever is prevented. I have now watched a large number of cases of formidable operations, removal of tumours, amputation, &c., in which the temperature was accurately noted from day to day, yet the thermometer was rarely found to rise above 100°.

It is, of course, true that in order to establish the fact that antiseptic dressings containing carbolic acid prevent traumatic fever and its more formidable allies from attacking patients after operations and injuries, we must have comparative results from similar cases treated upon different plans. Yet, of this I am convinced, that since I have adopted the use of carbolic acid dressings, I have not met with constitutional disturbance among my cases such as I was used to formerly.

It is quite certain that many cases of even formidable wounds may recover without any traumatic fever supervening without the application of any antiseptic dressing; the question is, are not these cases greatly increased in number by this treatment? I cannot hesitate to say that they are. Billroth met with twenty cases out of 273, in which the traumatic fever was absent. Among these were some grave operations upon the face, one partial resection of the upper jaw, lesions of the phalanges, &c. Mr. Thomas Pick, in an interesting paper in *St. George's Hospital Reports*, states that in 108 cases tabulated by him thirty-five were absolutely free from symptoms of a febrile nature. Among these thirty-five cases several were wounds of a very severe description, including among others an amputation of the leg, two compound fractures, and an amputation of the breast; whereas several wounds of a slight description were followed by very severe symptoms.

Under carefully applied antiseptic treatment this proportion seems to be reversed: those cases are few in number in which any very marked symptoms of traumatic fever occur. It is true some increase of temperature usually takes place on the third or fourth day, yet very rarely have I seen formidable symptoms arise, and I believe I am correct in stating that no case of pyemia has occurred in Steevens' Hospital in any case hitherto in which carbolic acid dressing has been used.

My resident pupils, Messrs. Fitzgerald and Rathborne, have

noted the temperature, &c., in a large number of cases, from which I select the following, in all of which carbolic acid dressing was used:—

1st. Under the care of Dr. Colles—J. Middleton, aged forty-seven. Operation: Removal of a large fatty tumour from left breast (colloid lipoma); patient in good health before operation; chloroform used. Operation February 15th, 1868.

Day after Injury	Pulse	Respiration	Temperature
Day of Operation,	60	14	98 $\frac{1}{2}$
1st day after,	60	14	99
2nd ,,	72	16	101
3rd ,,	72	16	100 $\frac{1}{2}$
4th ,,	70	16	98
5th ,,	72	16	98
6th ,,	68	14	98
7th ,,	68	14	98

2nd. Under the care of Dr. Hamilton—Mrs. Kane. Operation July 25th, 1868: Removal of malignant tumour of left breast; chloroform administered; torsion used to control hemorrhage; wound dressed with carbolic oil and paste; no suppuration; wound healed by first intention:—

	Temperature.
Day of Operation,	98·4
1st day succeeding,	98·4
3rd ,,	99
4th ,,	98·4
5th ,,	99
6th ,,	98
7th ,,	98

3rd Case: Under my own care—J. Leedom, aged fifty. September 12th, 1868: Amputation of right leg for disease, consequent upon compound dislocation of ankle-joint; torsion applied to all

vessels save the anterior tibial artery, which was controlled by acupressure.

On the day succeeding the operation:—

Pulse.	Respiration.	Temperature.
100	30	99·4

Upon no day during speedy convalescence did the constitutional disturbance exceed this.

I might add to these, did I not feel it to be unnecessary, a large number of similar cases. It would be only to enumerate such cases as have already appeared in the pages of this journal in the communication of Dr. W. MacCormac, of Belfast, on the antiseptic treatment of wounds. He states that "he has observed over and over again the almost total absence of pain, inflammatory swelling, and surgical fever, where such might otherwise have been expected to occur." To this I can merely add that in the cases tabulated by me the absence of fever has been proved by thermometric observations.

Let me say in conclusion that I heartily concur with Dr. MacCormac in deprecating the attempts which have been made to deprive Professor Lister of the immense merit of having introduced this plan of treatment, a plan which bids fair to achieve great results, a plan which I doubt not will gain a lasting reputation for its author.

ART. V.—*A Case in which Septic Infection, which terminated in Death, was caused by the Breaking of a Dracunculus or Guinea-Worm, during an attempt made by the Patient to extract it.* By JOLLIFFE TUFNELL, F. and Examiner in Surgery R.C.S.I., M.R.I.A.; Surgeon to the City of Dublin Hospital; Ex-Regius Professor of Military Surgery.

THE gentleman the subject of this communication was thirty-eight years of age, a temperate and very healthy man. He had been in India for some years engaged upon the geological survey of the Madras Presidency, and, as such, was necessarily much exposed to jungle, and other influences tending to fever, and he suffered accordingly from ague on several occasions. He also had guinea-worm a few years back, which attacked him in an unusual situation, namely, above the condyle of the humerus of the left arm.