

Notes on the medical history and statistics of the British Legion of Spain : comprising the results of gun-shot wounds, in relation to important questions in surgery / by Rutherford Alcock.

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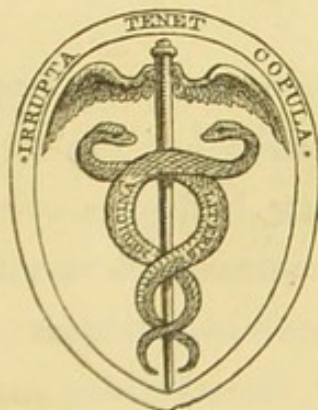
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NOTES
ON THE
MEDICAL HISTORY AND STATISTICS
OF THE
BRITISH LEGION OF SPAIN;

COMPRISING
THE RESULTS OF GUN-SHOT WOUNDS, IN RELATION TO
IMPORTANT QUESTIONS IN SURGERY.

BY
RUTHERFORD ALCOCK, K.T.S. &c.
DEPUTY INSPECTOR GENERAL OF HOSPITALS, WITH THE AUXILIARY FORCES
IN PORTUGAL AND SPAIN.



LONDON:
JOHN CHURCHILL, PRINCES STREET, SOHO.

MDCCCXXXVIII.

NOTES

OF THE

MEDICAL HISTORY AND STATISTICS

OF THE

BRITISH LEGION OF SPAIN

LONDON

THE RESULTS OF AN ENQUIRY INTO THE
MORAL AND PHYSICAL STATE OF THE

BY

ROBERTSON ALCOCK, M.D. &c.

WITH AN APPENDIX OF ORIGINAL DOCUMENTS
AND A HISTORY OF THE LEGION



LONDON

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TO
SIR GEORGE DE LACY EVANS, M.P. K.C.B.

LIEUTENANT GENERAL
OF THE NATIONAL ARMY OF SPAIN,

KNIGHT GRAND CROSS OF THE ROYAL ORDER OF CARLOS III., AND OF THE ROYAL
AND MILITARY ORDER OF SAN FERNANDO,
&c. &c. &c.

SIR,

Although a sketch of the Legion's Medical History necessarily contains many details purely scientific, yet to no one can it be so justly addressed as to the Commander in Chief of that force.

These pages may perhaps afford some proof that the health of the Legion, and its sick and wounded, were not confided to careless hands, but to a medical staff, anxious to perform their duty under whatever disadvantages or trials the nature of the service might accumulate;—and that the results of their exertions were not unsatisfactory. If this object be attained, their perusal cannot fail to afford you pleasure.

I cannot forget that to your favourable opinion, not less than to that of the Head of the Medical Department, I owed

a station in the Legion which enabled me to study and collect, on an extensive scale, the facts herein embodied. I trust you will accept this sketch, therefore, as a proof of grateful remembrance of many and long-continued acts of personal kindness.

I have the honour to be, Sir,

Your most obedient Servant,

RUTHERFORD ALCOCK.

Park Place, St. James's,

February, 1838.

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MEDICAL HISTORY, &c.

PART I.

AN arduous service in which those employed have been much maligned and little praised—a service abounding in toil, peril, and privation, and rewarded by hard blows and harder words, seems at last to have drawn to a close, by the dissolution of the 2nd Legion.

It has not been a service, however, of unmixed evil, as some of our friends would have the world believe. In other and abler hands I leave the agreeable task of proving the amount of good, in a military and political point of view, resulting from the part which the Legion took in the struggle. On me, more naturally, devolves the not less grateful labour of showing that the medical experience, gained in a field so fruitful in opportunities of the most valuable kind, was not altogether unimportant.

I feel there is another duty to perform—that of rendering justice to the zeal, ability, and courage of a numerous medical staff, who entered the service regardless of taunts and sneers at home, and were neither prevented by privation

nor danger from discharging their duties faithfully, during a period abounding in both.

In Vitoria, during the first winter, there were trials falling upon the medical officers alone calculated to paralyse all exertion from the conviction of its inefficiency to remedy evils which seemed each day to increase, bringing fresh sources of confusion and misery in their train. Even stout hearts seemed to quail; for many of our number were carried from the hospitals to their quarters to rave, in the sharp access of their delirium, of blackened feet rotting from the living flesh, of the screams of the dying still struggling among the dead, until they themselves were added to the list. Such scenes had they daily witnessed, and their faithful picture and piercing shrieks, more than once, in spite of the stoicism of habit, made me start and shudder.* Eleven medical officers died in four months, at Vitoria, and during the same period only six escaped from attacks of fever, so severe, as to leave them long in a shattered state—some, indeed, to this day feel its enervating effects. Strong motives, and minds not easily unnerved, were necessary at such a period, and it is with pride and gratitude that I remember the courage and zeal with which the Inspector-general and myself were seconded and aided to the last by the medical officers of the Legion, at head-quarters; so many of whom we had to regret, carried off in the midst of exertions, by which alone we could hope to prevent a still more serious loss of life.

On our return to San Sebastian, where regular hospitals were established for the British force—large establishments, where little was left unsupplied which the medical officers deemed necessary—the change was not less grateful to the surgeons than to the patients. The same officers who had

* The total loss in medical officers, at the different stations during the period of service, was *seventeen*: fifteen of these in the first winter.

toiled indefatigably when a sense of fulfilling an important duty could alone repay them, now applied, not less zealously, to the far more agreeable and fruitful labour of carefully observing and recording, the manifold facts presented by the treatment of nearly 5,000 cases—more than 1,500 of which were from gun-shot wounds.*

In no way can I more effectually render them justice than by these sheets, which give the general results of the service connected with their labours. Another work would be required to complete the task, showing the most interesting facts observed during the treatment of the wounded and others, with such illustrations and details, as would render it generally practical and useful: this, however, is a work requiring much time and labour, and the more so, that the materials are abundant.

The medical history of the Legion is divided into two periods—the first chiefly absorbed in the data and general results relating to the fever which decimated the force. The second devoted to the consideration of the casualties of the field—of the nature, treatment, progress, and result of gun-shot wounds, borne out by a more complete body of notes, preparations and accurate returns, than can often be obtained in any service, from the fortuitous circumstance that the force was employed during fourteen months in the same lines, and almost always within two hours of the hospital where they remained, under the same medical officers who received them, with some rare exceptions, until either cured, invalided, or dead—a circum-

* To these officers generally I feel personally much indebted, for the ready assistance and indefatigable zeal with which they seconded me in following out my views relative to the wounded, furnishing me with notes, preparations, &c., of every case of interest. To Staff Surgeon Johnson, Surgeon Sholl, and Assistant Staff Surgeon Dolce, particularly, I am obliged for the ability and unremitting labour, extending far beyond the limits of their mere duties, which they invariably displayed in the collection and arrangement of the various data and preparations required.

stance which must be of very rare occurrence in most armies, and affording extraordinary advantages for observation.

In the summer and autumn of 1835, the recruits for the Legion were landed along the northern coast of Spain, at Santander, Bilbao and San Sebastian. Near the end of October, between 7,000 and 8,000 men were in the country, and in about the following proportion. English 3,200, Irish 2,800, Scotch 1,800. The English were upon the whole a bad class as to physical capacity; a great number of them were sickly Londoners, or men recruited from Liverpool and Bristol, accustomed to the enervating life of a large city, and exposed to a total change of climate, food, and mode of life, on their arrival in Spain. The same observation applies to the Scotch, who were chiefly from the manufacturing towns—Glasgow and its neighbourhood—probably not more than 150 from the Highlands. The change of existence from a weaver to a soldier on active service is as violent as can be conceived. The Irish were undoubtedly of all the Legion the men who were physically and morally the best adapted for the service. Although many were recruited in Dublin and Cork, yet the majority were accustomed to pass their days in the open fields, and to sleep soundly on a mud floor, or the hill side—to eat what they could get, and when and where, with little regularity, but with a cheerful hardihood that makes even poverty sit lightly on the heart and frame. The career of the Legion through storm and sunshine gave a fair field for the observation of national temperaments. It often seemed to me that both English and Scotch were quite capable of growing thin, miserable, and sick upon the moody anticipation of evils and privations, while the reality itself seldom broke down the Irishman, and never until it produced actual disease. The result would seem to prove very unequivocally the fact, however little flattering it may be to my own countrymen.

At Vitoria, during the first winter of the Legion's service, the English brigade of infantry was swept into the hospitals with great rapidity—one-third nearly—the Scotch next, about one-fifth—and the Irish but in a comparatively moderate proportion, probably not more than an eighth. I regret exceedingly that the exact numbers cannot be given; I had, however, abundant means of satisfying myself that such was the proportion.

Sir James Macgrigor, in his "Sketch of the Medical History of the Peninsular War," gives several parallel instances of the sickness and mortality of recruits, and particularly among artizans; and the recruits of the British army must always have been, as I shall have occasion to show, of a far superior class to the great proportion of those sent out for the Legion. He says, "The 7th regiment, in its nine first months in the country, lost 169 recruits out of 353," that is, nearly *one-half*. In the 40th regiment there were 104 deaths out of 450 recruits—a little less than *one-fourth*. Yet," he adds, "no regiments on that service were more ably commanded, or better officered, than the Fusileers and 40th regiment." With respect to manufacturers and artizans, he further remarks, that, "of 358 recruits joining the 7th regiment in Portugal in 1810—11, 201 of them were artificers and manufacturers, and 152 had followed agricultural pursuits; in the course of a few months, 122 of the former and 62 of the latter died—the proportion being six out of ten in the artizans, and four out of ten in the agriculturists:" the one being a mortality of *more than one half*, the other less, but *more than a third*. This is a mortality fully equal to, if not exceeding, any which occurred in the Legion.

The national proportions of the Legion have been stated, but to understand its general character and composition we must go a little further. Before the force marched from Bilbao, a Medical Board, on which both the Inspector-general and my-

self sat, ascertained that upon an average 100 men in each regiment of infantry were either too young or too old for service, deformed, diseased, or crippled. Between 200 and 300 were invalided, as men absolutely and totally incapable of bearing arms. There were not means, it seemed, of embarking all, and the greater part even of these last, were still kept hanging on with the Legion. The system of recruiting adopted by the Spanish government, paying recruiting agents so much per head, without the previous precaution of *responsible* examination by medical officers, led to this evil, which was soon found to be of great magnitude. During the ten days which a Medical Board sat, some of the oddest cases imaginable were brought before them. Now it was a stripling of fourteen years, and now a hunchback, followed by an old soldier who had lost three fingers of his right hand, or an old man with a club foot, or a youth with a wry neck! But some of the recruiting agents seemed to have adopted a line of the Scottish poet for their motto, and to have exclaimed to the hunchbacked, the wry-necked, and digitless, while thinking of the "guinea stamp,"

"A man's a man for a' that!"

And, indeed, the government alone were chiefly to blame, for not taking proper measures to secure, *and abide by* the opinion of competent medical men, rather than to their enlisting agents, as to what might be considered "a proper man." It was no unfrequent occurrence for some of the medical officers to recognise in the ranks, after their arrival in Spain, men who *had* been submitted to them for inspection and been by them *rejected*. Thus, the form alone was adhered to, even at best, for the surgeon's veto seemed no impediment to their being shipped. A great number of men, however, never were examined. And wherever the blame may lie, the result was clear before us, that one-eighth at least of the whole force was

unfit for service and ought never to have been enlisted. We had in the ranks about a thousand men tainted, partially or totally disabled by disease, and from phthisis and scrofula, down to old ulcers, and varicose veins, the whole catalogue of the "disabilities for the British army"—and it is a long one, might have been run through with great facility. Of this number two-thirds, I should think, died in the hospital, and the whole number, without probably ever doing one day's effective duty, merely served to swell the numerical returns of the force, and crowd to a fatal degree the hospitals. It may be remarked, in addition, that of those classed as *fit for service*, that is, neither crippled nor diseased, two-thirds only were in the flower of manhood, or such as would be accepted in the British service; the rest were either youths or elderly men. No registers having been kept of the whole force showing the age of each individual, it is impossible to give with greater accuracy the exact proportions.

During the period of service, at different intervals, recruits were sent out, probably amounting to 1,500, and apparently enlisted after the same orthodox fashion, notwithstanding Mr. Callander, the Inspector-general of hospitals, received some long communications, written by different officers and persons employed in England, to assure us that some of the worst cases, sent back by the decision of a Medical Board held in San Sebastian, in the same vessel which brought them out, were very sound and fitting men: and with a perseverance much to be lauded, had its object been equally praiseworthy, these very men were actually returned to us.

The returns of the General Military Hospitals of the Legion, during the period of service, from twenty-two to twenty-three months, give the following results: 13,407 cases admitted, 1,588 deaths; which makes the proportion of deaths about one in eight and a half, of the total number of cases treated, or presuming the total amount of force disembarked in the

country to be 9,600, including recruits, a loss in hospital of about one in six of the whole force.

The number of cases treated, however, and the number of deaths, were both rather more than would appear in these returns, which only include the general hospitals established. There were also from time to time, and at different stations, where there was no general hospital, regimental wards; and during the period of our extreme loss, the troops were, in the depth of a most rigorous winter, changing their quarters from village to village, sometimes at two and three leagues from the larger establishments, and from the state of the roads cut off from all frequent communication. Thus arose the necessity of treating the sick in their miserable cantonments, as circumstances would best allow. At other times men were taken sick on the road, and left in the nearest Spanish hospital, or where a portion of the force was temporarily detached, the sick were received altogether in those establishments. Availing myself, therefore, of such returns and notes as I was enabled to collect, the total number of cases treated is estimated at 14,307, and the deaths in hospital 2,012, or in round numbers at 14,000, and 2,000, including wounded, making the proportion of deaths to cases treated, one in seven, or of deaths to the whole force, about one in four and two-thirds.

The following abstract, as regards the total loss in twenty-three months, is instructive. It will be seen, that the proportionate loss upon the whole force, both officers and men, is precisely the same—while the proportionate mortality in wounded officers and men varies considerably. Mr. Guthrie remarks the same fact, after the battle of Thoulouse, without being able to offer any satisfactory explanation of the cause of difference. A feather's weight will turn the balance upon which a life often hangs; and probably advantages of position and nursing, apparently trifling, are sufficient, in many cases, to decide the result.

Total force of serjeants, rank and file, disembarked in the country during twenty-three months	9,600
Officers	400
	<hr/>
	10,000
	<hr/>
Total officers killed in action	20
Rank and file	381
	<hr/>
	401
	<hr/>
Total of wounded officers	197
Rank and file*	1,495
	<hr/>
	1,692
	<hr/>
Total of officers who died of wounds	16
Rank and file	212
	<hr/>
	228
	<hr/>
Officers from sickness	62
Rank and file	1,788
	<hr/>
Total loss in quarters	2,078
On the field	401
	<hr/>
Total Loss	2,479

	Officers.		Rank and file.
	Proportion to total force.		Proportion to total force.
Loss by death in action	20 1 in 20	381	1 in 25
— from wounds	16 1 in 25	212	1 in 44
— from sickness	62 1 in 6	1,788	1 in 5¼
Casualties	2		
	<hr/>		<hr/>
	100	2,381	

Loss one-fourth of the force. Loss one-fourth of the force.

Deaths in officers wounded to number treated. 1 in 12

 Ditto rank and file 1 in 7

* The wounded here brought into the abstract merely include those received

Having now generally stated the results and the circumstances under which they took place, defining, first, the class of subjects comprising the force, we may enter more fully into details, and follow, in regular order, the movements of the Legion; tracing accurately the various phases of disease, their determining causes and special results.

The months of July, August and September, were occupied in the gradual disembarkation of the men, and the organization of the force. In October nearly the whole, with the exception of the cavalry, were concentrated in Bilbao; a town of some size, situated on the banks of a river, in a deep valley. A portion of the troops were but badly quartered; and neither the discipline nor internal economy could, at so early a period, be very perfect, consequently considerable excess was frequent—the cheapness of the wine and aquadiente of the country greatly increasing the difficulty of prevention. Notwithstanding this, the sickness both at Santander and Bilbao was exceedingly moderate; about 500 out of the whole number, and by far the greater proportion trifling cases—sprains, slight fevers, or diarrhœas, and catarrhs, from debauchery: for a general hospital, which was established at Bilbao, destined only for severe cases, never had more than 150 in its wards. The cases admitted into San Esperanza, (the general hospital) were chiefly dysentery, or dysentery and fever combined; simple continued fever; rheumatism; acute ophthalmia;*

in hospital. It will be shown hereafter that many slight cases were not brought into those returns—probably 300 in the whole.

* At one period the number of cases of acute ophthalmia reported by the regimental surgeons became sufficient to attract the attention of the Inspector-general, and a few cases that had been admitted into the general hospital, at that time under my charge, seemed to have attained a degree of aggravation which medical aid, properly directed, is well capable of preventing. In company with Mr. Callander I visited all the regimental establishments, and selected the whole of the cases, amounting to near fifty, and directed them to be sent to the general hospital. The simple but efficacious treatment practised and taught by Mr. Guthrie was adopted without delay, and in a fortnight all the ophthalmia cases had returned to their duty well: in one or two cases, after blistering, bleeding, cupping and leeches, had previously been tried in vain,

sore legs; casualties; confluent small-pox: and in this order as to number. The number of deaths was very small. In this hospital, from the 15th of September to the 15th of October, 296 patients were admitted, 202 discharged, seven died, and eighty-seven remained under treatment; thus the deaths were as one to forty-two.

The weather was fine, the rations good, and the spirits of the men, excited by the novelty of the scenes, and mode of life, excellent. In this state, after a few marches and skirmishes, at San Sebastian and Bilbao, the Legion commenced its march into the interior on the 29th of October.

The sick and convalescent were left behind, with a portion of the medical staff, to be transferred to the Legion depôt at Santander. Nothing could be finer than the weather, or more picturesque and invigorating than the mountain scenery through which our route lay. The second day's march brought us to Castro, where we halted a day, and sent round about two hundred men who had knocked up with sore feet, fever, &c. and were unable to continue. Nearly the whole of these were weakly subjects, who should have been eliminated at Bilbao. We arrived at Bribiesca, a miserable town in the plains of Castile, on the tenth day. There had been three days' halt at different places; and each day's march had averaged from fifteen to twenty miles. The men, upon the whole, marched well for raw troops; although the weight carried was evidently grievous to many. At Bribiesca the Legion remained three weeks; the weather was cold, alternately snowing and raining. The majority of the troops were badly supplied with warm clothing, beds, or bedding; and although personal experience has taught me, that four stone walls and a roof are by no means to be despised, yet they leave a great deal to be desired when snow lies on the ground. Under these circum-

two or three judicious applications of the Ung. Hydr. Nit. sufficed—combined with very mild and simple general treatment.

stances, more sickness than we had to complain of might fairly have been expected. The number reported by the medical officers of brigades was even smaller than at Bilbao. As the sick quarters, however, presented nothing but confinement and physic in the shape of inducement, (the severe cases were sent to the Spanish General Hospital,) doubtless many who, under other circumstances, would have reported themselves sick, continued on duty. The troops, too, were daily expecting to renew their march, and scarcely time enough elapsed for the stimulus of the last to be exhausted. Thus the small sick list may perhaps be explained: for although here, probably, the seeds were germinated, of the disease so shortly destined to thin our ranks, privations are often long felt before their effects tell upon the system in any very tangible form. The Legion was again in motion on the 1st of December, and on the third arrived at Vitoria.

The loss of life, in the period we now approach, was great; yet all armies, and the British not less than others, have been, at times subjected to privations and miseries, and to a mortality, under such circumstances, fully equal to that of the Legion at its worst period: but that which leaves the sting, in all my recollections of Vitoria, was the inertness, the lukewarmness, and sometimes the hostility, of the authorities. They harped upon our independence, and seemed willing that we should die for it! The *Ordenador* of the army of the north shrugged his shoulders when the wants and the consequent sufferings of the Legion's sick were detailed to him; declaring that he could and would do nothing; and never, in his career, could he have more religiously kept his word. The contractor of the army, to a similar representation, pointed out, with equal imperturbability, that he was not bound to furnish the Legion; adding, by way of a safeguard, that he had no blankets, (the point in question,) which I had reason to know was untrue; and losing his temper,

ultimately, he declared, with a frankness which did not seem usual, "and if I had thousands, I would not give any to the Legion hospitals." It is needless to multiply examples; whether among the provincial civil authorities, or those acting from government with the army under General Cordova, or the agents of the government, sent down to the Legion, the same want of interest, and tardy or utterly disproportionate assistance, among the best, was constantly observed: that is, that we were allowed to labour under many and cruel evils which might have been removed. The means were there—the will was the power wanting.

Before entering into the peculiar character and results of the fever and dysentery at Vitoria, it may be well to glance through the period, and inquire into the causes of a degree of sickness rivalling some of the worst periods of the medical history of armies, and a fearful mortality. They were many; and, however similar in their tendency, very various in their character and mode of action.

1. An overcrowded state of the town by troops.
2. A most inclement and trying winter, both to natives and foreigners.
3. The rations; bad in quality, deficient in quantity, irregular in delivery, and imperfectly cooked.
4. The state of the hospitals, and convalescent depôt, generating and aggravating disease, and rendering impossible the adoption of all the means which medical science indicated for the treatment of the diseases.
5. Ultimately the deficiency of medical aid.

Vitoria being the centre of General Cordova's line of operations, a large mass of troops were generally in the town and its immediate neighbourhood; and during December, January, February, March, and April, we had cold weather, with frost, snow, hail and rain, alternately. The ground was generally either covered two or three feet deep with snow, or rendered almost

marshy by thaws and rain. With respect to the third cause, General Cordova, and our late Deputy Commissary General, Faxardo, have each published a pamphlet, in which the supply of rations forms a very prominent feature of the quarrel. Wherever the fault might lie, very just grounds of complaint existed.

They were indeed bad in quality. The bread was often made of unsound flour, of the worst kind, imperfectly kneaded and baked; forming a mass of black and heavy dough, calculated to puzzle the digestion of an ostrich, incapable of affording nourishment, and well adapted, on the other hand, to produce disease. It was said, the bread was intentionally mixed with deleterious matter—that it was poisoned, &c. : but I am not aware that any proof existed, and nothing is easier or more common, in times of great distress, than to raise such a cry.* All bad food is more or less poisonous; and I saw quite sufficient to generate disease, without searching for arsenic. The bread may have had something to do with the distinguishing and most distressing feature of the prevailing disease—the gangrened feet. We know at least that diseased rye will produce dry gangrene; why may not some deleterious property of bad corn produce a parallel disease—moist gangrene? †

* The contractor for bread, however, was found guilty of corresponding with Villareal, and attempting to induce our men to desert, to poison their minds, if not their bodies; and he was *garoted* in the square of Vitoria with a baker coadjutor.

† A similar prominent and fatal symptom accompanied the fever which attacked the British army in the same month, twenty-five years before. Thus Sir James Macgrigor, in the "Sketch" already quoted, states:—

"In January, 1812, fever made great havoc in all the general hospitals. At Ciudad Rodrigo, Dr. Neale informed me, that the cases of typhus had almost universally mortification of the lower extremity, with livor, and mortification of the nose. This contagious fever soon seized on all the ward masters, nurses, and orderlies, and, Dr. Neale himself excepted, upon every one of the medical officers attending the hospital." Not less than eleven of our medical men died there, &c.

"I believe I have already stated, that the clothes of the soldier was very bad;

The meat I have seen thrown into the camp kettles, so immediately after being killed, that it was still reeking and quivering with the principle of life. I have seen the same meat swallowed but half-cooked; and that at six o'clock in the evening—not probably having been received until past four. The wine was sometimes very sour and bad; at others less so, but rarely of sound quality; and these were the rations, with such addition of strong stimulus, in the shape of *aqua-diente*, to assist and irritate the stomach to its hard task, as could be bought, borrowed, or stolen, often of course sufficient in quantity to produce temporary oblivion of every evil past and present, and to lay up store of new ones by inflaming the whole of the alimentary canal.

During the first two months the Legion occupied large convents and churches, with a very imperfect supply of bedding and straw; which the improvidence of all, and dishonesty of some of the men, constantly tended to destroy or diminish, until at last the majority lay on the boards, many on flagstones, with no covering but their clothes, frequently saturated with rain and snow-water.

And yet, when anxiously asked, more than once, by officers in command, what extraordinary cause could be assigned for an amount of sickness and mortality truly alarming, something of incredulity has stolen over the countenances of my hearers while the natural causes above described were detailed: so little are we disposed to believe that great effects can be produced by the action of common causes. We are all prone to overlook or slight that which is evident, in a search after

and if I add that he had little or no bedding, I believe it will not be necessary to say anything further to account for the great prevalence of dysentery thereafter.

“In the chronic stage, and when there was much debility, success was not to be expected from any mode of treatment where the patient was unprovided with warm clothes and bedding; and I regret to say, that not unfrequently we felt the want of these *adjuvantia*.”

A picture of the Legion at Vitoria, given in gentle terms.

hidden wonders. Nor should the depressing influence of all these causes combined be forgotten. The mutual influence of the *morale* and the *physique* reacting upon each other, is too generally understood to need further proofs, but all tending, while they diminish the healthy powers of life, to feed irritation and inflammation of the stomach and intestinal canal.

These were the principal predisposing and proximate causes of the diseases which assailed the Legion. There still remains for consideration three circumstances which exercised an important influence, by fostering, propagating, and preventing the efficient treatment of any disease once contracted.

1. Want of space and accommodation for the sick.—Sir John Pringle very truly estimated among the principal causes of mortality in an army—hospitals; and doubtless, with us, where materials and means were so miserably deficient, they exercised a fatal influence. The rapid increase of sick soon crowded to overflowing the wards, which had been selected, in the first instance, in the different barracks as sufficient for the probable number; and the difficulties, the heartbreaking delays, created with all the fluent ingenuity of Spanish authorities, apparently animated by a determination “never to do to-day that which could by possibility be put off till the morrow!” Their eternal answer of “Mañana”^{*}—with many amplifications and plausible reasons, but still surely ending in that one hopeless word, made, indeed, the heart sick; while their obstinate ignorance, partly real and partly feigned, for purposes of their own, of the space and accommodation required for any given number of sick, and their unwillingness to rely upon our judgment in a matter upon which we alone could be competent judges, would pass all belief, had I not once chanced to come in contact with an English officer, and one who could count long years in the British

* To-morrow.

service, in whom something of the same kind might have been observed. Thus, while the Inspector-General, armed with all the authority of General Evans, was engaged, by entreaties, threats, commands, and, more than all, unceasing application, in wringing from the reluctant authorities a house or a convent—by the time it was placed at our disposal it was no longer sufficient to remedy the evil! and, when a building was obtained—bare walls and floors; often no doors or windows; rooms inconveniently distributed, &c.—behold our materials for an hospital! Then a few tressels and palliasses, long used by troops, were with great difficulty obtained; perhaps a few blankets; two or three camp-kettles, some cups and jugs. Fortune smiled on us, when a cart-load of straw or a hundred new blankets were received; and while this was going on, our sick list increased to 1,150, and upwards; our daily deaths to ten, twelve, and once seventeen. And how could it be otherwise? Ventilation either in excess, during a rigorous winter, or deficient, accordingly as the disposition of the buildings placed patients in little close rooms, or vast corridors, without windows; the sick lying heaped together for warmth, even where space was not wanting; the delirious, the convalescent, the moribund, or dead, for a time within a few feet of each other. A scanty supply of medicines obtained in the town, of inferior quality, and not extending beyond a dozen of the simplest preparations of the pharmacopœia. Add to this the want of any efficient system of cleanliness, rendered totally impossible by the circumstances—in one hospital of 300 patients there were not fifty utensils of any kind for the purposes of cleanliness; and the imagination may form an idea which, nevertheless, will fall short of the reality. Once convalescent, the men were removed to a convalescent depôt, or barrack, as deficient as every other quarter allotted to the troops in bedding, windows, cleanliness, and good rations; so that they soon returned to the hospitals, bound as it were

by a spell in this fatal circle, out of which many never escaped.

One more feature is wanting to conclude this picture of misery—the deficiency of medical aid—one of the many consequences of these combined causes.*

The medical staff, at the beginning of this period, consisted of a fair average for the amount of the force, taking into consideration its organisation into fourteen different corps, each requiring to be complete in itself; besides the regimental staff, of three to each corps, which had been originally provided. Several, however, of the battalions, from resignation, &c. had but two, a surgeon and assistant. There was a general medical staff of nine superior medical officers, and sixteen assistants; of these, at the depôt at Santander, where they had a sick list of 300 and upwards, there were eight. At Bribiesca, another depôt, where the number of sick was from 100 to 200, there were four. At head-quarters, we had, at the commencement of the winter, fourteen officers of the general establishment for hospital duty. The number of hospitals, caused by the smallness of many of the buildings, of course also increased the labour. Thus we had seven general hospitals in Vitoria, and every regiment had some sick in its cantonments. From January to April eleven medical officers died, and seventeen lay seriously ill in Vitoria alone, at the same time, leaving but

* When I remember, that in after-days I heard many officers raise an outcry, in unison with agents of the Spanish government, and talk of the numerous medical staff of the Legion, considerably diminished, too, at that period, it is difficult to judge them with that moderation which perhaps all our errors merit, however selfish their motive, or fatal their consequences. It abundantly proved to me that there are minds so curiously protected by a hard shell of prejudice and ignorance, and so incapable of taking within their grasp more than the little present, that all experience, however powerful, in striking examples, is lost upon them; no ray of light from past or future can ever find entrance. When they act but for themselves, they are to be pitied; but woe to those whose fate is to be influenced by them! Fortunately General Evans's mind was of a very different stamp, and the proposition of the agents, and the opinions of the few individuals alluded to, met with the degree of attention they deserved.

twenty-three for the whole service of the Legion; regiments separated in different villages; seven general hospitals, and upwards of fifty officers, sick in quarters. To those who are familiar with the service of hospitals it is unnecessary to say how terribly labour is increased, when arrangement, system, and abundant means to carry every measure into effect, are wanting. Hospital serjeants, clerks, wardmasters, all fell ill in the same manner, leaving none to supply their places. In one week the change of the medical officers in charge of an hospital was rendered thrice necessary, by illness, and at a moment's notice. It was difficult to make any head against such a sea of troubles; and, as if nothing should be wanting to a climax, there were no purveyors; and, harassed as the medical officers naturally were, by their attendance on the sick, and their endeavours to provide a remedy for a thousand deficiencies, they had to keep large cash accounts, purchase provisions, make out stoppages—attend, in fact, to all the administrative details! But I am weary of the task, although but a faint outline has been attempted—an outline, which, indeed, was due to the medical officers of the Legion.*

* To show how little impression this period made upon the government's agents, a commission was appointed in June, at San Sebastian, nominally to settle the affairs of the old Legion, and form a new one. On this sat the chief civil agent of the Spanish government with the Legion, a Senor Llanos,* who at Vitoria stated his instructions directed him particularly to render the medical officers and their sick effective assistance: and although he very rarely indeed trusted himself within their desolate walls, yet he did twice, I remember, and was otherwise made fully acquainted, by the Inspector-General and myself, with our state. One of the most notable decisions of this commission tended to fling upon the head of the medical department the onus of discrepancies or objections which paymasters made rightly or wrongfully to some Vitoria hospital stoppages; and although aware that medical officers in charge, wardmasters, clerks, and all employés, fell sick, and died, each week almost—although two purveyors died before they could reach their

* The other two members were Brigadier Tena, and Colonel Wylde, to the former of whom the new Legion was indebted for a long series of miseries and persecutions as unmerited by the sufferers as they were disgraceful to their author.

All the preliminary information which seemed important having now been furnished, and the reader having before him the first general table of results, the distinctive characters of the diseases may be considered, which carried off a fifth of our force in less than five months, and threw 5,000 cases for treatment into the hospitals, out of a force of scarcely 7,000 men.

The following was the most usual course of the disease. The patient felt for some days a general *sensation* of lassitude, frequent nausea or even vomiting, attended with pain of the head alone, or in others down the spine, sometimes extending to the whole frame. A disordered state of the bowels, diarrhœa more or less violent and frequent, very often was an attendant, though less prominent subject of complaint. No longer able to perform his duty, the patient would at last report himself; and this preliminary stage varied much in duration from twenty-four hours to as many days, but more generally from two to five days. On examining the patient, the medical officer would often find a full pulse, flushed face, dry hot skin, violent pain of the head, a crusted or loaded state of the tongue, with total prostration of strength; at other times greatly diminished vitality, purple and livid countenance, or skin shrunk. Delirium very quickly supervened—the tongue and fauces became dry and hardened, the lips loaded with sordes. Dysentery became developed, the rapid decline of the pulse and all the powers of life followed, and from the tenth to the twentieth day the patient died. During this period the feet, partially or entirely, sometimes including the whole of the legs, would run rapidly through all the stages of gangrene.

post, and means were *entirely deficient* for the proper organization of hospitals—although men used to be brought in carts in the middle of the night, sometimes moribund and unable to speak; yet, with all this, the Commission and Senor Llano s, who had been on the spot, were quite willing that sundry hundred pounds should be charged against the account of the head of the department. But Mr. Callander had already returned to England — *et les absents ont toujours torts!*

In others, again, dysentery and its train of symptoms presented the leading feature, with the same fever quickly supervening, running a still more rapid course.

If, on the contrary, the patient's state improved, one of his first complaints, on recovering from his delirium, was the tenderness and insupportable sense of heat and pain in the feet, for the relief of which neither bland nor stimulating fomentations, nor friction, nor opiates, general or local, availed. The feet would feel cold to the touch, but present no external appearance of disease or inflammation whatever, and were exquisitely tender; at last, either these symptoms would gradually disappear after a menacing inflammation, or finally separate the tips or the whole of the toes; but in the worst cases often involving feet and legs before the line of demarcation indicated its cessation.

The reduced state of the patient rarely, if ever, allowed any option as to the performance of amputation *before* the line of demarcation was distinctly formed. Had it been otherwise, I should certainly not have hesitated in removing the limb, at some distance above the highest point of external disease. The following abstract, although but one case, furnishes, it seems to me, strong evidence in favour of the practice.

A lad, about seventeen years old, a drummer of the Irish regiment in Portugal, was admitted into the English wards of the hospital of San Francisco da Ciudad, in the spring of 1834, having been sent from Cartaxo to Lisbon, a distance of about twelve leagues.

On his admission he was found to be labouring under fever, of a low and nervous character, and mortification had already set in on one foot, extending to the ankle. The Portuguese medical officer at the head of the establishment happening to pass through, was shown the case; and a few days afterwards, the patient having greatly recovered from the fever, and the mortification which had approached nearly to the knee, ap-

pearing stationary, I proposed removing the limb. In consultation with the Portuguese surgeon alluded to, and a colleague, they expressed themselves so strongly opposed to it, that I waived my opinion and consented to wait. In three days the diseased action seemed to have gained increased vigour, and instead of forming a line of demarcation, began to spread rapidly over the knee. There seemed no hope of saving the patient's life, if the operation was longer delayed, and I amputated about midway up the thigh, some inches above the highest external mark.

The lad never had a bad symptom—the stump healed rapidly and soundly, and in six weeks he was quite well.

If asked, in one sentence, to give the chief feature of the fever of Vitoria, I should say, “the inflammation and gangrene of the lower extremities.” Although exact data on the subject are wanting, I cannot be far from the truth in stating that I saw 300 cases of gangrened extremities; for in my daily rounds the medical officers were requested to show me all such cases, whether in the incipient or advanced stages. In February, having obtained the convent of San Antonio, and much to the annoyance of the Spanish authorities, who sent a complaint to Madrid, stood by while our pioneers threw down some fifty thin partitions, cutting the building up into little cells, but ill adapted for the purposes of an hospital:* all these cases were transferred; and thus could be kept more immediately under my eye. Here a great number of amputations were performed at the tarsal and metatarsal articulation, and across the metatarsal bones, also of both legs; for it was rare that one foot or leg alone was

* After we left, the Spaniards took possession of it also for an hospital—and forthwith threw down, without compunction or crime, the partitions I had spared—cleaned, whitewashed, and made the changes and repairs urgently called for, but then it was not for the English! The crime of demolition, it would seem, lay in the colour of our coats.

involved. These were necessarily performed under very unfavourable circumstances, on patients debilitated by fever and dysentery. Of the result, I cannot, however, give more than a return of those who recovered, and were at Santander in July, when I visited that depôt.

Amputation of both legs	6*
. of one leg	1
Partial amputation of both feet	2
. of one foot	3
	<hr/>
	12†
	<hr/>

The nature of the different amputations cannot be entered into here, but will find place when the subject of amputation in reference to gun-shot wounds is considered. The result of the partial amputations of the foot disappointed me; for three months after entire recovery they were unable to bear any weight upon them, although the stumps healed fairly.

This, however, must in justice be stated, probably depended upon the state of the feet after this fever, which invariably left them tender, painful on pressure, and rendered the patients more or less unable to walk long after they recovered their general health. I do not remember one instance where this symptom was wanting; and I observed, in many of those who suffered severely from the Vitoria fever, a certain weakness of the intellectual powers and, although apparently in robust health, an incapability of the same exertion, especially of long continuance, of either mental or bodily powers; and this, as long as twelve months after their illness. That the brain became ultimately the chief seat of disease, thence acting upon the whole nervous system, all the most prominent symptoms

* Two of these died afterwards, probably from sequelæ of the disease at Vitoria.

† This number is not probably more than a fifth of the number of operations, according to the report of Staff-surgeon Watson, to whose unremitting zeal and ability these cases were confided.

indicated. The gangrene of the lower extremities seemed to me to depend upon the near approach to annihilation in the powers of life, continuing at the lowest point consistent with existence, sometimes for many days; pulse even imperceptible at the wrist; and if the circulation was too languid to reach the hands, it is evident that the loss of vital powers in the blood vessels, to propel the blood, would be still more fatally experienced at the point furthest from the centre. The coldness of the extremities, the dreadful pain which followed, with the supervening and often very unmanageable inflammation of all the soft parts, further confirms the probability that this is an accurate diagnosis, and that some disorganizing change took place in the structure, varying in degree.

Many men, however, presented themselves at the hospitals, proceeding from their barracks, emaciated, weak, and sickly—often suffering from dysentery, with the toes of one or both feet in a state of gangrene. They always attributed it to exposure to cold on some particular day or night, and perhaps truly; for with the languid circulation observed in them—the weakened vitality of the whole system, cold, or undue heat, and other causes incapable of producing such consequences on a healthy frame, might well prove the proximate cause on matter peculiarly predisposed.

The distinctive characters, then, of the Vitoria fever were—its frequent commencement as common continued fever—its rapid assumption of the low nervous form, with nearly entire exhaustion of vital power, and gangrene of the lower extremities.

The diarrhœa, or the dysentery, with which it often seemed ushered in, or with which it became subsequently complicated, although, doubtless, a strong predisposing cause, yet I think formed no integral part of the disease in question. That strong irritation of the stomach might exist in all, is more than probable. The causes of dysentery were every-

where to be met in abundance, and there were very few indeed in whom careful examination might not detect evidence of irritation, and often inflammation, chronic or acute, slight or severe, in some portion or in the whole of the mucous membrane of the intestines.

Time and hands were wanting, as well as a fitting place for the pursuit of pathological anatomy—which I regret much ; but time, under such circumstances, devoted to the dead, must have been at the expense of the living.

A fever similar to this in many leading features, but wanting in the one designated as distinctive—the gangrene of the extremities—wanting at least, with a few rare exceptions, and in very minor degree—attacked the troops at Oporto shortly after the cholera had disappeared. It was, however, less fatal and more manageable. It is true we had better means at our command. I took charge myself of several wards of one of the hospitals organised for the English, for the purpose of studying closely the disease, and soon went through its stages in my own person. The pain in the head, at the occiput, was intense, and I insisted on being copiously bled with the violence of a patient fast approaching delirium—the desire was complied with more out of respect to my wishes, than in accordance with the judgment of the medical officer. It had well nigh proved fatal, but youth and strength, rarely tried by sickness of any kind, carried me through. On my recovery, I again returned to my wards, and paid the greatest attention to all the symptoms. Warned by my own experience, I did not allow myself to be deceived by the appearance of a sharp attack of continued fever, with bounding pulse, headache, &c. ; but treated the pain of the head by blisters at the back of the neck—plunged my patients in the dry hot stage into a tub of cold water, and dashed a pailful on their heads at the same moment ; while, having first relieved both stomach and bowels by an emetic and purgative, internally, mild diluents, saline effervescents, and gentle diaphoretics only

were administered. Strongly as this treatment, as regards the first administration of an emetic and cathartic, is opposed to the principles laid down by Broussais and his disciples, the treatment was peculiarly successful, but possibly may be more applicable to soldiers, whose stomachs are generally loaded with crude food, fruit, and fiery stimulants, than to civilians whose aliment is more carefully prepared.

It was gratifying to find how many were saved from the worst type; and even when I did not succeed in preventing their passing on to the low typhoid form, it was almost invariably observed, that the character was milder, and its duration shorter, while the patient's convalescence in its rapidity contrasted much with those who had been treated by bleeding, in the first instance, or without the aid of counter-irritants and cold baths.

In Portugal, as in Spain, this fever was by no means confined to the foreigners—on the contrary, the native troops seemed to suffer greatly also, although, perhaps, not in equal proportion.

Some of my readers may be disposed to attribute the gangrene to the crowded state of the hospitals, the want of cleanliness, ventilation, &c., already described. Such a supposition, however, seems to be negatived by the fact, that precisely the same tendency manifested itself in all the officers attacked, who were quartered in separate rooms, and in private houses. Although only one of those who recovered was crippled, the inflammation supervening having proceeded to gangrene in spite of every care and exertion, yet the difference may be much more naturally attributed to the greater care and attention, in the shape of domestic attendance, better clothing, bedding, &c., which most of the sick officers could obtain. With fewer of these advantages, evidence was not wanting to prove, that the disease in them would have run exactly the same course; and even with all this, two of the fatal cases had both their feet in a state of sphacelas when they died.

The treatment above detailed I followed with many officers at Vitoria, and have reason to believe it the best adapted, carefully supporting and even stimulating the vital powers in the latter stages. Unfortunately the wretched state of our means rendered this treatment, simple as it may seem, always difficult, and sometimes impossible.

About the middle of February, a long expected supply of blankets, hospital clothing, baths, cooking utensils, &c., obtained from the British ordnance, arrived at Vitoria; and the medicines and medical stores originally ordered, before the Legion left England, were received at the same time. The possession of large convents enabled us to make better arrangements also, and the condition of the patients, although far from what it ought to be, was at least signally improved. On the 12th of April, the Legion began its march back to the coast, and the joy of leaving the scene of their sufferings seemed to act like a charm. I left on the 14th, and passing the different brigades *en route*—thinned though they were by the sick and dead left behind—a wonderful change might be remarked. Even the sickly and the wan pushed gaily on, and the stronger marched with the elasticity and spirit of men who had shaken off all care. As for my friends the Irish, they looked as if they had never known care nor sickness either, and when they piled arms were as ready for a “lark” as ever they had been at Donnybrook fair.

The following is the return of the general hospitals at Vitoria, from January 1st to April 13th, 1836.

Months.	Admitted.	Discharged	Dead.	Remaining	Proport. of Deaths	If to 819 be added 187-1,005, it will be seen that the actual loss was about one-fifth rather more than less.
January . . .	2,345	1,102	237	1,006	1 to 9 $\frac{212}{337}$	
February . . .	897	693	231	979	1 to 8 $\frac{1}{4}$	
March	1,901	1,012	275	893	1 to 8	
April to the 13th	263	293	76	787	1 to 13 $\frac{2}{3}$	
Total.	4,706	3,100	819	787	1 to 5 $\frac{611}{819}$	

From April 14, to June 27, when the depôt was broken up, 187 died at Vitoria out of the 787 left in hospital, and such

few admissions as might arise from weakly convalescents left behind; seventeen men also died during removal to Santander. Thus the loss at Vitoria was 1,023, exclusive of December, which may be estimated at 100; at Trevino, and the other cantonments, certainly not less than a 100 more,—total, 1223, for Vitoria and its environs in six months.*

During this period forty-five officers died at Vitoria, of which eleven were medical; the proportion of the latter, therefore, was about one to five, of other officers about one in ten. The great disproportion in the mortality between the two classes, while it fully proves the zeal of the medical officers, also shows the fatal influence the hospitals exercised upon the mortality, which in the men was about one in seven of the whole force.

During the first four months the mortality in the sick was about one in forty to the number treated. From the end of the fifth to the ninth month, one in five; from the tenth to the twenty-third, one in 13, $\frac{88}{270}$. And this last period extended through a winter, to the full as rigorous as the first, the troops much exposed and constantly on duty in the lines, much dysentery, diarrhœa and fever prevailing among them, and after they had been severely debilitated and shattered by the previous sickness. The bad policy, setting aside any inhumanity there might have been, of the Spanish authorities, is written in this short but very conclusive paragraph.*

* This number of deaths took place out of about 7,000 men which were at head quarters.—And besides deaths there were at least 500 men incapacitated for further effective duty. Thus the defective arrangements of the Government, or its agents, and the hostility or inertness of the provincial authorities, lost to the cause the services of nearly 1,800 men out of a force of 7,000—for this is exclusive of nearly 200 who were swept away at Santander and Bribiesca, while labouring under the miseries and hardships of the same bad management. Thus in one winter they lost the lives and services of 2,000 men of the Legion, besides crippling and enfeebling the whole force for six months—if not for the whole period, even were no account taken of the mass of human suffering unnecessarily entailed!

The mortality at Bribiesca during the same period was one in three; 160 admitted, of which fifty-three died: but these were all the worst cases, for there was a barrack in which a few beds were placed, and called the Brigade Hospital, where the sick were received in the first instance, and only transferred when their cases assumed an alarming aspect: by approximation, 200 may be taken as the number admitted here, of which three died. The average mortality of cases treated, therefore, would be about one in six and a-half.

At Santander, out of 717 cases treated, 111 died, making a proportion of one to 6th, nearly six and one-third; so that allowing for sources of error inevitable under similar circumstances, it may fairly be presumed that the mortality was, as nearly as may be, the same at the different stations; and the circumstances were closely parallel; for it was not until the 20th of February, that anything deserving the name of an hospital was obtained by the medical officer in charge at Santander.

The following is a return of Santander, corresponding in date with that given of Vitoria, and for which I am indebted to Dr. Stone, who had carefully collected the data at that depôt where he was stationed.

*A return of Admissions, Discharges, and Deaths, from
January 1st to April 15th, 1836.*

	Febris.	Dysen- teria.	Varia.	Total.	
Remained Jan. 1st	136	5	48	189	
Admitted . . .	329	26	163	528	
Discharged .	550	21	152	543	
Dead	81	9	21	111	
Remained April 15th	44	1	38	83	Proportion of deaths 1 in 6 $\frac{11}{111}$

The sickness and mortality of the Legion and their causes during the first period, I have endeavoured to detail with clearness and accuracy. Questions of some interest arise from their consideration; the first periods passed in the country by the troops, were summer and autumn; quartered too in a valley, and on the rising banks, yet our sickness was exceedingly slight—and the men seemed to escape altogether the severe remittent and intermittent fevers which might have been expected to prevail. At the close of the autumn an exciting and exhilarating march of ten days, kept up, doubtless the healthy state of the troops—and even in Bribiesca each day almost expecting to renew their march, during their three weeks halt, the stimulus scarcely died away. It was only after their arrival in Vitoria, exposed to the greatest misery and privations in food, clothing, and shelter, that disease in the worst form—accumulated and concentrated—apparently fell upon us, and became suddenly and fatally developed in the worst forms of remittent fever—a species of typhus gravior, although peculiarly characterized. Had the appearance of the usual forms of autumnal diseases in that climate been merely retarded by the excitement and high spirits of the troops, leaving the seeds still dormant in the constitution, to be developed ultimately with virulence, but modified in form by the exciting causes I have detailed ?

With respect to our proportional sickness and mortality compared with that of the British army in the Peninsula, great as ours may justly be considered to have been, I find, on reference to the returns of that army, that many parallel cases at least might be selected from those records. And the British soldiers could rarely, it is presumed, have been left in so destitute a state as the Legion at Vitoria, although of course at periods subject to great privations. Sir James Macgrigor's Sketch does not include the first two or three years of the army's sickness—consequently, it is only by reference to par-

ticular instances of sickness and mortality in recruits, that anything approaching to a fair comparison can be established. If we take the greatest strength of the Peninsular army at 60,000, and I believe it never exceeded that, we shall see that in thirty months, from December 1811, to June 1814, 339,870 cases were admitted in hospital: take 100,000 off as an allowance for eight months, and we find that in twenty-three months, a number of cases amounting to three times the numerical strength of the force, was admitted in the same period: calculating the Legion's greatest force at 9,600, and even allowing 5,000 cases for sickness in barrack wards, or distant cantonments, not carried into the returns of general hospitals, still the whole amount of our cases would not more than double the numerical strength.

If we go farther into details of recruits, which form a still closer comparison, the result does not differ widely from our short but disastrous period at Vitoria. In less than two years, Sir James mentions, that the 91st regiment lost by death 220 men out of 1,703, a little less than one in seven,—but the brigade of guards, in twenty-two months, lost from death in hospital 674 out of 1,965, besides 280 invalided—that is, one-half of the whole were rendered ineffective by disease, and more than *one-third* by death. The Legion was a body of recruits, with the additional disadvantage that they were never picked as recruits necessarily are for the guards; so much so, that one-third of them came into the country unfit for service, and were certainly subjected to a degree and duration of hardships and privations not likely to befall the British troops.

Mr. Guthrie, in a paper on the diseases of the Peninsula, published in the “London Medical and Physical Journal,” and consisting of a report on the causes of the sickness which prevailed in the fourth division of infantry of the British army, formed of nearly 6,000 men, in Spain and Portugal,

during the years 1811 and 1812, gives the following facts relative to the proportionate sickness and mortality. "In the six months, from September to March, in the 7th regiment, there were 1,329 admissions from all complaints: of these 86 died in regimental hospitals, of whom 75 were recruits; 427 were sent to general hospitals, including 320 fevers, of which 160 died. Of the 246 dead in six months, 169 were recruits, out of 353 landed at Lisbon, in June 1811: 77 were old soldiers out of 1,145, that is, nearly half of the recruits, and one-sixth of the old soldiers, or about 1 in $5\frac{1}{2}$ of the whole number treated.*

"The 40th regiment, from March to September, had 1,189 sick admitted, of which 180 died (1 in $6\frac{1}{2}$), of 450 recruits 102 died (1 in $4\frac{1}{2}$), of 1,117 old soldiers, 78 died in the six months; that is, nearly a fourth of the recruits, and a fourteenth of the older soldiers.

"The third battalion, nearly composed of Irish and of young men, during this period remained remarkably healthy, possessing no advantage over the others in local situation,"—which corresponds remarkably with the observations already made on the Irish of the Legion.

Thus, then, it will be seen, that whenever we come to the detail of sickness and mortality of recruits, by which we can compare similar classes under somewhat similar circumstances, that is, in periods of great sickness, the difference is not great; whereas, taking the average mortality upon the whole army and the force of the Legion, there is a difference so striking that it requires explanation. The mortality of the British army, taking the *last* thirty months of its service in the Peninsula, was only one in $18\frac{2}{3}$ to the numbers treated; while

* The 7th regiment seems to have been 1,500 strong; the number of cases, therefore, in six sickly months is within 169 of the strength. In the 40th, the strength appears to have been 1,567; the number of cases amounts to one-fifth less.

in the Legion, it was one in seven, in its *first* twenty-three months. But inasmuch as the proportionate number of sick was much greater in the Peninsular army, so it is to be presumed that there was a much greater proportion of slight cases admitted; and as an increase of our sickness of 5,000 for such slight cases has been allowed, so that number should be added to those treated in general hospital, raising the mortality to one in nine. But we have seen, whenever recruits are instanced, and all examples I could find on record have been produced, that the mortality in the best commanded regiments of the service, the guards, 40th fusileers, 7th regiment, 91st, &c., varies from *one-half* to *one-fourth*, and the lowest one-seventh.

Not only does the amount of sickness on the last twenty-two months of the Peninsular army, by the official returns quoted, seem greater than that of the Legion, but the proportionate mortality upon the whole period to the numbers serving, presents a similar result: thus, the deaths in thirty months were 18,513: if we allow 5,000 for the last eight months, and supposing that 60,000 troops had been in the country, the mortality or loss is 1 in $4\frac{1}{2}$.

No one, I think, will suspect me of a desire as absurd as it would be futile, to draw an invidious comparison between the two forces; but it was necessary, after stating frankly and without comment a mortality in hospital of more than double that of the Peninsular army, that I should show the vast disparity to be more apparent than real, and that comparing the Legion's worst period of sickness with similar periods on recruits in the British army, results not less disastrous were sometimes inevitable, in spite of all the abundant means, and the long-tried zeal and acknowledged talents of the medical staff of that army.

Nor does it in any degree exculpate the Spanish authorities, to prove that some divisions or corps of the British army

were on some occasions unavoidably subjected to great privations, if, on the other hand, it be shown that we were wantonly or unnecessarily subjected to these evils.

These particulars it has seemed to me but fair to place in a clear light, both to prevent misconception and to do justice to others, inasmuch as the results must be considered creditable not to the medical officers of the Legion only, but to the officers and the Legion generally.

PART II.

THE second period of the Legion's medical history brings us to the 5th of May; by which time nearly all the effective force, with the exception of the cavalry and artillery, was again concentrated within the walls of San Sebastian, besieged by the Carlists, who had entrenched themselves in a triple line of field-defences. In the lines from San Sebastian, to Passages, the Legion remained the rest of their period of service, with the exception of two expeditions to the Bidassoa. A large square building, originally destined for an exchange and assembly house, well ventilated, and overlooking the bay, was converted into an hospital for the Legion. It consisted of two large wards, one on each floor, and some lesser rooms, chiefly taken up in offices, &c. This was made the fever hospital; and after the action of May 5th, the large convent of San Telmo, occupied by the French and English alternately, in the Peninsular war, as a barrack or an hospital, was given up, and a surgical hospital organised within its walls. As the nature, treatment, and result of gun-shot wounds form the chief, if not the only feature of interest or importance in this section, reference to the few wounds which occurred at Bilbao and Vitoria was purposely avoided, in the preceding part. Any particular cases worthy of note will find their place, when considering in detail the class to which they belong.

Before, however, proceeding to lay before the reader the tables of results, it may be well, as points of some importance

are involved in them, to sketch, in a few lines, the *locale* where the wounded were treated.

The convent of San Telmo consists of two wings, at right angles, raised upon a broad terrace, some twenty feet above the court below, in which the kitchen offices, &c. are situated. The principal wing, consisting of four stories, and extending a length of upwards of 160 feet, running from east to west, is built upon the declivity of the rock, on which the castle stands high above, its eastern end standing sixty or seventy feet above the beach immediately beneath it. The other wing only rises one story high above the terrace, although three from the court. A part of the ground or terrace floor was occupied by the stores, Inspector general's office, &c. ; and the first floor, and part of the base, were formed into wards.

The three higher floors of the principal wing were particularly devoted to gun-shot wounds, and no other ; and in the second and third, the most severe and important cases were placed. A description, therefore, with the admeasurement of one of these, will give that of the others. Thus the third division, as it was termed, (or ward,) was 157 feet in length, thirty-two feet six inches in breadth, and from the roof to the floor fourteen feet seven inches. There were eight windows down to the ground, along the front, six and a half feet in height, and three feet four inches in breadth ; and one large window at the western extremity, looking on to the castle-hill ; the spacious staircase and entrance into these wards being at the eastern end. Two small rooms were partitioned off at one end, for the ward-master, and medical officer in charge. Each division was calculated for one hundred patients ; although in March, a month particularly fatal to our surgical operations, in the six divisions there were 800 patients for a time.

Thus rating each division at one hundred patients, there would be, by the above admeasurement, 744 cubic feet of air to each.

This floor was twenty feet above the terrace, and devoted to the gun-shot wounds, and injuries of the head, chest, and abdomen: No. 2, the floor above, to amputations, and gun-shot wounds of extremities, with fractures; each division being rendered complete in itself and placed in charge of a principal medical officer, and the number of assistants required by the nature and number of the cases, ward-master, orderlies, &c. Perhaps this may seem tediously minute; but as the results of the cases may tend to controvert or to confirm important conclusions already received as axioms from the high authorities by which they are sanctioned, it is desirable that those to whom the subject may prove interesting, should have at once the means of judging how far local circumstances, independent of the injuries and their treatment, may have influenced the results observed.

I have only further therefore to remark, that there was a free circulation of pure air, the sea-breeze circling round and through the building; the necessaries at the further side of the staircase were perpendicularly over the beach, a hundred feet below. The great thickness of the convent walls assisted to keep the wards cool in summer and warm in winter; so that, with order and cleanliness, which was strictly enforced, the whole hospital was perfectly free from all bad odour, and the establishment was provided, after the first week or two of its formation, with diets of excellent quality, and with everything most necessary to the efficient treatment of the wounded, and the regularity and good arrangement of a military hospital.

The patients were carefully classed according to their injuries, so that the eye and attention of the surgeon could take in rapidly and in succession the features of resemblance or dissimilarity in parallel cases—an arrangement I have ever considered of great importance, and productive of not less advantage to the patient than the surgeon.

With these preliminary observations, the general results which

the tables are calculated to give in a succinct and complete form may be considered. From a great number of returns, carefully made after every action, and registering their results at stated periods, those which give the general results of the whole have alone been selected. For although none are deficient in interesting detail, and taken collectively, as bearing upon each other, form a body of evidence of the most complete nature; yet they are so numerous, that they would render this slight sketch of greater length and more complicated than is desirable. Without giving the tables, I will endeavour to condense some of the contents.

The returns of the first action only commence on the 14th of May, the ninth day after it took place. A wound in the knee, otherwise too slight to have confined me to my room, by effectually laming me, prevented any exertion for several days after the 5th. Thus it was not until the 14th that the surgical hospital of San Telmo could be said to be established, the organization of which establishment was entrusted after the action to me. And to this circumstance is to be attributed the number of gun-shot fractures of the femur, reserved for treatment. The campaigns in Portugal had left no doubt in my mind, as to the propriety of primary amputation in all such cases. Our wounded, however, during the first few days, were crowded into churches and temporary buildings, where classification was difficult and the conveniences for operations very limited. It was at this period that the ladies of San Sebastian furnished us with bedding, linen, and everything required, with great generosity; and their own care and attention was devoted during these first days to our wounded, with a kindness of heart and feeling, and a degree of courage and patience, which would have done honour to the humblest and best *sœurs de charité*, or the bygone days of their own chivalry, when the fairest dames were the kindest nurses.

In considering the wounded of each action, it must be ob-

served, that many cases are borne on the hospital returns, which are generally in documents of this nature left out, being classed among the dead in action; severe wounds of head, chest, &c., many of which did not survive two hours their entry in the hospital books, their removal to the establishment being exceedingly rapid, from its close proximity to the scene of action, and the exertions that were made to effect this object. Add to this, that many admissions take place on a day of battle, which ought not strictly to be classed among the *wounds*, although casualties arising from it, falls, burns, sprains, kicks from horses, &c., &c., these by my directions were never included in the tables. A great many slight contusions and grazes were, moreover, never admitted. These causes influence greatly the apparent average of mortality, which it would have been very easy to render more favourable, but in my opinion, the conclusions would be less rigidly accurate, and less valuable for the purposes of science.

Before entering more particularly into the scientific detail, a few observations may be useful on circumstances which affect the wounded before their admission into an hospital, and also on the discipline and interior economy of these establishments, upon which the successful treatment of patients most materially depends.

The transport of wounded from the scene of action is an affair of no small importance and difficulty in the operations of all armies, not only involving the lives and welfare of the maimed, but sometimes affecting directly, at others indirectly, the whole corps-d'armée. It is a subject, therefore, to which I have given much consideration during several campaigns in Portugal and Spain, with a view to determine, in my own mind, the best and most efficient plan, and put it to the proof of experience.

Twelve of Cherry's carts were sent out with the British Auxiliary Legion, at Mr. Guthrie's recommendation. They

were employed on several occasions in the neighbourhood of Vitoria, and in all the actions in which the Legion was engaged in Guipuscoa.

Upon the whole they were found serviceable, and much may be said with justice in their favour; but they are also liable to objections of some importance.

Small as they are in size, calculated only for four wounded capable of sitting upright, in heavy roads they become too much for one horse or mule, unless a very powerful one. It is rare also that a single draft mule will draw well; it was almost invariably necessary to employ two whenever we turned off the main road.

The shafts and the wheels seemed scarcely proportionate in strength to the work of the cart: in heavy roads they broke down in several instances, and at each time either in the shaft or the wheel. It is precisely in such situations, in narrow, deep, and hilly roads, where there is no possibility of flinging a broken-down vehicle out of the direct line of march, that such an accident is sure to cause great delay and confusion, by rendering it impossible for anything in the rear to pass or advance a step. Any other accident would only be to the detriment of the four wounded. One of the nature pointed out may affect the march of a whole column, if more than one move by the same line, and at all events interfere with the closing up of the rear for hours, and, of course, if an active enemy be hanging on the skirts, is likely to compromise all that may thus be unavoidably detached from the column.

There seems to me another objection relative to the wheels, but upon which I speak less confidently. Speed can never be an object in these carts, but rather a capability of progression, however slow, under the worst circumstances of time, roads, and weather: this is of the last importance. It appears to me, therefore, that if, at the same time that the wheels were made stronger, they were also somewhat increased in width of rim,

they would cut less deeply into heavy roads, and be less liable to stick fast, and create a stoppage, which—however short it may be, as all military men know—is among the worst evils which can befall a column *en route*.

As to the remedy proposed, however, it will be for abler mechanics than myself to determine how far it is calculated to answer the end.

The mechanism and construction of the carts in many other points—the slinging of the cot, the covering, and the mode by which the cart may be used, either with springs or without—are excellent. As to the general question of how far they are adapted to supply the transport for wounded, required by an army on active service, I have formed an opinion unfavourable to their general—perhaps I should rather say—exclusive use.

A general action, even when but a few thousand men are engaged on each side, if well sustained, will often produce from 500 to 1000 wounded. To remove this number from the field, supposing one-half to be slight—and this is a very favourable proportion—the number of carts would be enormous,—sufficient to fill a town of themselves, and extend and encumber a line of march for miles.

A single campaign, however, is sufficient to prove to any one the importance of having means readily available for the transport of wounded from the immediate scene of action, without allowing a legitimate excuse for any part of the effective force being so employed. In all armies, there are a sufficient number of men who, although they may have passed their previous lives without manifesting any sympathy for the misfortunes of their neighbours, suddenly, on a field of battle, become wonderfully compassionate to a wounded comrade; and never is this sympathy so strongly displayed, perhaps, as when there is a check or the probability of a reverse,—precisely the moment when their presence in the

front, and not their sympathy for their comrades going to the rear, is required. As battles are not generally fought upon plains, but upon some vantage ground, often steep or wooded hills, the most rapid and effective mode of withdrawing the wounded from the scene of action to any point in the rear previously fixed upon, has seemed to me to be the following, which was tried upon different occasions, our deficiency of mules alone rendering it impossible at all times.

A brigade of mules, say twelve to each column of 2000 rank and file, and four of Cherry's carts placed on the main road, or by the side if possible, at the point nearest to the centre of the column engaged, each mule having a bat-man, and a chair or seat on each side, (commonly used throughout the Peninsula, and forming a part of the pack-saddle,) will in most cases be found capable of picking up the wounded within a few yards of their post, and without delay. The carts, from the smallness of their size, may often approach close to the rear of the force engaged, and pass along its line, although there be only a cross-road, or even none at all; and they would thus take up at once officers or men with fractured limbs, or who may be otherwise too seriously wounded to be able to ride or sit. These are the means of transport from the *immediate scene of action*, for at, or near the point from whence they started should be a relay of spring wagons, capable of containing from twelve to fourteen wounded, and conveying them to the first ambulance or hospital station.

In this manner Cherry's carts might be employed with great advantage, as peculiarly fitted; and in proportion as the means of the corps-d'armée to which my duties attached me allowed the arrangements described to be made complete, the wounded were more speedily transferred to the hospital station, and the number of sympathising and aiding comrades greatly diminished. I once observed, in less than an hour, a whole battalion tail off after some fifty wounded,

one carrying his comrade's musket, and another his little finger!

A better contrivance than the "jolters," or spring wagons, hitherto used in the British army, might be easily found; but I am firmly convinced, that whatever their construction, they should be adapted for carrying at least twelve wounded men. And upon the same grounds it appears to me the proper use of Cherry's carts is to circulate as close as possible along the rear of the scene of action, for the purpose of removing men so dangerously wounded as to require a stretcher, and eight, twelve, or sixteen men from the effective force; and such a number may now and then be seen accompanying a wounded officer far into the rear.

The British Legion, which in the first instance was organized in all its departments closely upon the regulations and system of the British service, offered many difficulties to the medical officers upon whom devolved the duty of organizing general hospitals, and directing the service on the field.

A series of changes were effected in this branch of the service, under the sanction of the Inspector-General, Mr. Callander, and authorised by the Lieut.-General commanding; the results of which were beneficial in the extreme,—I believe in every way, may be confidently asserted, and acting not less directly upon the inmates of the hospitals than upon the effective force in the field.

There might be objections to some of these innovations in the British service, for many were adopted with reference to the peculiar and temporary nature of the force and other circumstances which, affecting the Legion, would not have exercised any influence upon a portion of the British army. Nevertheless, I am strongly impressed with the conviction, that the principle of some of these changes might be acted upon with manifest advantage in a more permanent service; and, at all

events, the facts resulting from their adoption on service may claim some attention.

The first, perhaps the greatest difficulty experienced, was the impossibility of obtaining fitting men for the various and responsible duties of ward-masters, clerks, orderlies, &c., from the different corps composing the force. No commanding officer willingly sends for hospital service his best men, were there not even a prevailing and very erroneous idea among military men, that any class of subjects will do for an hospital. Thus, if there be an incorrigible thief, drunkard, or dirty sloven, the first requisition that arrives for an orderly, he is dispatched: and if a good man by any chance finds his way into the hospital establishment, no pains is spared by a zealous Colonel to get him back again, even although he may have learnt all his duties, and become familiar with the routine, and in spite of his being declared indispensable in his situation. It matters not—he is a good man—*ergo*, the regiment wants him; and nine times out of ten the regiment gets him, and the hospital in exchange receives a stupid or a drunken fellow, or both, totally ignorant of all the duties, and as unwilling to learn as he is incapable of doing so.

Wearied at last by the perpetual recurrence of these annoyances, and convinced of the impossibility of establishing a regular and efficient system in the general hospitals while labouring under these disadvantages, permission was obtained to form two small corps, or companies, for the service of the hospitals and the transport of the wounded in the field. The first consisted of fifty rank and file, the skeleton of which the Inspector-General had formed in England as conductors for the carts; these were generally able-bodied men, and received artillery pay. The second, or “hospital corps,” was selected principally from the weakly men of all the regiments, and from the wounded who remained partially disabled. These men had infantry pay, and neither corps had any extra allowance.

The two companies were commanded by a lieutenant, under the orders of the head of the department; and a deputy purveyor of hospitals, with 2s. 6d. additional pay per diem, appointed paymaster, who was enabled to perform the duties of that office as well as those of deputy purveyor.

The men were selected with reference in some degree to their trades; so that if the carts required repair, or any minor work in the hospitals, they were always at hand; and were the means of saving the government much expense, and the hospital administration delays—inevitable in Spain. From this last company the hospital staff were allowed each a servant. The whole of the two companies were instructed in their duties, the wardmasters and clerks being selected from the “Ambulance Transport Corps,” and the orderlies and inferior servants from the “Hospital Corps,” with the prospective advantage, if their intelligence and conduct merited it, of promotion to the “Ambulance Transport Corps.” The conductors, and a small guard in charge of the carts, medical stores, &c., when required in the lines or on the field, were furnished from these last.

A month had not elapsed after these arrangements were made before the general hospitals assumed an improved appearance. The utmost order, regularity, and cleanliness, were maintained in every division: every man soon knew his duty thoroughly; and being under the entire control of the medical department, with equal quickness learnt the necessity and advantage of strictly conforming to his instructions. The hospitals became a source of pride to all connected with them, and the General commanding, often took occasion to express his satisfaction when visiting the wounded.

How far it might be possible or advisable, on service, in a British army, to form a corps of this kind, by selecting, from time to time, those who become weakly from climate and chronic complaints, or in consequence of flesh wounds, which often prevent the perfect use of an arm or a leg for months

after they are healed, is a question upon which I do not presume to decide. But I feel assured, and the French have proved by long experience the fact, that a corps peculiarly and solely destined for the transport of wounded and the service of hospitals, is not only highly advantageous to the sick and wounded, but a politic measure in every point of view. When properly formed and directed, such a corps must greatly tend to produce three important results. 1st. To prevent great straggling to the rear of effective men accompanying the disabled; which not only weakens materially the actual strength of a battalion under fire, but tends also to produce a disorganising effect, more or less strong in proportion to the character and discipline of the troops, and the nature of existing circumstances. 2nd, To insure the more prompt and efficient transport of the wounded. 3rd, A more efficient system of hospital treatment and administration: for as a surgeon, however zealous, cannot do everything with his own hands, the result of his treatment depends, in no unimportant degree, upon others. Thus there would be a saving of human suffering, and the more prompt and certain cure of the patients. Not only this, but such a measure will remove many sources of irregularity and injury to the service, arising from the incessant struggle between the opposing wishes and interests of commanding officers, who are naturally intent upon the strength and efficiency of their corps, and medical officers not less anxiously bent upon the efficiency of their establishments.

These evils existed, not in the British Legion alone, but have always been experienced, and often commented upon, in the British army; and I confidently refer to the testimony of the British officers who served in the Peninsular war; for from the lips of many I have heard them detailed. Why should not this be remedied? The Canadian war, if not already extinguished, offers an excellent opportunity of trying, on a moderate scale, some new and better system.

The tables, which are here brought forward, furnish evidence upon many and important points of surgical science ; and although facts, however carefully or ably collected, are almost always too liable to a variety of interpretations, to establish any point beyond dispute, yet are they never without value. It is, on the contrary, eventually by such labours, and the subsequent exercise of a high order of reasoning powers upon them, that all the principles of medicine have been established, that all the improvements, whether in surgery or medicine, have been elicited and adopted.

The following are the chief points of interest upon which the tables bear.

1. The average mortality in any given number of wounded, from musketry principally, both in the total and in the different classes of wounds adopted in the returns.

2. The ultimate loss to the effective strength of an army, in the total number wounded, and in various classes ; and the scale in which the first loss, after an action, decreases, from the first to the sixth month.

3. The proportion the different classes of wounds bear to each other, and to the whole, inasmuch as the tables include the wounded of a force attacking and defending batteries, houses, and lines, skirmishes and actions in the open field, and the assault of a fortified town. The result of the whole may be taken as fair evidence on the average.

4. On the relative value of primary and secondary amputation.

5. The proportion of cases of secondary hæmorrhage, and of tetanus in wounds.

1. The average mortality in any given number of wounded, from musketry principally, both in the total and in the different classes of wounds adopted in the returns.

The returns of wounded, admitted into hospital at San

Sebastian, resulting from the most important actions, leaving out of the question such skirmishes and minor affairs as produced less than fifty wounds—too small a number to afford any fair criterion, run thus:—

The attack on the entrenched lines of the Carlists, on the 5th of May, 1836, the return commencing with the 9th day; all very slight cases, and a proportion of the most severe injuries having before that time disappeared, gives a total of 382, mortality 1 to $9\frac{1}{4}$

The defence of the lines on the 6th

of June 66 1 to $6\frac{3}{4}$

Ditto, 1st of October 158 . . nearly 1 to 6

Several successive attacks on the entrenched lines of the enemy during three days in March; and the

battle in position on the 16th 490 1 to 6

The storming of Irun, on the 16th

and 17th of May 83 1 to $5\frac{3}{16}$ *

(The four last including every case admitted, resulting from those actions, the last alone including officers.)

Finally, the wounded resulting from these, and all minor affairs, in Guipuscoa, from May 1836 to June 1837, admitted into hospital, give

a total of 1351 mortality 1 to $6\frac{17}{16}$
or very nearly 1 to 7.

In considering the mortality in the different classes of wounds, beginning with gun-shot *injuries of the head*, producing fracture, we find, that from the action of May the 5th, but one remained on the 14th with injury to the brain, and it proved fatal: June 6, three, of which one recovered. Oct.

* This is the greatest mortality. A more than usual proportion, however, of slight cases, avoided coming into hospital—it being so near the termination of the Legion's service; and many of the more serious wounds were point blank shots.

1, eleven and one recovered. March, eleven, two recovered. In May, none were admitted. The general return of the whole gives 28 cases of fractured skull, of which 22 died, giving an average mortality of 1 to $11\frac{3}{11}$. Five were discharged to duty. The loss to the effective force, in these injuries, therefore, was twenty-three in twenty-eight.

May 5, mortality 1 to 1
 June 6, . . . 1 to $1\frac{1}{2}$
 October 1, . . . 1 to $1\frac{1}{10}$
 March 1, . . . 1 to $1\frac{2}{3}$

Of *Scalp wounds*, with and without abrasion, there were 61; 2 only died; 1 to $30\frac{1}{2}$; and one only presented disease of the liver, the other died from an attack of erysipelas. Thus it would seem that the sympathy with the liver cannot be very great or constant, although a few cases have come under my notice of great interest, and distinctly implying the possibility of a direct and fatal sympathy, which I purpose endeavouring to trace in another work. The 61 here alluded to, were under treatment from 1 to 3 months; 28 were discharged during the first month.

Penetrating Wounds of Thorax.—From a total of 33, two were discharged to duty; but in one the penetration of the cavity was doubtful; and the other was shortly afterwards invalided, his wound having disabled him; seven were invalided. The mortality will be found therefore to be 1 to $1\frac{2}{3}$. Three, of both thorax and abdomen, died, nor do I remember to have seen any case of recovery in this class.

From the action of	recovered
May 5, resulted 9 penetrating wounds of thorax	0
June 6, . . . 1	0
October 1, . . . 13	6
March 15, 16, 9 three complicated with abdomen	0
May 16, 17, . 4	1
—	—
36	7

The mortality upon the total of these actions is 1 to $1\frac{7}{29}$; but the results of the different actions show the difficulty of establishing a correct average, or rather, the necessity of taking the average of a large number of cases. The cases of October, which offer so favourable a result, were all, with one exception, injuries of the most severe kind. Five complicated with fracture; and in three of these the ball was lodged. Among the whole of the injuries of this class, which occurred during the twelve months, are two other cases of recovery. One with the ball lodged, and one without fracture, making a total of nine. The nature of these injuries, and the causes influencing their result, are of the highest interest, and well repay careful investigation. I must, however, confine myself here to the more general results alone, and reserve the consideration of this subject to a future period, when these cases will prove, satisfactorily, two points of importance, among many others.

1. That the presence of a foreign body in the lung (a musket-ball for example) does not necessarily produce, nor consequently imply, disease of the parts surrounding and in contact.

2. That a sympathy exists between the mucous membrane of the alimentary canal, and active or long-continued disease of the lungs materially affecting the result of the case.

Penetrating Wounds of Abdomen.—The total number is nineteen, from gun-shot, of which one alone recovered, to be invalided; seventeen died the first month. One case of recovery occurred in an officer, in which there was lesion of stomach. A third case recovered, after a stab from a knife, apparently wounding the liver.

Penetrating Wounds of Joints; in which class is included only those cases which were not amputated in the field. (Of these there were four—one shoulder, two elbow, one wrist; the last only died.) There were 37 cases admitted into hospital, and 21 died—1 to $1\frac{6}{37}$.

	Died.
22 were treated without amputation . . .	13 . 1 to 1 $\frac{2}{3}$
9 underwent primary amputation . . .	2 . 1 to 4 $\frac{1}{2}$
6 secondary	6 . 1 to 1*
4 primary amputations in the field . . .	1 . 1 to 4
—	—
41	22
—	—

Some of the principal actions give results as varying in this class of wounds, as we have already observed in those of the head, thorax, &c.

	Cases.	Died.
Thus, from May 5, resulted 12, of which 5†		
June 6 2	2	0 †
Oct. 1 3	3	3 §
Mar. 16 16	16	13 ||
—	—	—
	33	21
—	—	—

Gun-shot Fractures of the Extremities.—The several actions of the Legion furnished 32 cases of gun-shot fracture of the femur.

11 partial—21 complete.

Of the 11 cases of partial fracture,

5 were into the knee joint—1 recovered without amputation—2 after primary—and 2 died without amputation.

6 in the shaft—1 died of irritative fever—external wound healed.

* Five were of the March series of operations, and one very unfavourable case of shattered knee.

† Two after secondary amputation, and one after primary.

‡ Both elbow, one recovered after primary amputation, one with ankylosis.

§ All of the knee.

|| Three after secondary amputation—five after primary.

Of the 21 complete,

	Died.
3 were amputated in the field	3*
3 underwent primary amputation in hospital	2
15 were reserved for cure, or secondary amputation.	
Of these, without amputation	8
In 6 amputation became imperative	3
One remains under treatment at the end of eighteen months without hope of ultimate recovery.	
—	—
21	16
—	—

The fifteen cases reserved for treatment presented three cases of secondary hæmorrhage, for which, in two cases, amputation was performed: one died, one recovered; and, in the third, the state of the patient forbade amputation, and the femoral artery was tied at its upper third; sphacelas of the foot supervened, and, on the eighteenth day, return of hæmorrhage, and death. The artery and vein, it was found on examination, had both ulcerated within the space occupied by the fracture. The ligature was applied about three-quarters of an inch above the giving off of the profunda. The ligature remained attached, and a clot had formed, occupying the vessel a short distance above it; a clot had also formed, and occupied the portion of the artery for several inches *above* the ulcerated opening: but the *channel of the lower portion was perfectly unobstructed*. A most instructive case, and fully proving the soundness of the principle which establishes the necessity of securing both ends of a wounded artery whenever it be possible.

Thirteen of these cases resulted from the action of the 5th of May; and were all fine, young, and healthy men, to whom my attention was particularly devoted; and although the par-

* One a sickly young Basque—another had his limb carried off, high up, by a cannon shot, and died of tetanus; both very unfavourable cases.

particulars cannot here be detailed, it may be remarked, that notwithstanding the greatest care directed to them, under my own observation, and with as good means for treatment as can generally be found in military hospitals on service, several preparations have been preserved, proving abundantly the difficulty, if not impossibility, of keeping the fractured portions in good juxtaposition, for the long period required by the tedious and exhausting curative process. Showing, moreover, how inadequate are even nature's *vigorous* efforts to repair the mischief almost invariably the result of a gun-shot fracture of the femur. These cases, and the preparations resulting, are calculated to establish several other data of importance, viz.

1. That there is a relative and proportionate activity of the absorbent and secreting vessels established during the process of cure.

2. That the different functions and actions brought into play by the fracture, in the bone and surrounding parts, particularly in the periosteum, have a constant and injurious tendency to extend far beyond the seat of injury, and the limits where their action would seem alone required or beneficial.

3. That loose fragments are readily cemented together, and do not necessarily, nor frequently, become foreign bodies; consequently, that no harassing operations should ever be performed to remove them.

These, and many other points, requiring illustration and details in proof, cannot be advantageously entered into here.

Of gun-shot fractures of the leg, not complicated with injury to joints, there were 57 cases, of which 20 died; 1 to $2\frac{7}{30}$. Eight underwent secondary amputation, and all recovered. Nine appear in the return, but the ninth was a patient who lost his feet by gangrene, at Bribiesca; and both legs were

amputated. Only two primary amputations were performed in this class, previous to March; one on the field, and one in hospital: the latter died, having three flesh wounds, and a considerable formation of matter in the opposite knee.

Of gun-shot fractures of the humerus, not implicating joints, there were 31, of which 11 died; 1 to 2 $\frac{2}{3}$. Twenty-two were amputated.

13 primary, of which 7 died	
9 secondary, . . . 2	
—	—
22	9 = 1 to 2 $\frac{2}{3}$

Five primary amputations, and seven secondary, were performed previous to March, and all recovered.

There were 52 cases of gun-shot fracture of the hand and fore-arm, of which 3 died; 5 were amputated.

3 primary, of which 1 died	
2 secondary, . . . 0	
—	—
5	1

Nineteen were discharged to duty, the rest invalided, having been more or less disabled.

The general severe wounds amount to 403, of which 45 died; as nearly as may be, one-ninth: nine of these from tetanus. Out of 1500 cases of men and officers, no case of secondary hæmorrhage occurred in simple wounds without fracture. There were twelve cases, however, of secondary hæmorrhage, many of which required ligatures. A few details will be given, in a short abstract, at the conclusion.

General return of wounded admitted into the General Military Hospital San Felmo, San Sebastian, from 14th May, 1836, to June 10th, 1837.

Nature and state of wounds on admission.	Admitted.	Discharged to Duty.	Transferred.	Invalided.	Died.	Remain.	Proportion of deaths to cases treated.
G. S. F. of Cranium with lesion of contents . . .	18	..	..	..	18	..	1 to 1
" " " without lesion.	10	5	..	1	4	..	1 — 2½
Abrasion of pericranium	3	..	2	..	1	..	1 — 3
Scalp wounds	58	52	3	..	1	..	1 — 58
P. G. S. W. of thorax with lesion of contents	29	..	..	2	27	..	1 — 1½
" " " without lesion	9	2	..	5	2	..	1 — 4½
P. G. S. W. of abdomen with lesion	18	..	..	..	18	..	1 — 1
" " " without lesion	1	..	..	1	..	..	0 — 1
Pg. Thorax and abdomen with lesion	3	..	..	..	3	..	1 — 1
Pg. wounds of joints	37	2	2	11	21	1	1 — 1½
Amputations in the field	15	..	2	8	5	..	1 — 3
Wounds of spine	2	..	..	..	2	..	1 — 1
G. S. F. of Femur	20	..	2	5	12	1	1 — 1½
" " " Leg	57	6	1	29	20	1	1 — 2½
" " " Arm	31	1	..	18	11	1	1 — 2½
" " " Fore-arm	52	12	7	30	3	..	1 — 17½
General wounds, severe	403	146	131	96	45	3	1 — 8½
" " " slight	585	548	34	..	3	..	1 — 19½
Total	1351	774	166	208	196	7	1 to 6½

Proportion of men discharged to duty is 1 to 1½, rather more than 1½. Disabled, 1 in 3208, more than a fourth, and considerably less than a third: total loss by death and disability in a twelvemonth, out of 1351—577, or 1 in 2397, a little less than 1 in 2½. 100 of those classed here, however, as disabled, if not more, may be considered only temporarily disabled, and would not be invalided in the British Service, and from 27 to 30 of those transferred were subsequently discharged, which would make the proportionate loss 1 in 3.

2. *The ultimate loss to the effective strength in the different classes of wounds, and the scale in which that loss decreases from the 1st to the 6th month after an action.*

The tabular returns of the whole of the wounded, and of those resulting from the two principal actions, give these results for the *first* month concisely. They fully confirm Mr. Guthrie's estimate as to the ultimate loss, being 1 in 3, that is, between a third and a fourth of the total number treated. The rate in which the loss after an action decreases in each succeeding month after the first, taking the average upon the whole number of 1350, is as follows:—

Return to Duty.	Of number treated.	Return to Duty.	Of total number treated.
In the 1st month	1 in $5 \frac{181}{350}$	By the end of 1st month	1 in $5 \frac{181}{350}$
2nd	1 in $4 \frac{123}{297}$	2nd	1 in $2 \frac{242}{331}$
3rd	1 in $7 \frac{112}{117}$	3rd	1 in $1 \frac{623}{728}$
4th	1 in $36 \frac{119}{37}$	4th	1 in $1 \frac{686}{785}$
5th	1 in $96 \frac{71}{71}$	5th	1 in $1 \frac{672}{772}$
6th	1 in 1351	6th	1 in $1 \frac{671}{780}$

The sixth month generally giving the ultimate gain to the effective force. In the actions which gave the greatest number of wounded, May 5, 1836, and March 10, 14, 15 and 16, 1837, the proportion in the three first months vary considerably.

Number		
May 5th, 382.	1st month 1 to $4 \frac{26}{89}$	By the end of 1st month 1 to $4 \frac{26}{89}$
	2nd 1 to $4 \frac{42}{83}$	2nd 1 to $2 \frac{12}{87}$
	3rd 1 to $11 \frac{8}{34}$	3rd 1 to $1 \frac{174}{208}$
March, 493	1st month 1 to $6 \frac{47}{81}$	By the end of 1st month 1 to $6 \frac{47}{81}$
	2nd 1 to $6 \frac{11}{59}$	2nd 1 to $3 \frac{19}{59}$
	3rd 1 to $5 \frac{31}{31}$	3rd 1 to $2 \frac{4}{43}$

After the third, the result varies but little from the general average.

3. *The proportion of the different classes of wounds to each other, and to the whole number of wounded resulting from an action.*

The accompanying table, in which the wounded of five of the principal affairs are classed, requires little further explanation. The proportions varied a little in the total number of wounded; an additional column, therefore, was added, showing the average proportion taken upon 1,351.

This table standing alone cannot establish an average conclusively; but I conceive that six such tables accurately compiled, from as many sets of wounded men of 1,000 or 1,500, might place the question upon an indisputable basis. Nor is it a mere question of scientific curiosity, but one, on the contrary, of great importance and capable of practical application, affecting all the preparatory arrangements of hospitals and their stores of every description. And when these preparations are made upon an extensive scale for a large army, and to be sent to a great distance, it is of the last importance that the medicines, apparatus, stores, as well as the number and quality of the medical staff, should be *adapted* both to the *number* and the nature of the cases. A gun-shot fracture of the leg or thigh does not require the same apparatus of splints or consumption of dressings, pads, tow, &c., which either the arm or the fore-arm does. Still less are the remedial means required for injuries of the head adapted for fractures of the limbs or wounds of the trunk. The medicines for ague or syphilis are not exactly the best adapted for a wound of the lungs or abdomen. It is common, I believe, in all armies to provide stores required for hospitals upon general data of the most vague description. The most erroneous selection must be the natural consequence—injury to the patients, and loss to the government; magazines may be

filled with stores not required, while the hospitals may be altogether deficient in others for which there is urgent demand. The quantity of fracture boxes, &c., sent out for the Legion was so disproportioned to the possible exigencies, that I am inclined to think the whole of the wounded might have been put in splints! It would assuredly be no difficult affair to collect, from the surgical memoirs of armies and their campaigns, abundant proof that more positive data and some fixed average is required, to enable governments to provide for the wants of the wounded, without the extremes of excess and penury meeting in the same measures. It seems to me, that the most certain and ready means of obtaining such indications and guiding averages, would be the formation of a table founded upon the results of several actions.

Class of Injury.	Legion attacking in Lines, May 3. No. Wounded, 382.	Legion attacked in Lines, June 6. No. wounded, 66.	Legion attacked in Lines, October 1. No. wounded, 158.	General actions in position and skirmishes from the 10th to 16th of March. No. wounded, 490.	Assault of Iron 16th and 17th. May. No. wounded, 83.	Total, 1179.	Average proportion.	Average proportion on the whole number, 1351.	REMARKS.
<i>Head.</i>									
G. S. Fracture of Cranium with lesion of contents.	1 in 382	1 in 33	1 in 17½	1 in 98	0 in 83	..	1 in 69½	1 in 75¼	
..... Without lesion of contents.	0 — 382	1 — 66	1 — 79	1 — 81½	0 — 88	..	1 — 131	1 — 135½	
Abrasion of pericranium	0 — 382	0 — 66	0 — 158	1 — 163½	0 — 83	..	1 — 393	1 — 450	
Scalp wounds	1 — 38½	0 — 66	1 — 17½	1 — 16½	1 — 41½	..	1 — 25½	1 in 23½	
Total.	1 in 34½	1 in 12	1 in 7½	1 in 11½	1 in 41½	..	1 in 14½	1 in 15½	Head.
<i>P. W. of Trunk.</i>									
Penet. W. of Thorax with lesion of contents .	1 in 544	1 in 66	1 in 19½	1 in 81½	1 in 20½	..	1 in 45½	1 in 46½	
..... Without lesion.	1 — 191	1 — 66	1 — 31½	0 — 490	0 — 83	..	1 — 147½	1 — 50	
Pg. W. of Abdomen with lesion of contents .	1 — 191	0 — 66	1 — 158	1 — 61½	1 — 41½	..	1 — 60½	1 — 75½	
..... without lesion of contents.	0 — 382	0 — 66	1 — 158	0 — 490	0 — 83	..	1 — 1179	1 — 1351	
..... of abdomen and thorax.	0 — 382	0 — 66	0 — 158	1 — 163½	0 — 83	..	1 — 393	1 — 450½	
Total.	1 in 34½	1 in 33	1 in 10½	1 in 28½	1 in 13½	..	1 in 23½	1 in 22½	Severe wounds of trunk penetrating the cavities.
Penetrating wounds of joints	1 in 31½	1 in 33	1 in 52½	1 in 30½	0 in 83	..	1 in 35½	1 in 36½	
Wounds of spinal column	0 — 382	0 — 66	1 — 158	0 — 490	1 — 83	..	1 — 589½	1 — 675½	
<i>C. F. of Extremities.</i>									
G. S. fractures of femur	1 — 27½	1 — 66	1 — 158	1 — 245	1 — 83	..	1 — 62½	1 — 67½	
..... of tibia and fibula	1 — 23½	1 — 22	1 — 17½	1 — 22½	1 — 20½	..	1 — 21½	1 — 23½	
..... humerus	1 — 31½	1 — 33	1 — 31½	1 — 49	1 — 83	..	1 — 39½	1 — 43½	
..... radius, ulna, and bones of hand .	1 — 29½	1 — 33	1 — 26½	1 — 17½	1 — 83	..	1 — 20½	1 — 26	
Total.	1 in 6½	1 in 8½	1 in 7½	1 in 7½	1 in 11½	..	1 in 7½	1 in 8½	G. S. fractures of the extremities.
General wounds, severe	1 in 57½	1 in 3½	1 in 53½	1 in 2½	1 in 5½	..	1 in 3½	1 in 3½	
..... slight	1 — 186	1 — 14½	1 — 23½	1 — 85½	1 — 14½	..	1 — 203	1 — 281	
Cases of Tetanus	1 in 634	3 in 66	0 in 158	1 in 44½	0 in 83	..	1 in 69½	1 in 79½	
Secondary hæmorrhage	1 — 85½	0 — 66	0 — 158	1 — 122½	1 — 41½	..	1 — 131	1 — 135½	
..... amputations	1 — 23½	1 — 7½	1 — 17½	1 — 18½	1 — 10½	..	1 — 17½	1 — 148½	

4. *Evidence on the relative value and propriety of primary and secondary amputation.*

There are no questions in surgery so important, from their frequently and deeply involving life and limb, as those which relate to amputation in all its bearings. In no part of my practice and experience in the treatment of gun-shot wounds has the conviction of the great importance of correct principles and good instruction in surgery been so frequently or strongly impressed. While these sheets are going through the press, a copy of the first of a series of lectures on gun-shot wounds, delivered by Mr. Guthrie, has reached me, in which I see with pleasure, that the rules and precepts which were of such essential service to me, when I became, yet young, the arbiter of the lives and limbs of my fellow creatures, are about to appear in print, and will no longer be confined to the circle of his own pupils. There were two precepts above all others he never lost an opportunity of enforcing, and which, doubtless, will be reproduced in these lectures, of such vital importance, and so often exemplified by the circumstances and cases which occurred during my campaigns, that I am tempted to encroach upon the more general results by relating two or three instances.

It happened, strangely enough, that the first amputation I ever performed, and the last, both presented features of peculiar difficulty. While yet nominally assistant surgeon of my regiment, although the only medical officer left, a smart skirmish took place—a prelude to the first determined effort to carry the town of Oporto by assault, from which resulted between twenty and thirty wounded of the English marine battalion. On the field at the time, the wounded were dressed in one of the huts forming an outpost. One of the first cases was a serious gun-shot fracture of extremity, in which the upper third of the left humerus was severely shattered, and either

three or four of the metacarpal bones of the right hand were fractured. The shock seemed severe, and although there could be no doubt of the propriety of removing the limb, it was necessary to give him a little stimulus, and direct him on to the hospital in the town, after carefully dressing the hand, with the hope of saving it. Night had already closed in; and before the whole were attended to, and an officer mortally wounded in the abdomen visited, it was past midnight.—Anxious, however, not to delay the operation until the next day, I proceeded to the hospital with a medical gentleman, a resident of Oporto, who was kind enough to accompany me. After rousing the sleeping orderlies with their flickering lights, we began to turn over the sleeping, and to question the sleepless until the patient was found. This was before I had organized separate hospitals for the English; our wounded were consequently mixed with the Portuguese in one of their military hospitals. The angle of a corridor full of patients was the best operating-room to be obtained at that hour, and a set of bed tressels was converted into an operating-table. Two miserable lamps and as many hopeful lamp-holders, with a couple of my own people, were disposed in the way most likely to be useful, giving the wounded arm to be held by the wardmaster, who was a licentiate of the Apothecaries' Hall, and had his diploma in all due form. The friend who accompanied me was good enough to undertake to compress the artery above the clavicle.

While yet engaged in the first circular incision one of my friends singed my eyebrows, and on my complaining left one side of the arm in darkness! The knife had not penetrated to the bone on the outer side, before I felt the arm tugged outwards by the late surgeon-apothecary, in a manner that threatened to separate it without the aid of the knife. Looking up for an instant, there was just time, as the white of his eyes rolling upwards met my sight, to grasp the patient's

arm, and disengage it from the assistant, when he rolled at my feet. Fortunately, beyond a little delay, no mischief was done, and in a few seconds more the arm would have been off—when, to complete the chapter of accidents and my trials, the patient had twisted by his movements from under the pressure above the clavicle, and no sooner was the artery divided by a sweep of the knife than a gush of arterial blood unequivocally convinced me that there was no effective compression. It was but one jet, however, for in an instant my finger had compressed the orifice, and it was secured without difficulty or further loss of blood, and the operation was then concluded. The stump was somewhat deficient in skin, but the bone was well covered by muscle, and he recovered, with an excellent stump—and after much tedious exfoliation, with some use of the hand of the other side. And thus my first operation fully proved the value of the two leading, and most carefully enforced of the instructions year after year received from Mr. Guthrie—“Never to be alarmed at hæmorrhage when the finger can reach the bleeding point”—“Be sure to cut the bone *short*.” The first enabled me under very trying circumstances to save the patient’s life; the second ensured him a good stump in spite of every obstacle.

Indeed, so thoroughly had I been imbued with the opinions of my teacher on this subject, that in all the operations performed either by myself or by officers under my orders, I do not think a tourniquet has been half a dozen times employed under my observation. Another, among many striking proofs of how safely it may be dispensed with when the surgeon has sufficient confidence in himself, occurred many months later, in the action resulting from the last assault of Don Miguel’s army on Oporto. They were about to make their last desperate effort, after several repulses, to overwhelm the handful of men opposed to them, and probably they would have succeeded with their immense superiority in numbers, but

that they fought for victory only, and we for victory and our lives. They had often assured us that they would spare neither man, woman, nor child, after cutting off all possibility of succour or retreat, and seemed to have forgotten, that, however valueless lives may be esteemed by friends or enemies, they are things which people defend to the last extremity against all odds. And, at all events, they had so often threatened to eat us up alive, that it is not surprising if every one determined they should kill him first and catch him afterwards. The expedition Don Pedro and their united fortunes, from its formation in the Azores to the capitulation of Don Carlos, Don Miguel and his army at Evora is a splendid episode in history, its incidents are more like those of a tale of old romance than sober facts—abounding in heroism, in stirring events, and wonderful vicissitudes. It is to be regretted that amidst a mass of common-places, or worse, which the press poured forth on this subject, no pen was found to do it justice.

But to return : it was at this critical moment when the attacking columns were again gathering thick in our front, that an aide-de-camp came galloping up, begging me to put spurs to my horse, and see if anything could be done for the Brigadier-general commanding on the left and his aide-de-camp, who had both been struck by round shot, in an advanced battery on our left.

The General, poor-fellow ! was found lying dead in the battery where I had left him an hour before, exposed to the fire of two batteries, within musket-shot ; his head was shattered—or rather carried off. A shot rattling through the crumbling lighthouse, round which the battery was built, and covering me with fragments of glass, stone, and mortar, warned me, that, since no service could be rendered, there was little wisdom in remaining in a position, where heads were so little respected. The aide-de-camp was lying at some short distance, blanched and faint, but calm—his left leg nearly torn

away above the knee. Although the shock was evident and great, I entertained hopes, that in a little time the limb might be removed, with a fair prospect of recovery; and ordering him a little brandy-and-water, to be given at intervals, endeavoured to compose his mind, and promised to return in an hour.

I returned alone, expecting to find the surgeon of his regiment and his assistant there. The surgeon was there indeed, but in mixing the brandy-and-water for his patient, it is to be presumed he had inhaled its perfumes to such a degree, as to render him useless. A steady orderly was there, however, on whom reliance could be placed, and an intelligent brother officer of the captain's; and I proceeded to the operation, after requesting the medical officer to compress the artery in the groin, taking care to place his hand myself, but fully prepared to take the artery up the moment it was divided. The laceration of bone and muscle had extended so far, that a tourniquet could not be applied without interfering injuriously with the steps of the operation. I was unwilling, however, to defer it, for the action was yet undecided, as the roar of cannon and musketry, and the whistling of shot and shell, round and sometimes into the house, fully proved; and we knew not what might follow, my own life being as little insured as that of my comrades. As had been anticipated, no sooner was the artery divided, than a jet of arterial blood followed; the femoral was secured, however, at once, and not more than an ounce of blood was lost from it. My calculation also that there would probably be little hæmorrhage from the branches, proved correct, for only the femoral required a ligature. He did perfectly well, and from being a very handsome, slim young man, has become portly, and, as I told him laughingly when we met in Lisbon, twice the man he was—in size, at all events.

My last amputation presented a difficulty connected with an artery of a very different nature; for the divided axillary artery had retracted so deeply, that it was impossible to

reach it without a second operation for taking up the axillary vessel. The case was a shattered humerus, occurring at the assault of Irun—the patient a young officer—and the arm was removed at the shoulder-joint. He was of a sanguineous and nervous temperament—bore the operation badly—falling into nervous paroxysms or convulsions. Seeing reason to believe that the track of the ball was across the artery, and had probably divided it twenty-four hours before, and no hæmorrhage supervening, I considered it safer, for the ultimate success of the operation, and the patient's life, to put the stump lightly up, without, in the state in which he was, proceeding to any farther operation, which could be done with facility at any moment *if* the necessity occurred, and when his system would better endure the pain. The result fully bore me out in the course adopted—no secondary hæmorrhage occurred, and the stump healed soundly, and rapidly. This is one of the cases in which I consider the surgeon, by perilling in some degree his reputation, probably saves a patient's life, which would otherwise be lost by an apparently less hazardous or more orthodox practice. And this case, however differing from the two preceding, equally illustrates the value of the great importance of a due appreciation, in contradistinction to an exaggerated fear, of the dangers resulting from hæmorrhage, and our means of meeting them. For this dictated the practice in all three cases, and in each, I have no doubt, saved a life.

In considering the general results of the amputations of the Legion, nearly a hundred from gun-shot wounds, and probably fifty from other causes, in many of which I have myself been the operator, and nearly the whole of them been performed, and the cases treated, under my immediate observation, setting aside a great number which occurred under similar circumstances, during three years' active service in Portugal, the mind involuntarily wanders into a wide field full of interest, and

involving, as already observed, many questions of the greatest importance in surgery—questions which have been much discussed without producing unanimity of opinion. On the contrary, however, finally it may be considered settled by many, the question of delayed amputation is one upon which evidence is still highly interesting.

One of the causes which lead to erroneous estimates of the comparative value of the two operations, and which has, it appears to me, had no small share in producing discrepancy of opinion on the subject, is the mode in which authors have defined the periods and circumstances which constitute primary and secondary amputation. M. Boucher, in a memoir addressed to the French Academy, defines three periods for amputation, and these are reproduced and adopted by Mr. Guthrie.

1. The period between the receipt of the injury and the appearance of the inflammatory symptoms.
2. When the inflammatory action has commenced and is more or less capable of disturbing the animal economy.
3. When the violence of the inflammatory symptoms and symptomatic fever have abated ; that is, when the suppurative stage is fully established.

Against this division of periods no objections can be urged. They are distinct, successive, and easily appreciable, constant in their order, and generally with intervals very sufficiently marked. But what are we to term the amputations performed in the second period, which is an intermediary period? They differ greatly in the principal circumstances which are held to influence the propriety of the amputation and its result, and ought neither to be classed with the primary of the first class, nor the secondary of the third. Would it not be a much better classification, leading to good and practical results and simplifying the question, to have three classes of operations, as there are three well marked and

distinct periods indicated for their performance ; viz., *Primary*, *Intermediary*, and *Secondary Amputation*, corresponding with the different states of the patient. The generality of authors, in defining primary and secondary amputation, confine the one to the first period and the other to the third—what then becomes of the second ?

If unanimity of opinion be attainable, it can only be rendered so by the weight of facts, upon the accuracy of which every reliance may be placed—facts observed and classed so as to bear distinctly upon the various points of interest involved in any decision on the subject, and it is very doubtful whether any theoretical writings on the subject have ever been otherwise than injurious. Unfortunately we are met on the threshold with a great if not an insurmountable difficulty. In considering the subject of amputation, we find so many causes influence the result, some, it is true, evident, easy to observe and define, but others difficult to appreciate, although not the less certain in their action : and hence all tables are more or less inconclusive. Thus there are several classes of causes which exercise an important influence over the results of amputation, whether primary or secondary, each branching into a multitude of ramifications, uniting, separating, and again interlacing, bearing upon each other, and finally, by their combination, producing the results upon which alone the reasoning on both questions and the deductions are chiefly drawn.

In large civil hospitals more leisure is attainable, but the nature of the injuries are not sufficiently various, and probably no one life would be long enough to register the requisite numbers. And hence, doubtless, one of the chief causes of the discrepancy of opinion which has prevailed ever since the days of Paré, when amputation first became a surgical or scientific operation calculated to save life.

From the causes alluded to, I may not hope to supply

that which must be considered a great desideratum. Although from fortuitous circumstances, unusual advantages were enjoyed on the one hand, yet on the other, accidental causes interfered with the results, and prevented their being conclusive. All the time and attention which could be spared, however, from many and responsible duties, was eagerly devoted to this subject, and in another work I hope to furnish a detailed tabular abstract of between one and two hundred cases, which certainly will leave very much to be desired,—but may nevertheless not be wholly uninformative or vain. I have too recently escaped from active service to be able to give it here in a complete form, even were it not otherwise objectionable from the illustrations, facts, and details, by which it must unavoidably be accompanied, to render it either instructive or available for the purposes described. The usual returns of operations, divided into primary and secondary, giving the results alone, with merely such explanatory notes as were necessary to prevent erroneous conclusions, have been given.

A few general observations in reference to this subject and the accompanying returns of operations, seem still necessary, and principally upon the causes influencing the results of amputations, and more particularly of many of those borne upon these tables.

It is not enough, in my opinion, to say, here are two sets of operations, primary and secondary—the greater mortality is in the latter, therefore the former is most advantageous—a summary mode of settling the question, which would be most desirable, were it just, and as conclusive as the numerical difference is distinct. There are at least certain classes of causes, the influence of which should be correlative and equal in the two opposing sets of operations, before the numerical comparison of results can be final. These I consider to be—

1. The nature of the original injury.
- * 2. The general constitution depending upon the organization and previous health and habits of the patient, and his particular condition at the period referred to.
3. The mode of operation, (in which the time occupied is included,) and a great variety of circumstances, some easily and others with difficulty appreciated or defined.
4. The after treatment, into which the *locale*, the state of the atmosphere, and many other features, enter.
5. The complexion of the mind, and the consequent mental influence which may be beneficial or deleterious to a high degree.

* The strong and determining influence of this class of causes, although generally admitted, can only be understood in all its force perhaps, by the striking difference in the results of closely parallel injuries which is forced upon the attention of every surgeon whose practice is extensive. I do not speak of the obvious differences between a broken down and impaired constitution, and one which, originally healthy, has never been tried by severe sickness or excess; although these differences are never taken into account, in comparative tables of the results of the two operations, but of a difference of organization and constitution which can only be observed and appreciated under severe trial. A crowd of such cases present themselves at once to my memory—two or three of which will better illustrate the subject than long arguments.

1. Two cases occurred nearly at the same period of superficial injury to the knee; a musket-shot entering below the integuments, at the inner edge of the patella, and without injuring the joint in either case. The most extensive and uncontrollable inflammation and subsequent suppuration ensued in one, and the case ended unfavourably within the month. The other had but little local inflammation, and very slight febrile action or constitutional derangement, and in the month was well.

2. Two cases of shattered femur at the middle, occurred near the same time, both fine healthy young men; both underwent primary amputation. One was carried off by the severe nervous febrile action about the twentieth day, the other suffered from a similar attack, but in a much milder form, and recovered within six weeks.

3. Two cases occurred, one in Portugal and another in Spain, of gun-shot fracture of skull, both young men; a musket-ball traversing the brain from temple to temple. The one in Portugal recovered and was sent home, although the displacement of bone and injury generally, was certainly greater than in the case which occurred in Spain. Both cases for the first ten days presented very similar symptoms, but the latter died within the first month.

Unfortunately, a rare combination of favourable circumstances is required to render the observations and registry of a sufficiently large number of facts, thus accurately and fully defined, possible. Military surgeons who have the greatest opportunities are, too generally, pressed with duties more immediately involving the lives and interests of the mass of their wounded, to be able to devote the time and concentrated attention necessary. For it is precisely when opportunities of observation most abound, that the labours of their station accumulate upon them.

Surgeons are not agreed in the particular cases, even those who are the most decided advocates for primary amputation, which may advantageously be left for the chance of cure, or the alternative of delayed amputation. For instance, in gun-shot fracture of the lower third of the femur, if not much shattered, it is admitted or recommended by Mr. Guthrie and other writers, that they may be left for trial. His opinion has doubtless great weight, and naturally no one can feel disposed to respect it more than myself; nevertheless it is opposed to the conclusions drawn from my own experience, more limited, it is true, and the expediency on service of *ever* delaying the removal of the limb with a complete fracture of the femur from gun-shot seems to me more than doubtful. This refers to soldiers—with officers the result may be somewhat less unfavourable, as indeed has been shown, although it may be observed, with respect to all such cases by gun-shot, that the injury to the periosteum seems to irritate and excite the whole of the membrane to such a degree, as rarely to permit a good and healthy union. The proportion of such wounds, indeed, is exceedingly small; out of upwards of 3,000 wounded, I have observed only five or six, and in more than one of those the fracture extended up to the middle third, and the attempt to produce union was unsuccessful. These transverse or slightly comminuted fractures of the femur from gun-shot are so exceedingly rare—the bone generally splin-

tering into fragments like china—that it is a question surgeons cannot often have occasion to decide.

A table is given of primary operations in the field and in hospital, which, under that view, resolves itself nearly into a question of time—the operations on the field being generally performed within six hours, those in the hospital from the sixth to the forty-eighth. They are also classed, however, in similar injuries, which renders it more available for comparison, being one of the conditions of parallel cases. Without any preconceived theory, the conviction was gradually formed, that even in musket-shot wounds, where the general shock or concussion is less than in cannon shot, the nature of the original injury exercises important influence on the final result of the operation. Thus I am disposed to believe, that the passage of a ball through the thigh merely breaking the bone in two portions will give the patient a better chance of recovery after amputation—*cæteris paribus*—than if the ball had broken the bone into twenty splinters or fragments; or had traversed the knee joint, crumbling the bones and lacerating the cartilages in its course. And this would seem rather to depend upon a difference in the shock to the system—some effect at least not easy to be traced, and difficult, if not impossible, fully to appreciate by our present means of investigation. Has this point had sufficient weight in our estimate of the comparative value of the two operations in these wounds? It has been admitted and distinctly stated in wounds from cannon-shot; but here the thrill and commotion is great and violent. A surgeon's attention is so much fixed upon the action of organic and material causes and effects, that perhaps a tendency is created to disregard or slight the more subtle and often primary causes of the material effects upon which he exercises his reasoning powers, while he seeks by his skill to control their deleterious action. Thus it is not certainly that the parts where the operation is performed are less sound and

beyond the visible and appreciable effects of the injury—it is something much more subtle in its nature and the disorganising effects which may succeed, proceed from the reacting influence of the brain and nervous system, and not by absorption, inflammation, or any other material action arising from the site of the wound.

Although physiologists—in which class should be included all who practise in the profession in whatever branch—for if they are not physiologists they are at best but sorry practitioners, whether in medicine or surgery—habitually refer much to the influence of the nervous system, and are ready to attribute to it whatever is strange and unintelligible in the phenomena of disease, it is at once a reproach and a misfortune, that we do this, much as the ancient sybils and physicians were wont, when they gave the moon and planets the benefit of a power as incomprehensible. Thus Cullen and his brother nosologists, have their class “Neuroses,” without having been able in any way to define in what this nervous influence consists, or how it acts; and if asked what we know of either its nature or mode of action, we have but a very unsatisfactory answer to give. All that the accumulated ingenuity, talent, and industry of physiologists have been able to effect in this—the most interesting of all researches, perhaps the most important connected with our organization, may be told unfortunately in very few words. And when all is told, how much nearer are we to a knowledge of the great mystery of our organization, and the wonderful operation of all nervous matter? There is a complex set of phenomena in the moral and physical nature of man, now almost separately and distinctly appertaining to and proceeding from the one or the other, now mingled and blent together in force and undistinguishable unity: in one instance producing effects on the material frame so slowly as to be appreciable in its ravages or amelioration only at long intervals, at others, concentrated, rapid, and crushing,

it annihilates, at a stroke, reason, physical power, or both, to the extinction of life, with the pathless speed and power of lightning.

These are among the phenomena of the nervous system, which seems the concentrated union of our material and moral nature, partaking of both, imperiously controlling both. If we seek in the constitution of the world around us for something analagous from which we may draw assistance and explanation, the mind inevitably reverts to the phenomena of electricity and galvanism, the only facts in the range of physical science which seem by their properties and action to claim affinity, but they hitherto have lent us no assistance.

Whoever has studied the facts which seem dependent upon our nervous organization, and pored over the elaborate researches, experiments, and systems of the distribution of the material apparatus, must have felt how incapable they were of affording the desired clue. Have we not been somewhat blinded too by the very minuteness and elaborate accuracy with which the complex mass of nervous matter, spread throughout and over the body, and ramifying in every fibre, has been described? Losing sight of the true and important object of so much labour, ingenuity, and patience—the nature of this nervous influence—how produced and how controlled?

We have taxed the elements and ransacked every region to accumulate materials to act upon the frame—we have pored over its mechanism, describing every follicle, gland, and fibre in the whole structure, discovering or imagining uses for all, our researches into the nature and *modus operandi* of the most powerful and subtle of all the agents to which our organization is subject—the most constant and all-pervading in its action, leave us the least upon which to congratulate ourselves. Nevertheless it has long seemed to me, that it is from this source we must look for any further great improvement in the art of prolonging life, controlling suffering, or counteract-

ing disease. It is, after all, the key to our organization, and its actions, the laws by which it breathes and lives.

These observations may have seemed to diverge far from the subject under consideration, yet have they sprung involuntarily from those made at the bedside, from the study of symptoms and effects, which could only be satisfactorily explained by reference to this subtle controlling principle—and which it has seemed to me influences much the question of primary and secondary operations; that it influences greatly the result of the primary. One or two details in reference to facts, which I shall condense into two classes, will show alike the opinions, and the grounds upon which they have been formed. 1. Those regarding the stumps. 2. Those regarding the general symptoms. The first I find already in a note made in one of my case-books of amputations, while the cases were under my observation.

1. “None of the primary amputations of the series of the 6th of June, have shown any disposition to healthy union by the first intention,—a singular fact when taken in connexion with the progress of the secondary amputations of the same series, many of which have, on the contrary, manifested a particular disposition, and nearly all have healed partially in that way.”

2. I had frequent occasion to observe that in primary amputations, done under the most favourable circumstances, the operations performed unexceptionably, after the first two or three days, sometimes extending even to ten or twelve, during which the operation would seem to act as a sedative, a febrile action came on, without any evident cause, without appreciable irritation or inflammation of stomach or intestines, in young, healthy, and robust subjects. In many instances, in spite of the greatest care and attention of medical officers well informed, and of experience and judgment which rendered them generally successful in their treatment, this action led to a fatal termination, the post mortem examination affording generally no satisfactory clue. In three cases only was there inflammation

of vein, and never extending into the vena cava; either no visceral inflammation or very slight; or if the case terminated favourably the same phenomena in the first periods of the case were present. Sometimes the stump presented an unhealthy and sympathising action; but at others the healing process went on favourably even to the last. This train of symptoms, febrile, absorbent, and disorganising, is not common in secondary amputation, and almost invariably, when it supervenes, is of a milder type, and seldom beyond control.

Some of the most striking cases in which these facts were observed, may be given hereafter: in the meantime, as they accumulated under my eye, I was insensibly led, after close investigation of all collateral circumstances, to the conclusion, that the symptoms developed were dependent upon the reactive power of the nervous system, highly and injuriously irritated by the double and quickly succeeding shock of the original injury and subsequent amputation, thus producing a violent and absorbent action—an action which, after a short struggle, exciting general febrile irritation, absorbs the powers of life. For a most powerful absorbent action must be one of the qualities of the nervous system, or how account for its fatal action in an hour or a day, when some violent shock of pain, or passion, destroys life without organic lesion? Pain, for instance, will kill, and a remarkable instance occurred during my house-surgeoncy at the Westminster Hospital, many years back. A fine athletic, healthy-looking young man, was admitted with retention of urine. Although he described himself to have been suffering since the previous night—this was the afternoon—yet the immediate urgency of the case, from distention, &c., was not deemed sufficient to warrant puncture until other measures had been tried. In less than two hours he died. No organic lesion was discovered in the post mortem examination.

To this peculiar effect and train of symptoms the cases of secondary amputation were certainly not so liable; nor when they occurred, have I observed them generally in such strong

degree; and consider them, therefore, the result of the two quickly succeeding shocks; less liable, of course, to occur after one, or after two separated by a wide interval. To the circumstances detailed may, perhaps, be attributed much of the discrepancy which has existed in the opinions of many eminent in the profession. The one party not giving sufficient weight to this result of primary amputation, even where a cannon-shot or a shell has not caused the injury, and the other not sufficiently weighing the greatly preponderating disadvantages and fatal accidents, preventing or accompanying delayed operation. For this seems to be the chief, if not the only solid objection to primary amputation, whereas, against delay the number and importance of the reasons have long been sufficient to decide the question in my own mind. Baron Larrey and Mr. Guthrie, have alone accumulated a mass of facts upon this question, well calculated to set all controversy at rest. No one ever doubts in which cases there is the greatest amount and duration of *suffering*; and this alone would have decided the question with me, had I been convinced the loss of life was *equal*.

The conclusions then—to recapitulate—drawn from the careful observation of between two and three hundred amputations performed under a great variety of circumstances, and from very various causes—are the following:

1. That there are two classes of effects, dependent upon the nervous system, which exercise their chief influence upon *primary* amputations.

A nervous absorbent action, resulting from two violent and quickly-succeeding shocks, developed in a febrile form and capable of causing death, without perceptible alteration of structure or lesion of any organ.

A nervous and disorganising action developed in an unhealthy, inflammatory or sloughing form, affecting the stump.

2. That sudden formations of matter in distant and uninjured parts, or active and destructive disease of lungs or liver,

hitherto generally considered as a peculiar consequence of *secondary*, may be frequently observed as a result of *primary* amputations; and is probably dependent upon the same disorganising action of the nervous system described as producing the two preceding classes of symptoms.

Series of Amputation in March.

Twenty primary Amputations.			Eight secondary.		
		Died.			Died.
10 of the thigh	.	9	3 Thigh	.	2
1 Leg	.	1	1 Shoulder-joint	.	1*
1 Shoulder-joint	.	0	4 Arm	.	3
7 Arm	.	7	—		—
1 Fore-arm	.	0	8		6†
—		—	—		—
20		17			
—		—			

I subjoin a short abstract of four cases from the operations of this series, collectively and separately, bearing pointedly upon the various observations made in this section. Nos 1, 2, and 3, are nearly parallel cases which may be taken as fair examples of the type of disease, which assailed chiefly the primary operations of that period, affecting either lungs, or liver, or both; with more or less distinctly marked bilious remittent fever.

No. 4, illustrates the first or local class of effects, defined page 73.

No. 5, is a striking instance of the mode in which primary amputations are sometimes carried off, without any evidence of organic lesion, or disturbance sufficient to account for an unfavourable termination, and depending, as I have above stated, upon the influence of the nervous system alone.

* Complicated with penetrating gun-shot wound of thorax, and the only one lost during the campaign, out of five.

† Only one of these with diseased lungs or liver.

CASE I.—*Series of 10th March.*

Musket-shot traversed knee-joint—Amputation forty-eight hours after injury. Died twenty-first day after operation. Diseased liver.

Bartholomeo Lepe, aged 18 ; a swarthy Andalusian, short, thin ; excitable habit.—He was shown to me on the evening of the 12th, in the church of Santa Maria, where a portion of the Spanish wounded, resulting from the action of the 10th, had been collected, and upon examination I found a musket-shot had traversed the knee-joint, partially fracturing the bones, and apparently striking superficially the opposite knee on the inside. Some little febrile action had set in, as also inflammation of the limb, but not to any great extent. At the request of the Spanish medical officers I amputated above the knee, by the circular incision ; and as I observed that they were in the habit of applying ligatures of half a dozen threads, and of leaving both ends hanging out of the stump, without speaking on the subject, which might have excited an unpleasant feeling without producing any good result, I made the strongest possible contrast in those points where they were most at fault—such as the inefficient application of the tourniquet—two persons carving at the limb at the same time—the cable ligatures, protruding bone, &c.* Thus, one of my own assistants compressed the artery at the groin, and

* As I have alluded to the bad surgery that fell under my observation among the Spanish medical officers attached to the army of the north, it is but justice to say, that I am aware there are exceptions among them. Dr. Belmunt, a Spanish physician and a graduate of Edinburgh, to whose services we were much indebted, informed me, that a colleague of his, educated at Barcelona, had during the war twice amputated at the hip-joint, and once with success—an operation which can never be performed with success, by an indifferent surgeon, nor is it indeed likely to be attempted.

no tourniquet was applied; the bone was cut down to, in two or three rapid sweeps—single ligatures only were used, and both ends were cut short, and the stump was presented to them with the bone deeply buried in the apex of the cone; scarcely any arterial blood was lost, and it may be remarked, *en passant*, that I had the satisfaction of seeing a visible improvement in their succeeding operations. The next morning I performed Mr. Guthrie's operation for amputation close to the head of the humerus, the one I have always adopted in such injuries as by far the best which has been suggested, and the medical officers who served with me in Portugal and Spain never used any other method, after having once seen it, from their conviction of its superiority. It seemed perfectly new to the Spanish staff, and attracted their attention much. This patient, by-the-bye, was the only one who survived of some twenty amputations that were performed in Santa Maria.

For the first ten days he was without an unfavourable symptom, the stump closing gradually and healthily. About this time his face became flushed, pulse accelerated, anxiety and a general sense of malaise supervening; bowels loose. A diaphoretic and gentle saline mixture was administered, and he was strictly enjoined to abstain from all food.

The febrile action and malaise continued without intermission to his death, and during the last five or six days only assuming a more determined form in pain referred to the abdomen generally. The day previous to his death the following note was made, and describes his state:—

April 2nd. He slept last night; skin hot and dry; pulse rather full, rapid and irregular, 120; tongue moist, but a little coated posteriorly, dark red. Within the last three days he has much deteriorated in general health, febrile action considerable: since yesterday he has complained of pain in his knee, which I find upon examination swelled above the articulation with indistinct fluctuation, but no tension,

heat, or redness of the part. The wound, which was closed, has opened again. B. open. Died, April 3rd, 9 A. M.

Post mortem examination, eight hours after death. On examining the stump it was found to be healthy, and firmly united except at the inner corner. The artery was dissected out, and afforded a good example of the mode in which arteries are filled up after ligature. The end of the bone looked unhealthy, some pus was found in the medulla. The opposite knee-joint contained upwards of a pint of fœtid purulent matter; the ball appeared to have entered a little distance, and to have slightly abraded the inner condyle just at the commencement of the cartilaginous structure; cartilage nowhere injured; contents of thorax healthy; liver enlarged, adherent to the peritoneum, studded throughout its structure with tubercles, some in a stage of suppuration; intestines somewhat injected, but neither thickening nor ulceration observed.

The chief features of this case, are the rapid and healthy healing of the stump, unchecked to the last—the absence of all general or local symptoms indicating internal mischief the first ten days—the indistinct diagnostic signs of the great disease of the liver, and the re-opening of the wound, with the sudden formation of a large quantity of matter from an injury, which at first seemed so incapable of producing mischief, that it was successfully treated and healed as a simple superficial wound of the integuments. The uninjured state of the cartilage proves that this formation had been exceedingly rapid.

CASE II.—*Series of March.*

Gun-shot fracture into elbow-joint—Amputation by double flap, within eight hours. Died in twenty days. Lungs and liver implicated by disease.

(ABSTRACT.)

Jeremiah Mahoney, aged 25.—Injury.—Gun-shot fracture of humerus through the inner condyle; ball lodged; amputation in hospital on his admission, a few hours after the injury was received; little blood lost; three ligatures applied; operation borne well.

Progress of the case.—Up to the eleventh day he had been going on satisfactorily, notwithstanding some little vesication; swelling and tenderness of stump, on the third day. On the 12th day he complained of severe darting pains, as if in the palm, and on the succeeding day fever was ushered in with furred tongue, hot skin, head-ache, and accelerated pulse. From this period to the 20th febrile action continued; complicated the *last two days*, with expectoration of matter and pain in the abdomen; on the 15th day there had been a temporary irritability of stomach producing vomiting. Stump apparently unaffected; great exhaustion throughout the last eight days.

Treatment.—Antimonials and diaphoretics; mild purgatives; blister to the epigastrium; leeches to the temples.

Post mortem.—Surface of the body of a greenish yellow colour; the flaps of the stump firmly united, with the exception of a small sinus at the inner part leading to the bone; periosteum a little thickened, and at the end denuded; absorption proceeding. *Thorax.*—Effusion in both cavities, lymph on the surface of the lungs, which were partially tu-

berculated and hepatized. *Abdomen*.—The serum lubricating the surface of the peritoneum tinged with bile. *Liver*.—The greatest part honey-combed by a congeries of abscesses containing pus of a bilious yellow colour.

Chief features.—No sufficient cause appearing in the progress of the stump to induce febrile action, it must probably have originated from the disease in the lungs and liver. The leading symptoms referred neither to the one nor the other until near death. This case proves one point, viz. that this extraordinary diseased tendency of lungs and liver does not depend upon diseased stump, neither does it necessarily produce bad action in it. This, and several similar cases, tend also to prove that those affections of the lungs, &c., which have been considered peculiarly distinctive of *secondary* amputations, and appertaining thereto, are more common in primary amputation than has been described, or that at least the *proportion* is greater than hitherto estimated.

CASE III.—*Series 16th March.*

Primary amputation of arm, within six hours. Gun-shot fracture of humerus. Died 21st day. Diseased lungs.

(ABSTRACT.)

Serjeant Debal, aged 46.—Athletic, robust.—Injury.—Gun-shot comminuted fracture of humerus, lower third. Amputation performed within six hours; flap operation borne well.

Symptoms, two days after.—Tolerably free from pain; considerable sanguineo-serous discharge; stump looking well, pulse 104, soft, bowels open, tongue moist. Stump dressed, cold lotion omitted. Mist: Febrifuge. 3rd. A little tenderness and redness of the edges of the stump; pulse 84, soft. 4th. Restless night, from slight but frequent *spasms of stump*. Diaphoretics and anti-spasmodics. 5th. Pain in the bowels, which are costive; copious healthy discharge. 7th. Rather heavy and feverish. External angle closed by first intention; internal discharging, and the discharge since yesterday of a sanguineous character; lower part of flap tumid, and very tender on pressure; pulse 96, sharp, tongue dry, bowels open. Diaphoretics and anti-spasmodics; hot fomentations. 8th. Improved in all respects. 9th. Bad night; frequent cough; *no pain of chest*; pulse 96, sharp and tense, tongue furred, bowels open. Add. Tr. scillæ. 10th. Much and general improvement. 11th. The same; one of the ligatures came away. 12th. Rather restless night; stump appears doing well, although tender and painful on pressure; discharge pretty healthy, less in quantity; two ligatures removed; pulse 84, rather full, tongue pretty clear and moist, bowels open, little appetite. Pil. morph. 13th. Fourth and last ligature removed. 14th. Severe rigor, followed by perspiration, during reaction, pulse 104, rather tense, tongue furred posteriorly, but moist; *no particular pain or uneasiness*. Calomel and antimony. Mist. Diaphoret. 15th. A good night; perspired much, complains only of weakness; pulse 112, soft, tongue covered with a dry fur. 16th. *Vomited last night fluid of a dark colour and bad taste*; easy night, *no particular pain or uneasiness*, bowels very loose, pulse 108, sharpish, and of moderate strength, tongue covered with a thin brown fur; two small sloughs came away yesterday; and to-day, an unhealthy, and foetid discharge, mixed with small sloughs. Absorbents and effervescents.

17th. Diarrhœa abated; returned, and again abated. *Some*

cough, but no pain of breast; expectoration rather viscid, pulse 92, of a fuller character, tongue covered with a moist dark fur, no appetite, discharge unhealthy, but less profuse.

18th. *Frequent cough, rather difficult expectoration, sputa mixed with streaks of blood, tongue covered with a brown fur, several loose stools, pulse above 120, small and weak; discharge improved a little in quantity and colour. Blister to the chest, antispasmodics and expectorants; evening, occasional hiccough.*

19th. *Restless night; hiccough abated and returned; does not complain of pain, but feels nervous and exhausted; expectoration viscid, and of dark colour; three loose stools; cough seems a little relieved by blister, pulse 104, soft, and of moderate strength. 20. Moribund. 21 died.*

Post mortem.—Skin and cellular tissue tinged with bile; soft parts of *stump* diseased, matter extending to acromion process; periosteum detached half an inch from bone; thin coating of dark-coloured lymph in brachial vein, as far as axilla. *Thorax.* Old adhesions on both sides also to the diaphragm, purulent matter in bronchial tube of right side, a cluster of vomicae in anterior margin of middle lobe, (right,) upper lobe of left lung gorged with a sanio-purulent fluid; whole structure easily broken down.

Chief features.—Tenderness and spasms of *stump*, 3rd and 4th day; febrile symptoms on the 7th, abating till the 14th, when a severe rigor came on. No particular pain or uneasiness: no cough until 9th day; not forming afterwards a prominent symptom, until the last three days; expectoration not affected until the 17th day, when it was first marked viscid; then streaked with blood, and difficult; lastly, viscid and of dark colour; sympathy of stomach and bowels; relation between the action in the *stump* and the lungs, were they simultaneous or successive—was the one produced by the other, and which was the cause, which the effect?

Other questions of interest also arise on careful consideration of this case. A primary amputation of arm, done under highly-favourable circumstances, by a good and experienced operator, ends fatally in twenty-one days. On examination, the stump is found unhealthy; matter burrowing up to the acromion; extremity of bone denuded: bronchiæ inflamed, containing purulent matter; old and extensive adhesions of pleuræ; vomicæ filled with pus in a small portion of the right and the upper lobe of left lung. There was tendency to inflammation of the vein, but it stopped short at the shoulder, and could not have caused death; neither was it likely to arise from the exhausting action of the stump. The time was short. Death may be attributed, with greater probability, to the lungs; and yet they were in a state to have carried on the functions of life for a long period. The most prominent cause, however, still is, in the state of the lungs and bronchiæ. Yet, with all this, there never was any pain, and but moderate cough; that even not till the ninth day. No altered expectoration until within three days of his death. The tinged skin and cellular tissue would, on the contrary, have indicated a disease, which did not exist, in the liver. It would seem, from a careful analysis of the symptoms in their order, that the bad action of the stump preceded any active disease in the chest; that both subsequently reacted upon each other is more than probable. Taking the symptoms for guide, no disease, of any kind, could have been suspected until the ninth day after amputation; and nothing serious until the seventeenth, within three days of his death. The diarrhœa, foul tongue, and vomiting, must be looked upon as merely the results of sympathy with the diseased actions of the stump and lungs, as no organic disease could be traced in the viscera of the abdomen. This case was treated without general bleeding; in others of somewhat similar character, where depletion was freely adopted, the result was still equally unfavourable.

CASE IV.

Illustrating 1st or local class of results affecting primary amputation, nervous disorganizing action, chiefly developed in the *stump*. See p. 64.

Series of June.

Fracture of all the metacarpal bones from a grapeshot. Amputation performed immediately on admission. Died 7th day.

(ABSTRACT).

Thomas Flinn, aged 32.—Injury.—While on piquet, his hand resting on a wall, he received the shot, as he thought, from a musket of the opposite skirmishes. The destruction of parts, however, was so great, and the entrance and exit so disproportionately large, that it must have been either grape or cannister shot. Amputation was performed within half an hour of his admission, and about two hours from the receipt of the injury. When he was brought to the operating-room he became faint, but quickly rallied and bore the flap operation of the forearm very well. When it was put up he walked away in good strength and spirits. The missile entered at the ball of the thumb, carrying away with it the whole extent of the metacarpal bone, and, passing across the hand, pounded and smashed the metacarpal bones and surrounding muscles, reducing the whole to a dark and mangled jelly.

Progress of the case.—First day after the injury. Complained of little pain—slept much. Mist. salin. et Diaph. 2d day. Had been prevented sleeping by pain in the stump; the bandages having become hardened and stiff, were removed, and light dressing applied: bowels open; tongue dry in the centre, white round the edges; skin hot; pulse accelerated; stump looking well. Mist. febrifuge:—Ext. Hyoscy. grs. iij. h. s. s. 3rd day. A dose of castor oil administered in the morning early, which operated well; considerable swelling and tension of the arm as far as the shoulder, the parts pained by

pressure ; no discharge. Tongue dry and furred ; pulse quick, rather small ; the dressings removed. Hirudines xxv. cubiti. appl. V. S. ad $\bar{3}$ xij. 4th day. He was bled to syncope ; leeches bled but little ; swelling and tension of the arm unabated, and even increased towards the shoulder ; slept a little the previous night ; bowels freely opened ; tongue dry ; pulse small, feeble, and quick ; the sutures were cut ; stump opened out and every cause of irritation carefully removed. Hirudines xxx. appl. cataplasm to the stump. 5th day. The tension and all active inflammation, pain and anxiety, the prominent symptoms of preceding day, relieved. Some deep-seated matter seemed to have formed about the elbow. Ordered small doses of calomel and opium. Tongue dry and brown ; the stump presented a sloughing and unhealthy aspect, and there were traces of some little hemorrhage ; bowels open ; pulse small, 120. 6th day. Appeared better ; slept pretty well ; discharge unhealthy ; tongue dry, much thirst ; pain and difficulty in making water. 7th day. Breathing difficult and laborious ; complained of severe spasmodic pains of the abdomen, which was considerably distended. Enema administered and produced three motions ; heart's action feeble and irregular ; countenance indicated extreme exhaustion ; skin covered with clammy perspiration ; arm in the same state as before.—Died in the evening.

Post mortem.—The whole of the cellular tissue up to the pectoral muscles much loaded with serum, the veins as far as the axilla somewhat thickened, but not presenting marks of active inflammation ; surface of stump covered with an unhealthy and grumous matter, and pus was found as high as the axilla in the course of the brachial artery ; viscera all healthy. On introducing a knife by accident into the thigh near the knee-joint a stream of pus followed ; the cavity of the knee-joint of the same side as the amputation was found filled with lemon-coloured pus.

CASE V.—*Series of March.*

Illustrating 2d class, or general effects influencing the results of primary amputations. (See p. 73.)

Gun-shot fracture of tibia and fibula. Amputation of thigh 2nd day. Died, 23rd day. No organic disease.

(ABSTRACT.)

Serjeant Major D'Almy, aged 37.—Injury.—Gun-shot fracture of tibia and fibula, three inches below the patella. Amputation above the knee, by circular incision : operation borne well ; three ligatures applied ; little blood lost.

Progress of the case.—Up to the 12th day after the operation the case went on most favourably, when febrile symptoms appeared, irritability of stomach, pain in the head, increased arterial action, &c. 14th day, this had much abated. From that period, however, to the 23rd day, when he died, a fever of a small irritative character clung to him, with disorder of stomach and bowels ; stump sympathising but little ; respiration and sensorium affected two days before death.

Post mortem.—Body not emaciated. The stump was found to have soundly healed, callus already rounding the end of the bone. A small quantity of pus found among the muscles at the outer side of the thigh, but unconnected with stump ; viscera generally healthy.

Chief features.—The febrile action, which would seem to have destroyed this patient, can scarcely be attributed to any irritation from the stump, which did not even sympathise with the bad action of the system generally, but healed up firmly and soundly. No disease in the thorax or abdominal viscera was found to account for any sympathetic or irritative fever. If the shocks of the original injury and subsequent operation did not produce death, what did ? And yet for the unusual period of twelve days, no one symptom, general or local, of an untoward nature, was remarked. On a careful review of the

case, it is difficult to avoid the impression, that, notwithstanding the long interval, the febrile irritative action developed at that period must have depended upon the hidden influence of the nervous system. The absence of all change of structure in all the important organs ministering to life, as also of all bad action in the stump, tend to support this hypothesis. Since pain, by its tension on the nerves, will kill, or, in other words, since life may be destroyed without lesion or perceptible alteration in any one structure, through the nervous power, why may not a severe shock develop a slower working irritation, or absorbent, than we have hitherto looked for as the effects of nervous intervention?

In speaking of the amputations resulting from the actions in March 1837, the bilio-endemic remittent fever which prevailed has been alluded to; and although I do not, on that account, consider the table showing the total number of amputations in the fourteen months, furnishes a fair scale from which to deduce any conclusions respecting the relative mortality or value of primary and secondary operations, while taking care to give the first six months separately, I have not thought it right to leave anything untold in this exposition, the object of which is to afford facts in elucidation of various questions of surgical science. The reader will thus be able, by comparing the several tables, to draw his own conclusions without being bound down or confined to my opinions and deductions.

It will be seen, on reference to the explanatory notes accompanying the returns, that there was, throughout the medical and surgical cases, an increase of mortality. Thus the average mortality in the wounded, exclusive of amputation, was 1 to $10\frac{1}{7}$; while in March and April it was 1 to $9\frac{1}{2}$, 512 the number treated. Of the surgical and other cases not wounded, treated in San Telmo, the average mortality, for the thirteen

months, was 1 in 36; in March and April it was increased to 1 in $33\frac{18}{100}$, number treated 1,898. In La Longa the average was 1 in $13\frac{22}{100}$, the number treated 3,598. In March and April it increased to 1 in $12\frac{4}{100}$, number treated 640; a general increase from 8 to 10 per cent.

It would be difficult to fix upon any one circumstance as the true cause of this bilio-epidemic, or endemic visitation, although there were many exciting and pre-disposing causes. The following are the notes, made at the time, of the weather.

“ From March the 10th to April the 25th, the weather was exceedingly variable; March 10 (the opening of the campaign) was a fine, hot, dry day; 11, 12, 13, incessant and heavy rain; the troops nearly all bivouacked; 14, rain at intervals; 15, half the day rain, the other half fine; none of these days very cold; 16, fine and hot. These are the seven days which the troops kept the field; on three of these, engaged in general actions, and two more in slighter affairs. The whole of the rest of the period, now and then for a day or for two days, fine and hot, but generally rainy, often exceedingly cold, sometimes hail storms, and for many days, about the middle of April, blowing hard gales of wind for two or three days and nights. During the intervals of fine weather it was hot in the sun, and chilly in the shade; and the last five days in April almost incessant rain.

The weather, then, we see, was not fine; and it can scarcely be necessary to enter into proofs that the weather exercises a direct influence upon the frame, and the functions of the brain especially, beneficial and deleterious. During the week of operations, the troops had been both much exposed and fatigued, and the last action was a reverse, ending in retreat. Moral and physical causes were here, therefore, in presence. The town, for some time before, had been more crowded than usual, and the great and sudden influx of

wounded Spanish and English, after crowding, to overflowing, the Spanish hospitals and churches, where this fever first presented itself, ended by crowding the English hospitals, for a time, also; and, although measures were taken to prevent any considerable excess in the divisions reserved for serious wounds, yet, in the whole hospital of San Telmo, for two or three weeks, there were 800 patients, instead of 600, which was its established number. That any injurious effects should fall more particularly upon the most critical cases, the amputations, was of course, to be anticipated. The operations, all except one, were performed by practised operators; I performed several myself, and only saved one ultimately, a second dying just as the last point of his stump was healing, with large abscesses in the liver. An abstract of the case has been given.

Return showing the relative success of primary operations performed on the Field and in Hospital, from May 5, 1836, to June 10, 1837.

On the Field.				In the Hospital.			
Injury.	No.	Deaths.	Proportion of deaths to cases treated.	Numbers.	No.	Deaths.	Proportion of deaths to cases treated.
G. S. W fracture of femur	3	3	1 to 1	1 limb carried off by round shot	5	2	1 to $2\frac{1}{2}$
Tibia and Fibula	1	..	.. ..	.. ..	5	5	1 to 1
Humerus	2	1	1 to 2	.. ..	5	2	1 to $2\frac{1}{2}$
Radius and Ulna	2	..	.. ..	.. ..	..	..	.. ..
Joints.							
Knee . . . . .	..	..	.. ..	.. ..	5	3	1 to $1\frac{2}{3}$ *
Shoulder	1	..	.. ..	.. ..	3	..	.. ..
Elbow	2	..	.. ..	.. ..	5	4	1 to $1\frac{1}{2}$
Wrist	1	1	1 to 1	.. ..	1	1	1 to 1
Total.	12	5	1 to $2\frac{2}{3}$		29	17	1 to $1\frac{13}{17}$

* One died after the stump was healed, and a second the fifth month with extensive necrosis.

This, although perfectly correct, is nevertheless not conclusive, for it is necessary to bear in mind, before taking the results in evidence, that there was a morbid cause influencing the mortality of *one* of these classes and not the other. Of those amputated in hospital, sixteen, out of which only three recovered, are of the series of March—a period when a bilio-epidemic fever swept through the surgical hospitals, Spanish and English, like a plague, carrying off nearly the whole of the amputations, 1 to $1\frac{1}{6}$, in spite of every precaution and the most earnest care and attention on the part of every medical officer. Thus perhaps the comparison would be fairer if these were eliminated, and the return would then stand as follows, and present a fair comparison of similar injuries amputated on the field, and amputated in hospital a few hours later varying from 6 to 48.

Amputations in the field, 12. Deaths, 5. Proportion, 1 to $2\frac{2}{3}$.
 hospital, 13. Deaths, 4. Proportion, 1 to $3\frac{1}{3}$.

Or in detail, selecting only parallel cases, besides eliminating the 16.

	In the field.			In the hospital.		
	Amp.	Died.	Proportion.	Amp.	Died.	Proportion.
Femur . . .	3	3	1 to 1	4	2	1 to 2.
Tibia	1	0	0—0	1	1	1—1.
Humerus . . .	2	1	1—2	2	1	1—2.
Shoulder . . .	1	0	0—0	2	0	0—0
Elbow	2	0	0—0	1	0	0—0
	—	—	—	—	—	—
	9	4	1 to $2\frac{1}{2}$	10	4	1 to $2\frac{1}{2}$

Which still leaves a fraction in favour of those performed some hours later in hospital.

Return of operations, primary and secondary, performed at the General Military Hospital, San Telmo, from the 5th of May, 1836, to the 31st of December 1836.

PRIMARY OPERATIONS.

Nature of operation.	No. of operations.	Invalidated cured.	Died.	Remain under treatment.	Proportion of deaths to cases treated.	Remarks.
Amputation of thigh. . .	8	3	4	1	1 to 2	Limb carried away by round-shot. Tetanus supervened. The two remaining under treatment were both out of danger.
.... leg and foot . . . . .	..	..	..	..	.. ..
.... at the should.-joint	2	1	..	1	0 to 1	
.... of the arm	5	5	..	..	0 to 1	
.... fore-arm and hand	1	..	1	..	1 to 1	
Total	16	9	5	2	.. ..	The proportion is 5 to 16, rather more than 1 to 3.

SECONDARY OPERATIONS.

Nature of operation.	No. of operations.	Invalidated cured.	Died.	Remain under treatment.	Proportion of deaths to cases treated.	Remarks.
Amputation of thigh	15	7	8	..	1 to $1\frac{7}{8}$	One man had both legs amputated after gangrene from fever.
.... of leg	9	9	..	..	0 to 1	
.... of arm	7	7	..	..	0 to 1	
.... fore-arm and hand	2	2	..	..	0 to 1	
Total	33	25	8	..	1 to $4\frac{1}{8}$	
Total primary and secondary.	49	34	13	3	1 to $3\frac{1}{2}$	

Return of amputations, primary and secondary, performed at the General Military Hospital, San Telmo, San Sebastian, from the 1st January 1837, to the 10th June 1837.

PRIMARY.

Nature of operation.	No. of operations.	Cured.	Died.	Remain.	REMARKS.
P. Amp. of the thigh.	9	2	7	..	
..... leg. ..	3	..	1	2	
.. at shoulder joint.	3	2	..	1	
.. of the arm	8	1	7	..	
.....forearm	2	1	1	..	
Total....	25	6	16	3	

SECONDARY.

Nature of operation.	No. of operations.	Cured.	Died.	Remain.	REMARKS.
S. Amp. of thigh	5	..	4	1	
.. at shoulder joint	1	..	1	..	
.. of arm	2	..	2	..	
Total....	8	..	7	1	
Grand Total.	33	6	23	4	

The greater part of the foregoing operations were from the actions of March, the proportion of deaths in which were 1 to $1\frac{4}{23}$ in consequence of endemic fever.—See enumeration of these operations, p. 76.

Return of the capital operations performed in the General Military Hospital of San Telmo, San Sebastian, from May 5, 1836, to June 10th, 1837.

PRIMARY.

Nature of operation.	No. of operations.	Cured.	Died.	Remain.	Proportion of deaths to cases treated.	REMARKS.
P. Amp. of thigh.	17	5	11	1	1 to $1\frac{6}{11}$	Those remaining out of danger.
..... of leg	3	..	1	2	1—3	
.. at shoulder joint	5	3	..	2	0—1	
.. of the arm ..	13	6	7	..	1— $\frac{6}{17}$	
..... forearm ...	3	1	2	..	1— $1\frac{1}{2}$	
Total....	41	15	21	5	1 to 2	

SECONDARY.

Nature of operation.	No. of operations.	Cured.	Died.	Remain- ing.	Proportion of deaths to cases treated.	REMARKS.
S. Amp. of thigh.	20	7	12	1	1 to $1\frac{2}{3}$	Com p. with G.S. W. of Thorax.
..... of leg . . .	9	9	..	..	0—1	
.. at shoulder joint.	1	..	1	..	1—1	
..of the arm	9	7	2	..	1— $4\frac{1}{2}$	
..... forearm ..	2	2	..	..	0—1	
Total....	41	25	15	1	1 to $1\frac{1}{4}$	
Total of the whole amputations.	82	40	36	6	1 to $2\frac{5}{18}$	

Thus the average is in favour of secondary operations, and of the primary in those performed in hospital from six to forty-eight hours after the injury.

It is, perhaps, not easy satisfactorily to account for the striking dissimilarity of results in this number of operations, and those furnished from the peninsular war, and more particularly, that while the secondary operations, upon the whole, present a more successful average, the primary should give a contrary result. In the second series the average is in favour of the primary. Some causes, however, are evident and conclusive, and among the chief are the following :*

It has been shown, in the first part of this work, that the class of men comprising the Legion was far inferior to those carefully selected for the British service. Thus, it often happened that a patient requiring amputation was already much enervated by long disease, probably after having been invalided from the Indian or British service, or even previously invalided in the Legion ; exactly such a subject as no surgeon would voluntarily operate upon.

2. The fatal endemic fever, which carried off almost the entire of one series of amputations, consisting of more than a third of the whole number, nearly two-thirds of which were primary. The smallness of the total of operations not affording sufficient body to counterbalance this accidental circumstance.

3. The depressing influence of the mind, constantly ob-

* Nothing, however, proves the difficulty of establishing an accurate average of results more than those of my own operations in Spain. In the first sixteen performed for gun-shot wounds, consisting of primary and secondary, including a shoulder-joint case, the majority of the thigh and leg, I lost but one, and that was an all but hopeless case of secondary amputation of the thigh, at the trochanter minor, rendered imperative by secondary hemorrhage in a gun-shot fracture of femur, the whole limb greatly diseased. In the next eight I lost seven, and the one saved was a complicated case requiring amputation at the shoulder-joint. In Portugal, I remember some of the worst injuries and least promising cases were at one time the most successful. I should say from my own experience, that no number under 1000, and those taken from different series, and at different periods, could furnish a true or positive average.

served, and expressed respecting their future means of existence, in the uncertainty or disbelief that they would be provided for by pension, bore unequally upon the two classes, exercising its chief influence upon the primary amputations. A man who has been lying from three to six weeks on a bed of suffering with a fractured limb, losing at last all hope of its being saved, naturally and instinctively begins to concentrate his hopes and wishes into the mere preservation of life, resigned to any future worldly miseries, and willing to encounter them for the sake of that life, which now becomes valuable to him in proportion to the jeopardy in which he conceives it placed. Not so with a man who a few hours before was in no such danger, but, on the contrary, was in full activity and uninjured; he cannot bear the idea of being crippled for life—of losing the means of earning his subsistence, and enjoying existence without bodily injury or impediment. A feeling of despondency, near akin to despair, takes possession of his mind; the desire to preserve life seems lost in the train of gloomy ideas which immediately take possession of his mind, and he dwells upon the long vista of misery which stretches before him, ending at best in a workhouse; regret and anger fill up the measure, at having exposed himself to such a misfortune as the loss of a limb, in a service which, he fears or believes, will neither requite nor provide for him. I rarely ever found any difficulty in persuading these men to submit to a secondary amputation. After they had heard me, their answer uniformly ran thus:—"Oh, I know, sir, my leg cannot be saved—I have suffered more than enough already—I shall only die with it on—I wish it had been off at first—so, whenever you like, sir—the sooner the better!" Whereas, with a patient who required a primary amputation, the answers were of a very different tenor, and my opinion and advice in some cases were obstinately rejected; but, even when they consented, the first answers almost invariably ran thus:

—“ What, lose my leg, sir?—Oh, no—no. What shall I do afterwards? What is to become of my wife and children? How am I to work for them? we shall all starve! Die!—well, I had rather. What’s the use of life to a poor man after? Ay—it is all very true, sir, I dare say—but I can’t—I won’t—I had rather die!” And this train of thought pursued each of the two classes generally through the treatment. One other cause influencing the recovery of secondary amputations, alone, existed. As it was only from some accidental circumstance of rare occurrence, after the first action, that cases which, from the nature of the injury, required amputation from the first, were deferred, it followed that those who were the subjects of secondary amputation had already proved, by the very fact of their arriving at the second period, that they were among those best capable of bearing the effects of a shock and subsequent disease, and the original injury was generally less severe. It should ever be borne in mind that a cause of fallacy pervades all the returns of secondary amputation given by the advocates of that practice, viz. that the cases are altogether lost sight of which *never arrive at the second period*, many of which would have been saved by operation at the first, and which, in my opinion, ought strictly to be added to the *losses* from that practice—an arrangement which would materially affect their tables of results.

5. *Evidence on the proportion of secondary hæmorrhage and tetanus in wounds.* The following abstract of the nature, treatment, and result of the two classes shows, that, no simple case of secondary hæmorrhage occurred, nor out of more than three thousand wounded, who have been under my charge in Portugal and Spain, have I met with one. On the contrary, they generally supervene in the most complicated injuries, as Mr. Guthrie has remarked.

Among the cases of tetanus there were two of recovery, for although the second terminated fatally, it was long after and from other causes. Amputation was tried in three cases

without avail, although some temporary mitigation of the symptoms was apparent.

Abstract of Cases of Tetanus occurring in the General Military Hospital of San Telmo.

Date of action 5th of May.—Six cases occurred. *One* after primary amputation on the field. *One* after compound fracture of tibia and fibula; amputation was performed after the first manifestation of tetanic symptoms. *One* with compound fracture of the metacarpal bones; amputation was performed after the appearance of tetanus. *Three* were flesh wounds. The treatment consisted in bleeding, opiates, and calomel combined with opium; none of the remedies were carried to any great extent. In the whole of the cases, death was the result.

10th to 16th of March—eleven cases.—*Six* were simple flesh wounds, two of the lower extremity, three of the upper extremity, and one of the trunk. One recovered, five died. The case that recovered was treated with large doses of carbonate of iron, after an unsuccessful attempt to arrest the progress of the disease with anodynes. The treatment of the fatal cases consisted in bleeding, acetate of morphia carried in one instance to a very large extent,* calomel and opium, and tartar emetic.

Three after compound fracture of tibia: one was amputated without any alleviation of the disease; one recovered of tetanus, and died afterwards of irritative fever, the knee-joint becoming affected. These, as well as the remaining case which died, were treated with opiates, bleeding and ant. tart, to a moderate extent.

One was a flesh wound of the lower extremity and fracture of the scapula.

One a fracture of the phalanx of the great toe: the same remedies were resorted to in both cases as in the three preceding.

* Four grain doses.

Abstract of Cases of Secondary Hæmorrhage, occurring in the General Military Hospital, San Telmo, from May 1836 to June 1837.

Date of action, 5th May. Seven cases.—*Two* after amputation of the thigh, secondary. The femoral artery was secured in both instances. In one case the patient died immediately; in the other, six days afterwards, the hæmorrhage continuing.

Three after compound fracture of femur; two were amputated immediately. The wounded artery was not discovered in one instance; in the other a spicula of bone had perforated the femoral artery; one was cured, the other died of diarrhœa. In the third case the femoral artery was secured; sphacelus of the foot and a recurrence of hæmorrhage ensued, from which he died. One gun-shot fracture of the bones of the face, after frequent recurrence, and proceeding to an alarming extent in very complicated and severe injury, the hæmorrhage ceased spontaneously.

One was a compound fracture of the humerus; the vessel could not be detected from whence the hæmorrhage proceeded. Amputation of the arm was performed, and he recovered.

10th to 16th March. Four cases.—*Two* were gun-shot fractures of the bones of face; the common carotid was secured; both died.

One was a gun-shot fracture of the radius into the elbow joint; the ulnar artery was divided, from which the hæmorrhage took place. Amputation of the arm was performed. Died of fever.

One compound fracture of fibula, secondary hæmorrhage from posterior tibial artery; femoral artery secured. Recovered.

14th May. One case.—After amputation of the arm, hæmorrhage occurred suddenly, and two vessels were secured. The patient died.

The general results of the sick and wounded of the Legion have thus, as clearly, fully, and yet succinctly, as abundance of notes and materials would allow, been given. The introduction of more of the detail of these notes into a sketch would have destroyed not only the conciseness essential to a *resumé*, but might possibly have impaired the clearness and value of the few particulars more immediately bearing upon those results which it has been found necessary to add. They will find their place more appropriately in a series of observations upon the nature, treatment, and results of some classes of gun-shot wounds, and other injuries, upon which I am at present engaged.

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The general results of the work are contained in the following pages. The results are given in a form which is convenient for reference. The results are given in a form which is convenient for reference. The results are given in a form which is convenient for reference. The results are given in a form which is convenient for reference. The results are given in a form which is convenient for reference. The results are given in a form which is convenient for reference. The results are given in a form which is convenient for reference. The results are given in a form which is convenient for reference. The results are given in a form which is convenient for reference. The results are given in a form which is convenient for reference.

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