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MEMOIRS
OF
MILITARY SURGERY,
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CAMPAIGNS
OF THE FRENCH ARMIES,

ON THE RHINE, IN CORSICA, CATALONIA, EGYPT, AND SYRIA;
AT BOULOGNE, ULM, AND AUSTERLITZ; IN SAXONY,
PRUSSIA, POLAND, SPAIN, AND AUSTRIA.

FROM THE FRENCH OF D. J. LARREY, M. D.

First Surgeon of the Imperial Guards, Inspector-general of the Medical Staff of
the French Armies, &c. Baron of the Empire, Commandant of the
Legion of Honour, Knight of the order of the Iron Crown,
&c. &c. &c.

BY RICHARD WILLMOTT HALL, M. D.,

PROFESSOUR OF MIDWIFERY AND OF THE DISEASES OF WOMEN
AND CHILDREN IN THE UNIVERSITY OF MARYLAND.

With Notes by the Translator.

FIRST AMERICAN FROM THE SECOND PARIS EDITION.

VOL. II.

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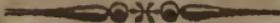




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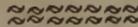


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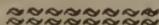
ERRATUM.

In the case of Mr. Williams, Vol. 2, page 84, it was stated that "the abdominal aorta" was wounded and tied.—A letter from Dr. Gibson informs us, that it was the "left aliaca Communis."

CAMPAIGNS

AT BOULOGNE, ULM, AND AUSTERLITZ.

CONTINUED.



THE symptoms of the hospital fever that prevailed among our troops in this campaign, varied in their character and appearance.

In proportion as the adynamick affection predominated, and showed itself with the expressions belonging to it, so also did the ataxick symptoms assume their own particular character. Wounds of the articulations, fractures of the limbs, injuries of the walls of the great cavities, and hæmorrhages most generally produced adynamia, which showed itself by nausea, vomiting, hicough, pains of the intestines, disorder of the alvine functions, quickness and weakness of the pulse ; by a catarrhal affection of the lungs, and a greater or less change of countenance. Internal heat, thirst, fever, and anxiety, succeeded almost immediately, and at the same time the moist gangrene, or hospital sphacelus took place in the

wounds. The rapidity of the latter depended on the age or irritability of the patient.

Wounds of the head, or any other part of the body, were complicated with ataxia, when a metastasis of the putrid or noxious principles of the purulent discharge affected the brain, from the inconsiderate use of spirituous liquors, stypticks, and astringent or cold applications, such as brandy, decoction of chineona, vinegar or oxy-crat. Yet these articles are recommended by some practitioners. The atáxia is ushered in in these cases by cephalalgia, partial or general paralysis, involuntary evacuations, incontinence of urine, loss of perception, and an alteration of the senses, except that of hearing, which appears to partake of organick life: for when this is only destroyed, the prognosis is less unfavourable, and there is more hope, as adynamia alone remains. Finally, delirium and drowsiness succeed, and if they be not immediately checked by the proper remedies, the patient soon dies.

Such is the difference between two affections which may appear at the same time, by the concurrence of the spontaneous causes of which we have spoken, with those which are external; such as improper temperature, unwholesome character of the winds, unhealthful situations, and bad diet. It is the union of these causes that produces the hospital or jail fever, described under different names by the ancient nosologists, and known in modern nomenclatures, under the name of adynamico-ataxick fevers. When the epidemick of Brunn came on with the complicated character that I have described in the first part of its history, which was generally the case, it often proved fatal in the third or fourth paroxysm.

This epidemick rarely appeared among the wounded guards who were placed in the hospital *la Charite*, which was distant from the other hospitals, and from the popu

lous parts of the city. It was well lighted, well aired, and kept perfectly clean. The personal attendance on the sick was diligently discharged by the proper officers, and the infirm soldiers of our *flying ambulances*, so that we lost in that hospital but few of the wounded or the sick. Mr. Charamond, the commissary, suffered a severe attack of this disease in our hospital, but he contracted it by having frequent communication with the Russian prisoners and the sick of the line, while discharging the painful duties of his commission. Finally, our sick owed their security to the benefits of suitable and prompt medical and surgical assistance, and to their successive removal to another hospital at Vienna, which had been prepared for them. This exercise, timely operations, good dressings, the use of good wine and bark, contributed much to their cure.

The causes of this epidemick may be referred to the fatigue and privations which the troops of both nations had undergone; to the severity and vicissitudes of the season; to the crowding together the prisoners, the wounded, and the sick of both armies; to the bad diet, and their confinement after the most fatiguing and rapid marches.

The prognosis was unfavourable when ataxia predominated, when the wounds were near the internal organs, or large articulations, and when the subject was young and irritable. I remarked that soldiers who had passed the adult age, withstood the effects of this disease best. Its progress was slower and less dangerous, when adynamia predominated at intervals, and especially when it was not attended with frequent paroxysms.

The indications of cure were founded on the nature of the affection, on its symptoms, and its different stages. When it came on in the form of an ataxick remittent fever, dry scarifications to the neck, and hypochondria,

and sinapisms to the soles of the feet, suppurative and antiseptick stimulants to the wounds, drinks acidulated with mineral acids, and mixed with theriacal and ethereal potions, arrested its progress, and averted the danger. Venæsection, which by some practitioners was prescribed and practised in this epidemick, was *always* fatal. Doctor Roussel, who, contrary to my advice, used venæsection at the first attack of this disease, which he had contracted in the hospitals, fell a victim to it and died on the seventh day, in spite of all our aid. It is even improper to use dry cupping, which, when judiciously prescribed, is certainly an important remedy. If the disease continue to advance, and the ataxia always predominate, to the remedies above mentioned should be added camphor and musk; the drinks should be strongly acidulated with the mineral acids. The surface of the body should be washed with strong lotions of camphorated vinegar, which should be used cold, and even with the addition of ice, *when the animal heat is great*: finally, rubifacients should be well applied to the feet, legs, and neck; cantharides also should be applied to these parts in the form of vesicatories. Opium, which is recommended by some authors, is injurious in this affection, and the cortex should not be given until after the first stage of the disease; when the crethismus has been removed, it may be used according to circumstances. If the nervous symptoms predominate, it may be given in decoction with other bitters, and in conjunction with Hoffman's mineral liquor: it may afterwards be given in substance, in larger or smaller doses, with the addition of sulphurick ether, and acetate of ammonia: the use of wine and coffee should not be neglected, if they can be procured. I have generally seen the best effects result from using these remedies in succession, and in different quantities, in the treatment of typhus. I have also from fre-

quent examinations of those who have died of this epidemick, been confirmed in an opinion which I have long entertained, that the ataxia acts on the nervous system of sensitive life, and the adynamia on organick life. In the first affection, the brain is always diseased, or has its arterial vessels obstructed and filled with black blood. In the second, the viscera of the thorax and abdomen, and in general, the stomaek and intestines, undergo a change.

When the disease began with symptoms of adynamia, arising particularly from a gastrick or intestinal affection, an emetick of ipeecacuanha or antimoniated tartrite of potash was given in small and successive doses, and immediately followed by the bark combined with opium and rhubarb in good wine, or a decoction of serpentaria or angelica. Also ethereal and theriacal potions, enemata of camphorated bark, washing the surface of the body with vinegar, the use of good wine, of vinous lemonade and stimulating frictions of the abdomen. In this case, the wounds which are affected with the hospital sphacelus, should be dressed with vegetable or mineral acids and camphor and bark, in combination with some balsamick substances, as the teribintliniate spirits are by no means proper, because they dry the ulcerated vessels, make them horny, swell the subjacent sound vessels, and increase the disease.

In adynamick fever, I have observed that vesicatories did not produce the advantages which have been attributed to them. The excoriations caused by their application were followed in a short time by an appearance of moist gangrene, or hospital sphacelus. The putridity increased, and the general asthenia remained the same.

In the cases where ataxia predominated, on the contrary, they may produce good effects: the *cutis* retains its vigour and elasticity. Mortification supervenes with

greater difficulty; and on account of the successive discharge of serum and pus, the capillary system is relieved, the spasm is removed, and the brain is no longer oppressed. These vesicatories should be applied on the neck and legs; but care should be taken to keep on the epidermis, which should fall off of itself: they should be dressed with a little cerate.

Nature sometimes assists the action of remedies, and precedes their effects by salutary crises; producing critical abscesses, copious sweats, abundant evacuations, and the return of suppuration in wounds. These crises, when they do take place, occur generally between the seventh and thirteenth day.

I have confined myself to this succinct account of this epidemick, as I did not intend to enter on the theory of this species of disease, which I doubt not has been treated *ex professo* by the physicians of the grand army.

As soon as we discovered the fatal termination of this epidemick, we hastened the departure of the prisoners of war for France, and then proceeded to remove the sick and wounded, who were transported to Vienna, where large hospitals were prepared for their reception, with every thing necessary for their cure. The weather changed, and the most severe cold now succeeded the rainy and moderate weather which had continued since the battle. This kind of atmospherick revolution, with change of situation, and the great attention which the sick received at Vienna from my colleagues, the inspectors general Messrs. Costes and Percy, arrested the progress of the epidemick, and moderated its virulence.— From this time the wounds continued to heal without difficulty, and almost all the wounded French, who were sent to this city, recovered. The epidemick continued to rage among the Russians and the prisoners, until they arrived in France. The obstinacy of this disease was

owing to want of cleanliness among the soldiers, (notwithstanding all the attention and care of the French nurses,) to their apathy and carelessness, and lastly, to the circumstance of their being crowded together in the places where they halted during their removal. These places, although large and numerous, were always insufficient, on account of their unequal distribution, and the great number of the prisoners. The mixture of the individuals of the two nations, propagated the disease along the whole route. These fatal consequences might have been prevented, if two routes had been established between France and Vienna, for the removal of the sick; one for the French, and the other for the Russians; and if the clothes of the convalescents, and those who had recovered, had been purified. But circumstances did not admit of it.

The removal of the wounded guards, which commenced the day after the battle of Austerlitz, and continued without interruption, was attended with much success. They were conveyed to the hospital of the Dominicans at Vienna, which was amply provided and prepared for their reception and comfort.

Peace was soon proclaimed at Presburg, and we had a near prospect of returning to France. I preceded the guards in order to inspect the hospitals for their reception on the route, and to prepare particular wards for the wounded and sick of this corps. I halted a few days at Augsburg to complete the organization of the hospitals. They were all crowded, and the Russian prisoners were still mingled with our soldiers. I ordered them to be separated, and proposed divers improvements, which, as I afterwards learned, tended much to check the epidemic. I arrived at Paris a short time afterwards, where I resumed my usual functions and studies.

Essay on Aneurism.

During the short stay that I made in Paris, after the campaign of Austerlitz, I collected the remarks that I had made at different periods, after inspecting the bodies of those who had died of internal aneurism, and I made it the subject of a short memoir, accompanied by some cases, which I communicated to the society of the medical school. As it was only announced in the bulletin of this society, I have thought proper to give it here in its original form. I shall only add some facts which support the principles that I then advanced. A *part* of these principles are in unison with those which the celebrated Scarpa supports in his excellent work on "Aneurism." I regret that my notice was not published in time, as it might be supposed that I have taken the opinions which I here support, from his treatise; but I do declare that they were suggested to me by observation alone. By the perusal of authors, and especially of Morgani, I am convinced that all intelligent surgeons, as well as Scarpa, have made observations on the progress of aneurism, and have remarked its consequences. I should not publish any opinion on a disease that has already been described by so many good authors, if I did not also expect to throw some light on this part of our science, by uniting to well-known facts, those which have been furnished by my own practice, and which I think will assist in establishing the difference between the principles advanced in the work of Scarpa, and those which arise out of my own observations.

If the opinions of the ancient physicians who have written on aneurism be examined with care, it will be evident that they admitted this organick affection to be dependent on a particular internal taint, which the celebrated Corvisart has called *acre deletere* (deleterious achor, or acrimony. *) Sabatier and Scarpa are also of the opinion that the development of this disease is chiefly attributable to spontaneous causes. It was with a view of informing myself of the true causes of aneurism, that I instituted the inquiries, the principal results of which I shall detail in the sequel.

Indeed, how can we suppose that a mechanical cause, such as a violent effort, sudden motion, a fall, or sudden compression, can all at once change the texture of the arteries, and especially of those which are included in the great cavities of the body, so as to cause them to give way, and the fibres of their proper coats to separate or break, without producing fatal hæmorrhages? No doubt nature has well provided against the frequent occurrence of such accidents, and for the same reason she must have taken the necessary precautions to prevent their effects: to this end she has endowed the arteries with great elasticity. They are every where surrounded on all sides by a more or less elastick and pliant cellular substance, and by soft parts which defend them against the action of mechanical agents. They are almost every where arranged in a tortuous manner, to follow the extension of the different parts of the body, or the uncommon motions to which they may be subjected. The fluid which they contain, also assists in rendering them more secure from the action of mechanical causes. Besides, if such mechanical causes operated so as to rupture the tissue of

* See his essay on the organick diseases and lesions of the heart, under the article 'Cause of Aneurism of the Aorta,' second edition.

the artery, as some authors suppose, would that rupture be confined to a few fibres of the muscular or membranous coats? No, a laceration, or total rupture of the vessels would then take place, and would produce an effusion or pouring out of blood, if in an internal artery of the body; or the sudden retraction of the vessel, and the obliteration of its caliber, if it were one of the superficial arteries. I have several times seen cases of this latter kind: violent contusions produced by balls, just as they have completed their parabola, act only, as I shall show in my memoir on amputation, by instantly bruising and disorganizing the arterial trunks, which open or break entirely; and we find in the cellular substance, and in the interstices of the muscles, an effusion of arterial blood, while the extremities of the vessels are deeply concealed, and retracted towards their trunks. Sometimes also in limbs, which are torn off by bodies projected with more or less rapidity, the arteries are broken at a distance from the part that was stricken; but unless mechanical causes act very violently, and produce such effects with a rapidity proportioned to their force, they cannot be considered as necessary causes of aneurism, at least in the sense which the partisans of this opinion admit. But we will allow that direct lesions of the arteries, and permanent or irritating compression, may be causes of aneurism. It is also very surprizing that they adduce experiments made on the dead body, as if the condition of a living part can be compared with that of a part that is deprived of its vital properties. Thus are errors produced and perpetuated.

Further, let them direct their attention to labouring men who lead sober lives, and have no taint of disease circulating in their fluids. It matters not how violent and sudden their exertions may be, or how unusual may be

the position of their limbs, yet we never find them attacked by aneurism. And why is not this affection seen frequently among our soldiers, who are exposed to the most painful fatigue, and to the most irregular marches? Indeed we seldom find it among them, unless one of its causes, of which we shall speak, produces it: and if we find it frequently among the boys of the amphitheatre, as Bichat has said, and his copyists have repeated, it does not here arise from the fatigue of body that they undergo, but from their great intemperance, and from the absorption of different poisons which may take place in several modes. For by the confession of authors, who adduce such cases, these men are often most depraved in their morals.

If it were possible to investigate the first cause of internal aneurism in persons who have died from it, we should be convinced that this cause was a particular virus which seizes on some part of the animal economy, according to the affinity which the part may have for it. The syphilitick virus, if it meet with obstructions, seizes on the parts with which it is in contact, and for which it has an affinity. This virus is also very susceptible of being nourished in its progress by new absorptions, without showing any external symptom. Nevertheless, it is easy to conceive that the coats of the arteries, which serve as conductors for it, may be the first to be attacked. It begins by irritating some point of their internal walls; the sensibility of the part is immediately changed, and a kind of latent inflammation takes place in it, the elasticity of the coats of the artery is weakened, their substance obstructed, and their walls give way, on account of the change in their texture, and the propulsion which the blood receives from the heart: a gradual dilatation then follows of a part or of the whole caliber of the artery; and this dilatation is in proportion to the size

of the arterial canal, to its shape, and the age and constitution of the patient. The large arteries, in proportion to their size, can be more dilated than the small, but this enlargement is limited, and of different degrees. But the *maximum* cannot be more than double their ordinary diameter. It generally happens, that aneurism is confined to a portion of the circumference. While the debility and obstruction of the vessels which go to the coats of the arteries, produce this irregular dilatation, the virus continues to extend its ravages, and by degrees alters the parts with which it comes in contact. This erosion appears to take place more easily in the villous and fibrous, than in the membranous coat, no doubt because the morbid principle has less affinity with the former. So chancres, that arise from venereal buboes, corrode the integuments, and even the aponeuroses of the abdomen, with surprising celerity, while they do not injure the peritoneum. In like manner the internal coats of the arteries are corroded irregularly by the syphilitick virus, or one similar to it, as the virus of the scrofula,* while the membranous or external coat is entire. But when the erosion has extended to the last layers of the internal coat, the blood presses against the membranous coat, distends it, and obliges it to dilate: this is more easily effected, as its fibres are flexible, and extensible, and do not appear to be so easily acted on by the virus as the internal coats. From this time the aneurism ceases to be *true*. or from simple dilatation. The common or cellular membrane contains the fluid, and forms a circumscribed sac, which characterizes the aneurismal tumour. In pro-

* Ruysch and Morgagni say they have found in animals, small effusions of a particular appearance in the fibrous coat of the artery, which had produced aneurismal tumour, by destroying this membrane, See *Medicine Operatoire of Sabatier*, vol. i. The same might take place in man.

portion as the texture of the internal coat is dense and firm, as in arteries of a small or moderate caliber, the dilatation will be less considerable, and the erosion more sudden and extensive. For this reason is this coat sooner perforated, and the external membranous sac more speedily formed. If this false aneurism be isolated and circumscribed, as is sometimes the case, it may be considered as encysted, and as a consequence of partial wounds of the arteries. The dilatation has greater effect on the arteries which are curved or bending, than on those which run straight forward. It also has greater effect in young than in old subjects, in weak and phlegmatick, than in those who are robust, whose fibre is firm and rigid. In fine, many idiosyncrasies may promote the dilatation of an artery to a certain degree: yet in all cases the extensibility of the external coats, and the action of the virus, have their limits. This dilatation is perhaps less restricted than Scarpa supposes; for the preparation of an enormous aneurism of the curve of the aorta proves, that the dilatation may extend beyond the limits which have been allowed it by this respectable author. This I shall attempt to demonstrate from this preparation, and from several others which are similar to it.

It is true that in a majority of cases the erosion of the coats precedes their dilatation, and checks its progress, which otherwise would be more considerable. The internal coats are soon destroyed, and the blood has no further effect on them by its presence, and by its accumulation, and its impetus. They remain separated to a greater or less degree, sometimes retract, and no longer assist in forming the aneurismal sac with which their corroded edges communicate, but are united to the membranous walls of the cyst. This union often takes place by means of small striated, irregular, and divergent bands, which are identified with the cyst.

This I have seen in an aneurismal tumour of the popliteal artery: the internal coats were perforated, in consequence of being corroded, as I found after the death of the patient, and were evidently united with the cystick tumour. The tumour then gradually increases, and by pressure it obliges all the neighbouring soft and membranous parts to assist in forming the sac. It even forms cavities in the hard parts which it meets with in its progress and enlargement, such as bones and cartilage; not by producing a caries of them, as some authors have supposed, but by compressing the lymphatick vessels of the membranes which cover them. By this disturbance, the lymphaticks undergo a kind of irritation which changes and increases their functions, so as to cause them to absorb the phosphate of lime or the salino-earthly particles which originally filled the walls of the osseous vessels, and this action gradually destroys the thickest and most compact bones. In the mean time the disease continues to increase until the tumour bursts, and the blood is poured out.

The progress of aneurism often varies: the first stage is marked by a dull pain near the part affected, with a sensation of unpleasant heat and uneasiness in the functions of the neighbouring organs. These symptoms are more apparent after eating, and while there is the greatest tone in the vital powers, as in the night. The same takes place in syphilitick affections. In the second stage the symptoms are more violent; pulsations take place, which the patient feels, and the physician can distinguish by the sight and touch, if the tumour be superficial: but they are no longer equivocal in the third or fourth stage. To these symptoms are then added all those of aneurism, as described by authors, which it is here unnecessary for me to repeat. It is sufficient that I point out the most prominent, as my intention is to ex-

plain the causes of aneurism, and especially of internal aneurism, and to point out some means suited to arrest its progress, to cure it, if in an incipient state, or to prevent it, if there be a suspieion of its approach.

Among the different kinds of virus which may produce aneurism, I believe that the coats of the heart and arteries more readily appropriate to themselves the venereal virus. The quantity of syphilitick exereescences, which I found in the ventrieles of the heart, about the origin of the aorta, and on the semilunar valves of this artery, in a soldier who had died of an inveterate syphilis; similar exereescences that I have seen in the hearts of other subjects, particularly at the hospital of the medical school, and finally the venereal symptoms which have preceeded the attack of aneurism, in persons who have died of it under my observation, support my opinion of the action of this cause. Again, we find that aneurism generally attacks those men who add to the syphilitick virus, contracted at various periods, the immoderate use of spirituous liquors, of indigestible and heating aliment, and disorderly or irregular habits of life.

According to these principles, I am of opinion that, to the general treatment advised by authors on the first appearance of internal aneurismatick symptoms, we should lose no time in adding such remedies as are proper to resist the particuar virus, which discovers itself by the concurrence of its general symptoms with those which arise from the aneurismal tumour. Thus have I, by this plan, checked the progress of this disease in many cases, and have removed it in others. But it is necessary to persist a long time in the use of these means, and to vary them according to circumstances.

The sanguineous tumours which appear in the thick part of the limbs, owe their origin to the gradual and insensible corrosion of the bifurcations of the arterial branches.

where the virus lodges more easily, when favoured by the predisposition of the vessels; and because the angles of these arteries, where the disease commences, are more obtuse. The blood being filtered through the aperture, which is formed in these narrow bifurcations, first fills the neighbouring cellular membrane, and gradually extends itself to that which is more remote, so as to penetrate into the texture of the muscles and aponeuroses, and to distend their small vessels or causing them to form a particular membrane, similar to the corpora cavernosa penis, or of the spleen, which is capable of a sudden development or comparative dilatation. These tumours, which always continue to enlarge, invade all the surrounding parts, and inclose in their interior the virus which first produced them, as is the case in chronick aneurismal, and serofulous tumours. The part affected must be entirely removed to effect a perfect cure: extirpation alone does not generally suffice. It matters not how deep it may have been carried, they soon return anew, and in a short time acquire the same growth.— These tumours have little or no pulsation: I have seen three cases of this kind. The first, for which my friend Mr. Petit consulted me, was on my route to Lyons, it was seated behind the internal maleolus of the left leg. Every part of the tumour had then been extirpated that could be removed, and the actual cautery had afterwards been applied; but the disease soon returned, and it became necessary to amputate the leg.

The second case was of a young lady at Versailles, who, after having twice submitted to an operation, similar to the above, for a tumour of the same nature, which she had had for several years on her right fore-arm, came to consult me. I did not hesitate to recommend amputation of the arm above the tumour, to which she consented, and it was attended with complete success. On

dissecting the tumour, I discovered a cavernous or spongy membrane, at the pedicle of which I found the bifurcation of an artery, slightly dilated, formed by the ulnar and anterior, or internal inter-osseous, in which the disease had commenced.

Lastly, the third case which I met with in my practice, was that of a soldier belonging to the imperial guard, who was received in our hospital. In his case the disease was seated also in the thick part of the fore-arm, and extended to the elbow, so that it became necessary to amputate the arm. The result of the operation was quite favourable; the character of the tumour was the same as in the two former cases.

The disease of which I have spoken is very violent: it resists every other means but amputation of the limb, when it becomes inveterate; but antisiphiliticks will arrest its progress, as well as that of aneurism, or even cure it in its forming stage.

I shall relate some facts which prove the circular and uniform dilatation of an artery of moderate caliber; for as I have already observed, the internal cause or virus, by depriving the proper coats of the vessels of their contractile and elastic properties, and by attacking their texture at the same time, almost always corrodes them, and immediately produces false aneurism, or forms a particular sac, from the external membranes of the vessels. To these facts, which might suffice to demonstrate the first stage of dilatation, I shall add the cases of several of my wounded, which will be found detailed in different chapters of my work. In these, a portion of the artery was found considerably dilated in proportion to the course and size of the vessel. In some cases I have also seen the arteries dilate above the ligature, applied after amputation, and remarkably so in the case of a dragoon that is given at the end of the work. This

sudden dilatation is really the consequence of a mechanical cause: but there is a great difference in the progress of the tumour and its development when it exceeds the bounds which I have supposed. It is the virus which establishes the morbid action, and causes the disease to advance. The first cases which I shall give, prove the possibility of arterial dilatation, whether it arise from an internal cause, or be the consequence of a mechanical cause.*

A person with whom I was well acquainted, died at Paris from the effects of aneurismal diathesis. On opening his body, we found the four cavities of the heart unusually dilated, the pulmonary aortal arteries enlarged in their caliber, to nearly twice their usual size. The trunks, the branches, and the principal ramifications of these two arterial trunks partook of this dilatation, and we observed that the trunks and principal arterial branches were affected with chronick phlogosis, and with a corrosion of some spots on the internal or villous coat. Purulent collections and scirrhus obstructions were also seen in the lungs, and along the course of the membranous and cellular texture, which surrounds the continuation of the aorta into the thorax and abdomen.

I am sure that this person never underwent any violent exercise, and on the other hand, that he had led a disorderly and intemperate life, and at different periods had laboured under different morbid affections.

Many similar facts are found in authors, and others of the same kind have been reported to me by physicians worthy of credit.

* Haller has observed that when the cellular membrane and the membranous coats of the arteries of living animals are removed, the arteries dilate, and form aneurism. I have repeated this experiment with the same result.

Michael Andre, an infantry chasseur, entered the hospital of the imperial guard on account of an aneurismal tumour, which extended from the cavity of the left axilla, to the fold of the arm. This tumour followed the course of the humeral artery: it was of the shape and size of the largest spindle used in spinning hemp, and the vessel was enlarged in its caliber to about three times the natural size. Its pulsations were isochronous with those of the heart, and produced excessive pain, especially in the night. Pustules of a venereal character appeared also in the same arm, and on other parts of the body, which, according to the information of the patient, came on with the tumour. Both these symptoms attacked without an effort, without an external cause, and in consequence of a chanere, which this soldier had suddenly healed with a desiccative quack ointment. But the cicatrix of the chanere was not yet firm. I directed him to make mercurial frictions on the tumour and soles of the feet; to take a diaphoretick tisan, and the liquor of Van Swieten. During the first fifteen days, there was no sensible change in the tumour. I persisted six weeks longer in the exhibition of the same remedies, and before the fiftieth day, the pustules had entirely disappeared: the tumour was about half removed, and the patient felt no more pain. I expected to assist the action of the mercury, by making a graduated compression along the whole course of the aneurism: and I believe this plan was of great advantage in the resolution of the tumour. Towards the end of the treatment, I applied a bandage covered with blistering salve over its whole extent, and it disappeared entirely, and the patient left the hospital in a few days after.

It is very evident that the arterial tube was in this case in a state of simple dilatation: the uniformity of the tumour, its lengthened and almost conical shape, ad-

mitting the point of the cone to be lost in the portion of the artery which runs deep under the aponeurosis of the biceps muscle, and buries itself in the bend of the elbow to divide into the radial and ulnar; finally, the gradual disappearance of this tumour, and its insensible return to the natural dimensions of the brachial artery, appear to me unequivocal proofs of this dilatation.

I saw another chasseur of infantry who had a well-marked dilatation of the two carotids; more particularly of the left carotid. Its pulsations were sensible to the eye, formed a cylindrical and uniform tumour, which occupied the whole course of these arteries, and the membranous cylinder was elastic and distinct from the neighbouring parts. This soldier was attacked by epileptick fits and by alarming syncope. Venæsection in the feet, and in the arms, with the application of small bladders filled with ice and ammonia, gave momentary relief, and also reduced the tumour which seemed to disappear entirely during the syncope. I regretted that I could not watch this disease to its termination, but the chasseur being desirous to return to his own habitation, I procured his dismissal, and have never seen him since.* Here again was an example of true dilatation, which, as in the former case, had advanced to the greatest degree the caliber of the artery admitted of: but the same internal cause that produced this dilatation by paralyzing the fibres of the coat of the vessels, no doubt would soon ulcerate it, so as to permit the transudation of the fluid

* There is now a soldier of the same army in our hospital with a very manifest dilatation of the trunk, and principal branches of the right temporal artery, to more than double their usual caliber, with several syphilitick exostoses on the same side of the cranium. There is reason to expect that the antisymphilitick treatment will remove these symptoms, which as yet are in an incipient state.

contained in the arterial cavity to take place. The irregular and circumscribed dilatation of the membranous coat is not limited in this case, while in the first, as I have said, it cannot go beyond certain bounds, as is observed in proper inflammation of the testicle. The tumefaction of this organ cannot at most be greater than double its former size, but then its proper coat bursts or ulcerates, and a cancer appears, or it forms an abscess which should be evacuated, if this do not take place spontaneously, to relieve the patient from the severe pain that he suffers.

While I was at Udino in 1797, I was consulted by one of the principal surgeons of the military hospitals of that place, on account of one of his patients, who had an aneurism of the popliteal artery, on whom it was intended to operate next day. The tumour in the ham was about the size of a hen's egg; its pulsations were obvious and synchronous, with the action of the heart. The patient experienced acute and lancinating pains in the parts during the night, but none during the day. On inquiring into his condition prior to the formation of this tumour, I learned that after several attacks of the gonorrhœa, he had a herpetick eruption of a syphilitick appearance, that had been removed by means of an unguent slightly caustick and astringent, prescribed by an Italian physician, and that since the disappearance of this eruption, he had felt stiffness of his joints, and a fixed pain in the hollow of the ham, which was removed by bending the leg, and on this account he kept the limb almost always in a state of flexion. Notwithstanding this stiffness, he came not to the hospital until the tumour appeared in the ham, and he was unable to walk. He had made use of cooling drinks, and emollients had been applied on the tumour. This plan had increased its size, and in a few days it became as large as a turkey's

egg. It was soft, the skin unchanged; pulsating and painful. At first its character was dubious, and it had been taken for an abscess. The patient was also emaciated, his countenance pale and sallow, his sleep painful, and interrupted by distressing dreams; his digestion was bad, and towards evening he had a slight febrile paroxysm.

After having attentively considered the nature of the disease, and the circumstances preceding and subsequent to its appearance, I thought that it could arise from no other cause than the repercussion of the herpetick eruption, produced by the topical astringents which this soldier had used. I proposed that the operation should be deferred, and I directed an uniform and graduated compression to be made on the tumour. I put the patient on antipsoricks, in the formulas of pills and tisans, with mild regimen and the most perfect rest.

After continuing this treatment several weeks, and renewing the bandage frequently, taking care to use mercurial frictions on the part before re-applying it, the tumour sensibly diminished, and the patient experienced no inconvenience from the compression. The same plan was carefully persisted in, and the mercurial frictions were extended to the whole leg and thigh. The pains which he felt on entering the hospital had entirely disappeared, and the diminution of the tumour was more and more perceptible. Belloste's pills were then substituted for the antipsorick pills, and the dose was increased to render them purgative.*

Before the fiftieth day, the tumour was no larger than a nut, fluctuation was no longer to be perceived in it,

* This treatment was continued by the chief surgeon of the hospital, who afterwards gave me an account of his cure.

and occasional slight pulsations could only be distinguished. The bandage and medicines that I had advised were continued twenty days longer; at the expiration of which time there remained in the popliteal region only a small, hard, indolent tumour, which the surgeon resolved entirely, by the application of a blister, and the patient was soon able to leave the hospital. But an elastic boot-top, with a cushion of a suitable shape, was made for him, to keep up for a few months a permanent compression on the course of the popliteal artery. Several years afterwards, I was informed that this soldier continued well.

I attribute this cure chiefly to the internal and external medicines that were prescribed: the compression was of little consequence. I am also of opinion that such success could not be obtained in similar cases, unless mercurial preparations in suitable forms be used in addition to compression.

I might report a great number of cases of aneurism, on the surface and in the interior of which, ulcerations with chronick and local inflammation have been found: to be convinced of this, it may suffice to read the celebrated works of Morgagni, and the excellent collection of cases by Mr. Pelletan. I shall confine myself to a brief account of some cases that came directly under my own notice.

At one of the sittings of the society of the medical school, a physician of the Hotel Dieu of Paris, presented a preparation of a very large aneurism of the curve of the aorta, with a narrative of the case. I was appointed with Mr. Dubois to make a report on this interesting case. The aneurismal tumour was about as large as a hen's egg, and was opened at the left posteriour and lateral part, where it had formed an adhesion with the corresponding lobe of the lungs, into the substance of which the blood had been poured. The internal coat of both portions

of the aorta (which was obliterated by the aneurismal sac,) was thick, inflamed, and ulcerated in several places, and the edges of the ulcerations that had given exit to the blood, were fringed, and as it were, corroded. The remainder of the *proper* membranes of the pectoral and abdominal aorta were evidently affected with chronic inflammation. We well knew that the subject of this case had frequently contracted the syphilis.

John Maurice Guenous, aged forty-one, a serjeant of the 1st battalion of the guards, entered the hospital April 7th, 1804. He had for some time complained of a painful spot in the thorax, about the middle of the sternum. This pain increased at night, and was attended with difficulty of respiration, and such an oppression, that he often felt in danger of death from suffocation. He referred all these pains to the venereal symptoms that he had had at different times. Indeed, when he entered the hospital, the sternum appeared to have formed a considerable angle at the junction of its two superiour portions. This at first had been considered as a venereal exostosis, but on my first visit I discovered pulsations in the tumour, isochronous with the pulse at the wrist. This, with the fluctuation, and the marble-colour of the tumour, the acute pains that the patient suffered, and the difficulty of respiration and the irregularity and smallness of the pulse, left me no room to doubt the existenee of an aneurism, which I suspected to be in the course of the aorta.

The patient was obliged to sit up; every other position was painful, and produced dangerous suffocation. When lying upon his back, he felt a most painful drawing that prevented him from remaining in that posture, even for a few seconds. We afterwards discovered the cause of this drawing, on inspecting the dead body. He was totally deprived of sleep, and his pain increased during the night.

All these symptoms continued to increase for some days, and the patient died in dreadful suffering on the 25th of April. Twenty-four hours afterwards I opened the body in the presence of the surgeons of the hospital.

The external tumour was slightly excoriated without being opened. I left the sternum and integuments which covered the aneurismal sac in their places. To effect this, I cut the ribs on both sides with a saw, and thus uncovered the two cavities of the thorax, and took every care to avoid injuring the sac. I was persuaded that there had been no rupture of it, and it was, as I had predicted, situated behind the sternum, beyond the edges of which it extended, and adhered on each side to the lungs, the texture of which was altered, particularly where they came in contact with the tumour. On making incisions into them, I found them ulcerated in many places, and containing a fetid yellow pus that filled the bronchial vessels. The lungs were tuberculous, and of a blueish gray. The tumour, as well as its external coats, were in a state of suppuration. An ulcer had formed in the left side of the sac, and had nearly perforated the internal coat; for on making a slight degree of pressure on this part, an extensive rupture was produced, from which issued a large quantity of black coagulated blood. That portion adhering to the sternum, was destroyed by a similar ulceration that was also apparent in several other parts of the internal and external surface of the sac. The sternum was perforated and carious, as far as it adhered to the anterior wall of the sac. Through this opening, the blood had passed into the cellular texture of the periosteum, which covered this bone on the outside, and converted it into a spongy substance. The posterior part of the tumour rested immediately on the trachea, the œsophagus, the thoracic duct, and the dorsal vertebræ. The latter were not injured, but the trachea was com-

pressed, and I doubt not that the suffocation which the patient experienced, when lying on his back, arose in a measure from the bulk and weight of the tumour intercepting the air. In this position also, the tumour by its weight distended the ulcerated portions of the membrane adhering to the sternum.

After having examined every part with which the tumour was connected, I separated it, leaving it attached alone to the sternum and heart. When removed, I found it the largest that I had ever seen. It was about fourteen centimetres in its transverse diameter, and the same in its antero-posteriour diameter; fifteen in length, and near thirty in circumference. It was made up of the arch of the aorta; the vessels that arose from the arch were less than natural. The vena cava had also lost its caliber, and was confounded with the aneurismal sac. The pulmonary artery adhered to it. The aorta at its origin was dilated to double its usual diameter; after running a short distance, this arterial portion seemed to terminate in the membranous sac, in the form of a funnel, by fibrous and striated bands: a similar disposition was observed in another portion of the arch which formed the other end of the tumour, and along the pectoral aorta that was itself dilated at many places of its surface as low down as the abdomen. The bifurcation of the abdominal aorta was also slightly dilated. The internal and fibrous coats of the whole arterial tube from the aneurismal sac to the crural arteries were red, inflamed, without elasticity, and covered with a purulent exudation in many places; an aneurismal diathesis prevailed throughout all the arteries. This diathesis may be considered as depending on a syphilitick taint.

From all the facts that I have adduced, I think the following conclusions may be drawn:

1st. That the essential cause of internal aneurisms, and of those which are gradually formed externally, is a particular virus: and that the virus of the venereal and scrofulous diseases most commonly attacks the white fibrous parts of the system in preference to others.

2nd. That mechanical causes produce speedy and sensible effects, which may be easily distinguished from the preceding.

3d. That when we suspect the existence of an aneurismal tumour, admitting that it could not be discovered at its commencement, the means which are suited to resist the internal cause of this disease may be used with more or less advantage.

I have thought proper to give in this place my essay on hæmorrhage, as a sequel to the diseases of the arteries.

Essay on the spontaneous Causes of active arterial Hæmorrhage.

Arterial hæmorrhage often proved fatal among our soldiers who were wounded in the commencement of 1806, and since that period. This species of hæmorrhage carried off some of our men, and in others it pointed out to us the means which nature adopts to arrest it, whether she act alone, or receive the assistance of art.

Praetitioners, and especially those who are unaccustomed to operations, having embraced the general opinion that the escape of the blood from a divided vessel, is prevented by the formation of a fibrous clot in its orifice, attempt to produce this clot by making direct or indirect pressure on the open vessel. I have long since doubted the formation and the necessity of a clot in the

accidental opening of an artery, or in the extremity of a truncated vessel. I was led to make some inquiries on this subject, from witnessing the frequent returns of hæmorrhage in those cases where compression alone was used. To this end, I have attentively collected the pathological facts which my practice has furnished, and those which have been the result of experiments on living animals. I have compared them, and have attempted to make the best deduction from them: but before I give an account of them, I shall attempt to explain the plan by which nature closes the orifice of a vessel that has been opened, or entirely divided by a wounding cause.

The arteries are susceptible of three motions, viz. dilatation, contraction, and a vermicular motion. These motions are the consequences of the elasticity and contraction of the proper coat of the artery that is made up of fibres, all of which appear to run in a spiral direction round the arterial tube. This arrangement is sufficient to convince us, that they possess a proper *contractile* power, which is dependent on the arterial vessels (*vasa vasorum*) that run in the same direction around these elementary fibres, and that whatever may be the nature of these fibres, they must constantly undergo a relative degree of abbreviation. The muscular and elementary fibres, of the nature of which we are equally ignorant, bear the same relation to the little arteries that surround them, and the phenomenon of their abbreviation also depends on the instantaneous obstruction of their vessels. If a muscle be cut transversely, the part which is separated from the arterial branches is of necessity paralyzed. The contraction of a tight cord or cable, after being soaked with water, is very great. This ingenious means is used to raise vessels of war from their *ways*, and to launch them; and thus by the contraction of cables can they raise such enormous masses. From this principle, it would be natural

to conclude that wherever the arteries are spirally arranged, their length must be necessarily reduced, when the fluid which circulates through their caliber is suddenly arrested, and accumulated in them by any cause. The primary causes of this obstruction are not easily explained; but it is probable that they are the effects of a vital or galvanic fluid, transmitted by the nerves into these vessels. Thus the contraction of the muscles of a living animal, caused by the transmission of this latter fluid, is in consequence of the instantaneous obstruction of the small arteries in the muscular fibres; and these vessels are so numerous, according to the injections of Prokaska, that the elementary fibre disappears entirely. The microscope shows nothing but vessels which wind spirally round each other. The first phenomenon that presents itself on opening or entirely dividing an artery, is the sudden approximation of the walls of the two arterial ends, and the retraction of its tube lengthwise; the celerity of these two motions is according to the strength, the age, and irritability of the subject. This power is often overcome by the force of the column of blood propelled by the heart. In this case, effusion takes place and the hæmorrhage will continue without ceasing until death ensues. If the vessel be large, and near the heart, in all cases, the patient's life is endangered. When the vessel is of small caliber, the hæmorrhage may be suspended spontaneously, or by slight compression. But sometimes the opening of a very small artery produces a hæmorrhage which is difficult to manage, and may prove fatal. This depends on its situation, on its relation to the neighbouring parts, and its proximity to a large arterial trunk. When an artery is simply opened by some instrument, the bleeding is very dangerous, because the walls of the open vessel approach each other with more difficulty, and its tube cannot retract. To the same cause

may be attributed the frequent return of hæmorrhages, the danger of which is in proportion to the size of the artery. On the other hand we frequently see very large arteries, that are quite divided, retract with such force as to stop the discharge of blood; in large lacerated wounds for example. Neither does hæmorrhage take place in gun-shot wounds, when the vessels are entirely broken.

After these general data, it is easy to perceive that the current of blood from the extremity of a wounded artery, is not arrested by the formation of a clot; for if it were, the hæmorrhage might be arrested by holding the aperture of the vessel a few minutes, and the clot would be immediately formed: but this is not the fact. If the vessel be not sufficiently irritated when the immediate compression ceases, the bleeding returns; and although on the *outside* of the open vessel a quantity of coagulated blood is found, it does not remain there.— These external clots cannot stop the hæmorrhage, and they lessen the resistance opposed to it, by destroying the sensibility of the parts with which they come in contact: crethismus then takes place in the part, and a gangrene, or hospital sphacelus soon makes its appearance, and all the symptoms which accompany that affection soon follow.

If coagulated blood be found in a vessel which has been tied some time before, this clot is the consequence of that coagulation which takes place in the small quantity of blood remaining above the ligature, in the space between the ligature of the artery and the nearest branch that it gives off; and this takes place from the want of motion in this part of the arterial tube: but the orifice of the vessel cannot be closed, unless by the *contraction* and *adhesion* of its walls. This adhesion is not confined to parts under the ligature, but extends some millimetres above it, so that if the ligature should come away, the

adhesion still continues, and can prevent the escape of the blood.

Adhesive inflammation of the walls of an open artery takes place, as I before said, sooner when the vessel is more irritable, and when the subject is young, and has greater vital energy. Thus we seldom see hæmorrhages succeed to operations for acute diseases, or after wounds received in battle. Yet it often happens that the ligatures are displaced, or even torn off a short time after the operation by the shocks and jerks to which the wounded are subjected during their removal from the *ambulances* to the hospitals of the first line. This short space of time* is sufficient for the production of adhesive inflammation. I am so well convinced of this fact, that I never make but one knot in the thread that I use for a ligature, even on the largest vessels. The second knot is useless, and often prevents the ligature from coming away, by causing it to stick in the cicatrix as I have often seen, and it is then difficult to extract. In some instances I have been obliged to cut the thread deeply under the artery with scissors. A difference should be made in operations for chronic diseases. The patients are exhausted, the vital forces are weakened, and the hæmorrhage easily returns, because adhesive inflammation in these cases comes on more slowly: it is necessary then to make two knots in the ligature, and to tie even the smallest vessels.

The application of a styptic on the recently-divided arteries of animals is generally sufficient to arrest the hæmorrhage, and to produce adhesive inflammation. I have repeated this experiment very often. In man it often happens that washing the part with cold water, or admitting cold air to the part is also sufficient to contract the small divided arteries, and to produce this inflammation, so that

* I suppose from twelve to twenty-four hours at most.

in many cases the ligature might be omitted. *But it will be prudent to tie all the vessels that can be seen.* In the operations that we performed at the battle of Eylau, while the cold was 14 and 15 degrees below zero, we had nothing to tie but the great trunks of the arteries, and the most simple and superficial ligature was sufficient.— Not one of our wounded was lost by hæmorrhage, during a long journey to their place of destination, beyond the Vistula.

Adynamick fevers, ataxick and scorbutick diseases, prevent this adhesive inflammation from taking place: in these cases we may expect consecutive hæmorrhage, as frequently happens when the vessels from which it takes place have been cut in an operation for a disease that has already exhausted the strength of the patient

In such cases attention should be paid to the re-establishment of the strength, and to the restoration of the natural irritability of the injured vessels. To fulfil the first indication, the bark should be given, united with opium or camphor; and to the drinks, should be added some mineral acid, as the nitrick, or nitrick alcohol may be used. Tonic and astringent substances should be applied on the vessel, or as near as possible to the ligature. The strictest rest should be observed by the patient, and he should have good jelly-broths, generous wines, &c. &c.

Some cases of sabre wounds, with hæmorrhage, which I shall report concisely, confirm the principles which we have just advanced.

CASE FIRST.

——— Morin, of the guards, was carried to the hospital with a sabre-wound that he had received in a duel. I did not see him until the following morning. The wound, which was small externally, had been made by the point of the weapon, and had penetrated deeply and obliquely into the middle and posteriour part of the right fore-arm, at the fold of the elbow, so that the ulnar artery had been cut under the *pronator teres*, and the ulna scratched: a large quantity of blood poured into the deep wound in the thick muscles of the fore arm. Notwithstanding the diffusion of this coagulated blood, and the pressure which it produced on the whole extremity, and on the course of the humeral artery, the hæmorrhage was incessant, and reduced the patient to the greatest danger.

I felt reluctant to lay bare the humeral artery to tie it, although the operation was indicated, and it being uncertain whether the limb could be preserved, I resolved to dilate the wound. The escape of a large quantity of coagulated blood facilitated my researches; yet I was not able to discover the artery: I could scarcely perceive some slight pulsations at the bottom of the wound, very near the brachial trunk, under the *pronator teres*. I made a counter opening along the course of this muscle on the internal side of the bend of the arm, where the aponeurosis had been cut by the point of the instrument, and distended by effused blood. I cut the aponeurotick portion deeply; made a transverse section of the *pronator teres*, to lay bare the injured vessel that I might tie it: but just as I expected to find it, the hæmorrhage

stopped, and never re-appeared, although I injected warm water into the wound to wash away the clots which obstructed my view. I was then obliged to consider the two wounds as *simple*, and dressed them accordingly. I only introduced into the bottom of the counter opening, towards the wounded artery, a dossil of lint, dipped in a digestive made with turpentine, oil of camomile, camphor, pulv. chinchona, and a few drops of sulphuric acid.— The wound was covered with pledgets of lint, and with compresses dipped in camphorated wine, and retained by suitable bandages. The arm was kept in the most suitable position. I prescribed a rigid regimen, acidulated cooling drinks, and pills of camphor and opium.

From this period the patient continued to improve; his strength returned, his wound became clean, and its cicatrix was complete on the thirty-third day after the operation, when he left the hospital.

CASE SECOND.

—— Moudre, a dragoon, entered the hospital with a sword wound in the cavity of the right axilla, small in its external dimensions, but very deep. He had an instantaneous and profuse hæmorrhage, which they attempted to check by strong compression on the wound, that was not more than two centimetres in length. The patient was feeble when I saw him, his pulse small, and his countenance discoloured: a stream of blood of a vermillion colour was constantly discharged from the wound. The pectoral region was considerably distended, and an ecchymosis had formed. By introducing a probe, I discovered the depth of the wound, and the immense effusion under the pectoralis major. I dilated the two an-

gles of the wound extensively, in a line parallel with the tendinous edge of this muscle, and turned out with my fingers about half a kilogramme of coagulated blood; I sought for the source of the effusion, and I cut up all the cellular and tendinous ligaments. I expected to apply the ligature on one of the thoracic arteries, which I supposed was wounded by the point of the sword; but after all the clots were removed, and the wound washed, no more blood was poured out. Being well convinced that the orifice of the vessel had retracted, I gave the wound a simple dressing, and prescribed the internal remedies, mentioned in the first case. Suppuration was soon established, was interrupted by no accident, and the patient was cured in less than six weeks.

These two cases, and a great many others of a similar kind that have occurred in my practice, prove that the clots of blood, so far from arresting hæmorrhage, on the contrary increase it by their presence. When blood has escaped from its vessels, and is effused into the cavities of the body, or into the cellular membrane, it loses its vitality, and its homogenous properties. It appears that the oxygen and calorick are absorbed by the surrounding vessels that remain uninjured. This fluid loses its vitality in some degree, and is carbonized as soon as it comes in contact with the external air. The arteries which open in the midst of these clots, are rendered torpid, lose their action, permit the blood that they contain to escape, and to be expelled by the contraction of the heart, and of the distant arteries: the hæmorrhage continues because the vessel has lost its sensibility, and cannot retract or inflame so as to produce the adhesion of its walls; the moving fibres being also rendered torpid, cannot contract and assist in the obliteration of the arterial tube.— External compression increases the symptoms by disabling the circulation of the cutaneous system, increases

local turgescence, and promotes hæmorrhage. These phenomena account for the cessation of the symptoms on removing the dressings, as we have often seen.

Being then well convinced that hæmorrhage will not cease, until there is a contraction of the vessel, and an obliteration of its caliber produced by adhesion of its walls, we should never use compression but when it can be made immediately on the open vessel, and when this vessel runs over a part which will afford a *firm* resistance: we should not hesitate to enlarge the wounds and to remove the clots, either to tie the vessels, or to remove these injurious foreign bodies; or with a view to cauterize or irritate them, taking the necessary precautions to avoid an injury of the neighbouring parts. This practice has been in my hands always perfectly successful. I shall add to this view of the wounds of arteries, a summary of two interesting cases.

Houze, a grenadier of the guards, came to the hospital with a wound, made by a cutting instrument, in the middle and anterior part of the right leg. It was parallel with the tibia, from the internal edge of which it was but two centimetres distant, and passed deep, backwards and outwards, to the posterior surface of this bone. It was suspected that the tibial artery was cut by the point of the sword: indeed there was an alarming hæmorrhage, which continued until the patient fainted, and strong compression was made on the wound: it still discharged vermilion coloured blood when he entered the hospital. The division of the integuments, not being exactly over the wound of the subjacent parts, which was deep, a large quantity of coagulated blood filled this internal excavation, without stopping the hæmorrhage.

I hastened to dilate the small external wound; I freely cut up the aponeurotick ligaments, and turned out all the

clots of blood. I washed the wound with water and vinegar, and waited for the return of hæmorrhage to discover the vessel, and to apply a ligature upon it: but as soon as the wound was cleansed, and the ligaments cut up, the bleeding ceased, and returned no more. I applied a suitable bandage, prescribed rest, regimen, and medicines suited to his case.

Suppuration took place in the wound, which I had dressed with emollients; it was healed over entirely on the 21st day after the accident. Just as he was about to be discharged, in consequence of a violent effort which the patient accidentally made, a circumscribed pulsating and fluctuating tumour was formed suddenly under the cicatrix, and gradually increased in size; but being kept down by a compressing bandage, it then extended itself along the course of the vena saphena, to the posterior part of the internal maleolus. I thought that this was an encysted aneurism, such as is described by Foubert.—The patient was, at the time, unwilling to submit to the operation which I proposed: but he will probably, at some future time, propose it himself, and then we may be able to discover the true character of this tumour.

Tabellion, another soldier, had been wounded by a sabre in the right hand, so that the point had pierced deep from the edge of the radius into the palmar region, between the first phalanx of the thumb, and the first metacarpal bone. The abductor of the index was cut; the radial artery had been lacerated, where it passes over the articulation of the first phalanx, and the deep arch of the palmar artery was cut by the point of the instrument under the flexor tendon of the index finger. The portion of the radial artery which goes to form this arch was aneurismal, and the wound filled with clots of blood. At first, the hæmorrhage was very profuse, and it continued until I saw the patient at my first visit. I enlarged the

wound above and below, and removed all the clots: I discovered the aneurisinal tumour at the bottom; but the flow of blood had ceased. As I was apprehensive that it would return, I applied a ligature on the radial artery. The sac burst, and I again had a sudden hæmorrhage, which I immediately checked, by making methodical and continued pressure along the course of the radius. This pressure had all the desired effects, and I simply dressed the wound. A slight inflammation of all the hand succeeded, with a paroxysm of fever: the palmar arch soon bled again. It was then necessary to perform a delicate operation. I first laid bare the radial artery, which I tied; but it was very difficult to tie the extremity of the palmar arch. Yet the operation was completely successful, and the patient was discharged, cured, from the hospital in a short time.

Of the effects of the Rheumatism on the fibrous and osseous systems.

If it be difficult to explain the *modus operandi* of the causes of internal aneurism, and of the cessation of hæmorrhage, it is still more difficult to account for the unhappy effects of the rheumatick taint on the fibrous and osseous systems, more especially in those persons whose ossifying process is not completed. Notwithstanding the obscurity which covers the progress of this disease, and the variety of its symptoms, I believe that the rheumatick principle, by its deleterious properties, deprives the fibro-cartilaginous substance and the vessels of the bones of their vitality. This substance loses its elasticity and its organick sensibility: the lymphatick vessels, which are not acted on by the morbid cause, but appear to un-

dergo a sympathetick irritation from it, act with increased energy on the particles of this substance, which have become as it were inert, and gradually absorb them.— They thus cause a destruction of substance in the solid bodies, and in the parts which are contiguous to the seat of disease: a latent inflammation, accompanied by a species of serous and purulent secretion is the consequence, which, by congestion, gives rise to abscesses. The *remora* of this heterogeneous fluid in the bones or ligamentous cartilages, which are changed, hastens the progress of caries, and spreads the disease more extensively.— This process of internal caries and decomposition, is rapid in proportion to the imperfection of ossification. In such subjects the absorbent system possesses great activity, and the phosphate of lime easily separates from the bones, because they have not acquired the hardness which is necessary to resist the action of the virus, or the secondary action of the lymphatick vessels. They who laboured under this disease in our hospitals and *ambulances*, were all young soldiers, between eighteen and twenty years of age. In some the rheumatism unfortunately caused a caries of the bony pieces of the orbicular or ginglymoid articulations, seldom with spontaneous luxation. In others a caries of one or two vertebræ, and in some a separation of the bones of the pelvis: we shall give some cases of it.*

This rheumatick virus acts on various parts of the body, according to their predisposing debility, or certain concomitant causes which determine the morbid principle to these parts. In every case, the disease, during its

* While visiting the soldiers who were to be placed on half pay, we found that one of them had the os coxigis separated from the sacrum. It followed all the motions of the corresponding thigh. This case was precisely similar to one which professour Lerithier showed us at the practical school some time before his death.

progress, presents uniform phenomena, unless it differ in its seat: I shall not point them out, as the works of Pott, and the memoirs of the royal academy of surgery have given us their etiology in detail. In general this disease is fatal, when proper means are not early used to arrest it. The success which has attended some of these unusual means in my hands, when applied with perseverance, has induced me to believe, that if they be exhibited on the approach of the disease, or the first appearance of its symptoms, it may be conquered, and its fatal consequences often prevented.

These means are such as will give a brisk stimulus to the diseased parts, so as to restore the elasticity, and the proper and natural sensibility of the weakened vessels.

Scarifications, if there be the least sign of local swelling, moxa, and the actual cautery, as a topical remedy, have produced the most happy effects in cases that have been considered desperate. Mercurial frictions, as near as possible to the seat of the disease, at intervals of four or five days, have appeared to me to contribute much to the cure. Even admitting that there is no syphilitick virus, I have generally observed that this remedy produces the best effects in all diseases which are improperly called *lymphatick*, provided the patients be not too much exhausted.

When the abscess makes its appearance on some superficial part which corresponds with the fistulas that communicate with the focus of disease, it may be treated with some success. When this abscess remains in the same state, after the use of internal and external remedies, it is a symptom which shows that the progress of the caries is checked. Under this impression I pass a pointed cutting steel blade, heated to a white heat, through the middle of it, and discharge as much of the matter as possible by means of a cupping-glass, that will include the whole tu-

mour and its two openings. I then pass a seton of soft linen through these two openings, and over all I apply a compress, dipped in camphorated oil of camomile, and a compressing bandage.

Contrary to the opinion of practitioners, I evacuate all the fluid at the time of the operation, without fearing the consequences of the admission of air into the sac, which would be more injurious if it acted on a large quantity of pus, because this would soon be decomposed, and would infect the individual; whereas, if the precaution be taken to evacuate it at once, this inconvenience will be prevented. The application of the moxa should be continued on the parts over the caries, as also local mercurial frictions. Internally, sudorificks, combined with bitters, sometimes with bark, and some of the mercurial salts, which are given with more advantage separately, in some convenient vehicle, have succeeded well in my hands. I shall not enter into minute details on the properties of these medicines, as some very satisfactory opinions on this part of the therapeutick plan may be found in Dr. Salmade's work,* but I consider topical applications, or the means which belong to surgery, as more efficacious in this disease, if it be curable.

I think we may expect a cure under the following circumstances:

1st. When the disease is not very far advanced, and is within the reach of art.

2dly. When the patient is young, and exempt from any other virus, such as the venereal or scrofulous.

3dly. When the caries is not deep, and is distant from the internal organs.

* See his practical observations on scrofulous affections, and diseases of the lymph.

We can easily conceive that when the disease is only in an incipient state, we may check or prevent its first effects by promptly changing the organick sensibility of the part affected, by restoring its elasticity, and the circulation of the fluids, by preventing the lymphatick system from taking on the unnatural functions which it assumes, and confirming those which are natural to it: I can adduce many facts to attest these truths. But how shall we explain the success that has been obtained after the abscess has been formed, and the caries has commenced? It is, doubtless, a difficult problem, and one perhaps that it is impossible to solve. I shall confine myself to a faithful report of the cases that I have collected.

One of the first examples was a young soldier of the guards, who came into the hospital on our return from Austerlitz, with all the symptoms of an incipient spontaneous luxation of the left thigh, at the coxo-femoral articulation. There were acute pains of the part, immobility of the limb, a preternatural elongation of it, to the extent of several millimetres, a projection of the trochanter, emaciation of the extremity, and a febrile affection. After some preparation, I put this soldier on the use of the tonic and depurative plan above mentioned, in the form of pills, ptisans or potions, and I immediately directed that scarifications should be made entirely round the joint; I then applied some blistering flies, and a sufficient number of moxas.*

The symptoms subsided by degrees, and on the ninth application of moxa, they had disappeared entirely. Yet I directed several others to be applied to confirm the

* I always took care to prevent ulceration in the parts burned by the moxa, by the immediate application of ammonia.

cure. I had also directed some mercurial frictions about the thigh and pelvis.

Eleven cases of persons of the same age have since been received in the same hospital. They laboured under the same disease, which had attacked the articulation of one knee or of one thigh: in five of these the cure was nearly complete; a slight lameness alone remained, with a shortening of the limb about one or two centimetres: yet we were obliged to disband them. In three cases spontaneous luxation appeared to have taken place; that is to say, the symptoms, which authors tell us indicate this luxation, existed; such as a decided shortening of the limb, deviation of the foot and knee from the natural line, (generally outwards,) elevation of the great trochanter, stiffness and difficulty in moving the thigh, and especially the impossibility of bending it. Has the sound head of the femur left the cotyloid cavity in these cases, and become fixed on some part of the circumference of this cavity, and does this cavity remain sound? Or, rather, is there a loss of substance or reduction of the head of the bone, or finally, is it a greater or less excavation of the articular cavity that causes the shortening and irregularity of the limb? My observations have induced me to adopt the latter opinion, as agreeing best with the principles of sound physiology. Besides, I have never been able to discover this supposed luxation of the head of the femur on dissecting the bodies of those who had laboured under spontaneous luxation. This displacement, authors tell us, takes place by a gradual obstruction and thickening of the cartilage of the cotyloid cavity, which by degrees expels the head of the femur, and complete luxation is the consequence. If a case attended with such circumstances has been met with, we dare affirm that the luxation was accidental, that is, produced by an ex-

ternal cause, of which the patient may even remain ignorant.

The cartilages of the moveable joints are not susceptible of the changes which are proper to organized parts, as I hope to prove in a subsequent essay on the *formation of preternatural and moveable cartilages of the joints*. Far from acquiring an increase of thickness, and a larger size, they easily dissolve, and are reduced to a powder, or small friable grains, and are easily absorbed by the lymphatics, so as to disappear entirely. This has been uniformly the case in the bodies of those who have sunk under this articular disease, as I have found in dissecting them. This cartilaginous substance being no longer secreted by the *osseous vessels* of the extremities of the bones to which it is attached, its particles disunite, are decomposed, and are absorbed, and thus is the femur shortened: even the *osseous vessels* sink down, become hard, and contract, which also assists in shortening the limb: and all this is done, and can be done without inflammation, suppuration, abscess, or hectic fever. Indeed, we often find the bony pieces of joints affected with this disease for a long time, and entirely stripped of cartilage, and yet, while living, the persons retained the power of moving these joints. I have in my possession several preparations of this kind, and a great number may be seen in anatomical cabinets. But a very interesting case that I shall give, proves that the cartilaginous substance and the osseous principle may disappear, and again be restored without producing any of these serious symptoms which often attend diseases of the joints, especially when they are entirely abandoned to the resources of nature.

Among the curious anatomical preparations in the museum of the university of Vienna, professour Prokaska showed me a dried thorax, in which the head of the

right humerus was fastened between the second and third true ribs, forming a tumour with its convex side looking into the cavity of the thorax. The singular error loci of this bone was the consequence of an accidental luxation caused by falling on the elbow, while the humerus was extended, and projecting from the body. The head of the humerus, after having ruptured the capsular ligament, had been violently forced into the axilla under the pectoral muscles, so as to separate these two ribs, and to pass through the space between them. The head of the humerus, or the bony sphere, overcame all obstacles, and penetrated entirely into the cavity of the thorax, pushing before it that portion of the pleura that opposed it. In vain was every effort and expedient made use of to reduce this singular luxation: alarming symptoms ensued, which were removed by venæsection, bathing, and cooling medicines; but the arm remained at a distance from the body, and the patient became by degrees accustomed to this position of the limb, and after some years of uneasiness and pain, it gave him no further trouble. Thus he lived to be thirty-one years of age,* and died of a disease which had no connection with this injury. The physicians were desirous of being acquainted with the nature of this singular infirmity, of which they had as yet formed an imperfect opinion. They were astonished on opening the dead body, to find the head of the humerus within the thorax, surrounded by the pleura, and firmly embraced around its neck by the two ribs above mentioned: but they were still more astonished, when in lieu of a small sphere covered with cartilage, they found nothing but a very

* He died sixteen or seventeen years after this accident had befallen him.

soft membranous ball, which yielded to the slightest pressure of the finger. The cartilage, and the bony texture of all that part of the humerus contained in the proper cavity of the thorax, had entirely disappeared: the absorbents had taken it up, and like faithful guardians, had endeavoured to destroy it gradually; not being able to expel an enemy *en masse*, that had feloniously entered a habitation where it was unwelcome and injurious. Nothing more of this part of the tumour remained, than the membranous rudiments of its bony head: yet these rudiments, in my opinion, belonged chiefly to the pleura costalis. This case, while it supports my opinion of the nature of that morbid process which takes place in rheumatic diseases of the articulations, explains the decomposing powers of Nature, who I believe is endowed in an equal degree with the powers of re-composing.

CASE FIRST.

The first cure of *tabes dorsalis*, with an abscess from conjection, that I saw, was on Mr. Bernard, a surgeon of the second class, who had been with the army of the east. He was twenty-seven years of age, and of a delicate constitution. This young man, during the blockade of Alexandria in 1801, after having for a long time felt pains in the posterious part of the body and thorax, suddenly experienced a debility of the lumbar region, which obliged him to discontinue his attendance at the hospital. The prostration of his strength became general. On the fifteenth day, having carried his hand mechanically to the lumbar region, he there felt a tumour as large as a hen's egg. He was then so weak as to be obliged to keep

his bed. I was called to prescribe for him, and found all the symptoms of an abscess from congestion. I directed that he should be immediately carried to the hospital in the mosque which was appropriated to the officers: and I directed several applications of moxa to the tumour. The fifth application of it was followed by such an evident improvement, that the patient was able to rise immediately after it, and take a turn in his chamber. I directed such a regimen as circumstances would then permit, and the use of tonicks and opium. The application of the moxa continued for eight days, when I was obliged to put him under the care of the chief surgeon of the hospital. The great number of general officers who were then wounded occupied my attention so completely, that I could not see him for two months afterwards. The tumour had enlarged, and changed its form; the patient was tormented by an obstinate costiveness, and sometimes could pass no urine.

Having decided on attempting to open the abscess, I applied a piece of concrete potash on the most projecting part of it, but the motions of the patient removed the dressings during the night, so that it produced no effect. Next day I plunged the point of a red hot iron with cutting sides, into the tumour. It discharged a serous pus of a dull gray colour, which towards the last was mixed with whitish lumps. I directed the bark and bitters to be continued. These in addition to good diet, removed the fever, and he soon regained his strength. After two months, the wound discharged nothing but a very small quantity of yellow serum, which ceased five days after in the latitude of the isle of Candia, as he was returning to France. The cicatrix remained blueish for three years, and was painful when the weather changed; but by strict regimen and great care, Mr. Bernard now en-

joys perfect health in the bosom of his family, and is troubled by no symptom of this disease.*

CASE SECOND.

Anglaret, an infantry chasseur, came to the hospital of the guard with all the symptoms of a caries of the fourth or fifth vertebra. There was a tumour at the part, and he remained always bent. Local pain, and an abscess as large as a turkey's egg, situated near the inferior angle of the right scapula, left no doubt of the caries. I immediately put him on the general plan of treatment above mentioned: moxa was applied nine times in succession on the muscles of the back. The tumour remained stationary for some time, and then appeared to diminish a little. I resolved to pierce it obliquely, from below downwards, with a steel point brought to a white heat: I applied cups immediately, to draw out the pus, and directed him to use bark, opium, and antiscorbuticks. Notwithstanding the very advanced state of this disease, the symptoms abated by degrees, and disappeared entirely. The abscess became clean, and a cicatrix formed on the two wounds some months after. This chasseur was finally restored to health, yet without being able to continue in the service. He remained crooked and weak.

* This case was arranged by Mr. Caumette, surgeon major of the guards, a companion of Mr. Bernard in Egypt, who also continued to attend him until he retired to his family.

CASE THIRD.

Zwart Villhem, a light horse lancer of the 2d regiment, twenty-two years of age, of a weak appearance, and subject to flying pains in both his shoulders from his infancy, was removed into the ward among the wounded, from the fever ward. At my morning visit, I examined this young man, and then discovered that he laboured under *tabes dorsalis*, or the *gibbosity* of Pott, so well described by him. It was marked by the relaxation of the ligaments of the spine, by great weakness of all the spinal column, by a considerable projection of the sixth dorsal vertebra, lying on the right side, constant bending of the thighs on the pelvis, in order to procure sleep and to relieve pain: finally, the patient walked with difficulty, with his back curved, and scarcely supported by the inferiour extremities. A seton had been inserted in the skin, over the diseased vertebra.

I ordered the seton to be removed, and I began with the moxa along the course of the spine: this plan was continued for some time, and every second day a new roll of cotton was burned on the muscles of the back, and about the tumour. I gave him, internally, tonicks, such as bark, opium, and good wine. These means produced an evident amelioration in the condition of the patient, and after thirty days he was able to walk abroad, during a part of the day, without being obliged as formerly to sit or lie down. He gradually regained his strength: the projection of the spinous apophysis insensibly disappeared. Several other applications of moxa

along the vertebral column, removed the debility that still remained there, and expedited the cure, which was complete the third month after he entered the hospital.

CASE FOURTH.

Miss A***, a young lady to whom I was called in the city, was attacked by the same disease, attended with the same symptoms as the lancer. She was cured by applying moxa five times on the dorsal column, and by the use of depurative syrup, with the addition of opium: she was also threatened with phthisis pulmonalis. Several physicians who had been consulted on this case, pronounced that it would prove fatal: an issue in the left arm, antiseorbuticks, the Iceland moss, (*lichen islandicus*) asses' milk, and good diet, completely restored this lady to health.

CASE FIFTH.

I shall here insert the case of Jacques Antoine Boybelaud, as an example of a cure of abscess from congestion, with caries of the vertebræ. He was a young grenadier, and came under my own immediate observation in the hospital of the guards, where he entered July 12th, 1811, with a tumour on the lumbar region, as large as the first, attended with all the symptoms of an abscess from congestion, and with a caries of one of the dorsal, or neighbouring lumbar vertebræ, caused by excessive onanism, and by the moisture to which he was exposed in *bi-*

vouac, during the two last campaigns. Although the disease had arrived at its last stage, and there was but little hope of a cure, I lost no time in putting him on the same plan of treatment as directed in the foregoing cases. The fluctuation of the abscess was sensible in every part. The skin of the most dependent parts, considerably worn away, and ready to burst. The patient was deprived of all motion, and lay in bed with the body and inferiour extremities continually bent. His debility was extreme: the chronick suppurative fever which accompanies *tabes dorsalis* is marked by slight paroxysms in the evening, by clammy sweats of an unpleasant odour, by insomnia, and by the irregular state of the pulse.

I put this patient on bark and opium in different formulas, according to circumstances; and I applied the moxa ten times along the spine, and about the base of the tumour, at intervals of one and two days. The stationary condition of the patient, the strength which he had acquired, and the wish which he expressed, that I should open this abscess that was about to break spontaneously, induced me to perform the following operation:

After having brought a steel point (which grew gradually broader towards its base, and had cutting edges,) to a white heat, I pierced the abscess with it from one side to the other, obliquely from the highest to the lowest part, where it was nearly ready to burst. This operation was attended with but little pain. A whitish scrous pus, mixed with white albuminous and thick flocculi, was discharged in great quantity: but in order to remove it totally, I applied cups on the tumour at different times. The abscess was thus completely emptied. The whole quantity of pus might be rated at more than half a litre. A deep cavity remained when the abscess was evacuated. Without introducing any probe into the wound, I

discovered by the touch that the caries was seated in the first lumbar vertebra. An open compress, dipped in hot oil of camomile strongly camphorated, was applied immediately over the wounds, with pledgets of lint, and a bandage slightly compressive. A draught of ether and laudanum was administered; I prescribed for him good broth, with claret, and two grains of opium in the evening to be taken in two ounces of hot sweet wine.

The nature of this case was such that I feared the operation would hasten the death of the patient; but to my agreeable surprize, I found him better next morning; he had slept several hours, and the fever was less.

For several days the discharge of pus was very abundant, but it diminished by degrees with the other symptoms of the disease. The eschars of the cauteries and of the moxa sloughed off, considerable quantities of albuminous floeculi were discharged from the abscess, the walls of which sunk down, retracted, and began to reunite. At different periods we had given him two mild emeticks, and had continued the bark with opium, good jelly-broths, and good wine. I am reporting his case on the thirty-first day since the operation: his ulcer appears to be in a good state, and secretes a small quantity of white thick pus. Most of the sores caused by the moxa have healed; his strength is in a great measure re-established, and his appetite and sleep have returned: he stretches himself on his bed, and can rise at pleasure.— Unless some unforeseen accident should occur, I do not doubt but he will finally recover.

CASE SIXTH.

Although the disease in the two following cases has some similarity to the foregoing, yet as their causes were different, I shall report them here.

Honore Desplan, a fusileer of the guard, at the battle of Wagram, received a contusion from a ball that was nearly spent. As it turned on its axis, it grazed his back, destroyed a part of his apparel, and produced an *incomplete* luxation of the 10th dorsal vertebra, so that the spinous process of this vertebra protruded about two centimetres. The two contiguous vertebræ were evidently more depressed than the rest. This soldier was several months in the hospital of the guards, after returning from the campaign of Austerlitz. He suffered greatly, and with difficulty could find an easy position. The parts insensibly became accustomed to this state, the ligaments grew strong, and he walked with ease, though his back was curved; he felt slight pains from changes of temperature.

CASE SEVENTH.

—— Moilleseaux, a voltigeur of the first regiment of the guards, twenty-three years of age, presented a case similar to the preceding. By falling, while in Spain, from a steep place, he produced an incomplete luxation of the 11th dorsal vertebra. He walked with his back bent, but the continual pain that he suffered, produced

gradual emaciation. He experienced an uncommon pruritus, attended with an agreeable sensation in the parts of generation, when he attempted to stretch himself on the bed. He is still at the depot of his regiment, and will soon be placed in the corps of invalids.

CASE EIGHTH.

Charles Stoll, of the artillery of the guards, twenty-six years of age, came into the hospital for a rheumatick affection contracted in Spain, by fatigue and exposure. This disease was seated in the left thigh, while the pain was principally in the knee. It was treated by cupping, by vesicatories, and by moxa. All these means could not prevent apparent spontaneous luxation of the head of the femur from the acetabulum, as was soon known by the shortening of the limb, its loss of motion, local pain, and the turning of the foot outwards.

The patient soon felt very acute pain in consequence of this affection, which acting on the general system, produced a sympathetick quotidian fever. Tonicks, bark, and bitters were administered, but he fell into a marasmus. A purulent discharge took place from his ears, a frequent cough came on with mucous expectoration; and a hectic fever, with all its symptoms ensued. The application of a blister to the leg of the diseased side, appeared to suspend the symptoms in some measure for a week, but they soon returned with greater violence, and after having suffered the most acute pain, he was suddenly attacked by a most dreadful suffocation: his face became discoloured, the pulse small and vermicular, and respiration difficult and stertorous. The *animal* life remained unimpaired until the last sigh.

On examining the body, we discovered an abscess at the hip-joint, filled with serous matter, mixed with white lumps, and the remnants of cartilage: the head of the femur was affected by a species of caries, and on the centre of the bony edge of the cotyloid cavity was an opening that communicated with the pelvis

CASE NINTH.

Nicholas Martin, an artillerist in the horse guards, was brought to the hospital with a deep fistulous ulcer in the superiour and internal part of the left thigh. After examining him next morning, I found that a considerable quantity of pus was discharged from the wound, the depth of which I could not ascertain. The patient felt great pain about the hip-joint, and especially in the knee. The leg was generally bent on the thigh, and the thigh on the pelvis. By these symptoms I discovered a spontaneous luxation of the head of the femur, and the formation of an abscess around the articulation: but the patient had already fallen into a marasmus, and I was obliged to confine myself to some internal remedies to support his strength, which was soon entirely exhausted.— He died at the expiration of a month. On opening the body we found the same disorder as in the preceding.— The cotyloid cavity was perforated, and the pus poured into a part of the pelvis.

CASE TENTH.

Frank, a fusileer of the guards, came to the hospital on account of a rheumatick pain that he had felt for three months in the left thigh. After having attended to him for some days, I discovered symptoms of a disease in the hip-joint, and soon after such as attend a luxation of the femur, or rather the destruction of the cartilage of the head of this bone, and of the acetabulum. I used the most energetick means, such as cupping, blisters, and moxa, which I often repeated, and thus prevented the formation of an abscess. The pains which at first had been very acute, now abated by degrees, the parts accommodated themselves to the change, and the patient regained his strength and good appearance. At the end of six months he left the hospital, but continued lame and deformed, the necessary consequences of such a disease.

CASE ELEVENTH.

Mongin entered the hospital with a disease similar to the last; but his pain was less acute. He was younger, and fell into a kind of marasmus. The disease went on in the same manner, and the same means were employed. The whole limb remained emaciated, and the subsequent deformity was very great.

Before I pass to the last subject relating to diseases of the joints, I may observe that my experience, and the results of my inquiries on the causes and effects of sponta-

neous luxation of the femur, agree with the principles of Sabatier. (See the fifth volume of the Memoirs of the Royal Academy of Surgery, p. 791.)

Essay on moveable and preternatural cartilages of the joints.

The formation of cartilaginous bodies, which remain loose and floating in certain ginglymoid articulations, is a disease that has not been noticed by the ancients, perhaps, because its diagnosticks were obscure, or because, when they had discovered these concretions, they had not courage to make an incision into a joint to extract them, from an opinion that all wounds, penetrating into the cavities of the joints, were highly dangerous. The first well-attested case that we have reported, where these bodies were present in the articulations of the knee, is reported by Ambroise Pare. In 1558, this celebrated surgeon, while opening an imposthume of the knee, saw a white hard polished concretion, of the size of an almond, pass through the orifice. In 1685, Dr. Vagnerus found several of the same appearance in the knee of an ox. In the next century Alexander Monro, Simson, Bromfield, Cruikshank, Theden, Morgagni, and Bell extracted similar foreign bodies from the knee-joint. The operation, although performed differently by each of them, had the same effect. Lately Sabatier and Desault, have performed it with equal success.

It was generally believed that these cartilaginous concretions were never formed except in the knee-joint: but Haller mentions a woman, in the articulation of whose jaw, after death, he found several: the cartilages of the condyle, and of the glenoid cavity of this articulation

were destroyed. Bell has also found them in the joint of the foot, and proposes to extract them in such a case by incision.

The development of these foreign bodies, and the uniformity of the symptoms which follow and attend them until extracted, prove that their production always depends on one and the same cause. Nevertheless, physicians who have written on concretions of the joints, are divided in opinion: some suppose that they are formed in some part of the synovial membrane that lines the capsule of the joint: others that they are formed of the adipose and vascular membrane that lies in the posterior depression, between the condyles of the femur, and are loosened from their attachments by shocks or concussions. Again there are others who adopt the opinion which is most generally received, viz. that a part of the synovia grows thick in the most dependent parts of the joint, so as to form these concretions, which afterwards gradually enlarge. All authors agree as to the diagnostick of this disease and the operation; and if we may except a very limited number, they all give the same good advice, to avoid making the incision of the skin, to correspond with that in the capsular ligament, in order to prevent the entrance of the surrounding air.

Without examining the different theories that have been advanced on the formation of these concretions, I shall attempt to refer their production to causes, that to me appear most reasonable. It is necessary, first, to be well acquainted with the nature of the cartilages that surround the extremities of the bones, forming the moveable articulations, for they differ in organization from all others. I would designate this substance by the term of fibro-cartilaginous: of this species are the cartilages which unite the different vertebræ, the bones of the pelvis and the ribs, to the sternum, &c. These carti-

lages are also supplied with vessels which are easily changed: they become ossified in advanced age, or prematurely by such causes as produce ossification. They unite the bones, and seem to make up a continuation of bony substance. The changes of the cartilages, where there is a union by diarthrosis, bears no analogy to those of the cartilages, where there is a sunarthrosis. The former are liable to none of the affections that are common to the ligaments, to the synovial capsules, and fibro-cartilaginous substances, such as tumefaction, inflammation, suppuration, and gangrene: the authors who have supported an opposite opinion have been led into an error by the colour which these cartilages receive from the fluids accumulated in the articulation.

As in acute nephritis, the urine is coloured red, so by inflammation of the articular ligaments, the synovia is also coloured red and stains the cartilage of a red colour: but if after an articular extremity be sawed off, and its ligaments removed, you macerate it in common water, this tinge will disappear. This I have remarked, and have repeated the experiment when particular circumstances occurred to corroborate this opinion. Sæmmering and Prokaska have demonstrated by very fine injections, that although the ligaments, the synovial membranes, the periosteum, and the bones be injected, the cartilages that cover the surfaces of their bony extremities, and form moveable articulations, or *diarthrosis*, receive no portion of the injection. On examining these prepared pieces with a glass, we see, on the contrary, little branches arising from the extremities of the injected vessels, and uniting to form the articular ligament, and the bony and synovial membranes, winding round each other, and describing so many small curves, from the convex part of which a villous system of vessels, exceedingly fine and delicate, seems to arise, and appears to be

lost in the cartilages. Yet I am convinced from dissection, that a very fine and delicate prolongation of the internal layer of the synovial capsule, covers the articular surface of these cartilages to which this membranous pellicle is so intimately united that it can be separated only with the greatest difficulty, and by the most delicate dissection.* It would seem that this membrane, when it reaches the edges of the articular surfaces, changes its texture and qualities. Nature appears to have intended it to confine the expansion of the cartilage, and to produce its smooth and polished surface, by filling up the small inequalities that remain between the particles secreted by the vessels of the bones: for having raised this membrane, the naked cartilage appears rough. I am also of the opinion that this membrane assists in exhaling the synovia. This portion of membrane is most probably insensible: it seldom gives proof of its sensibility even when acted on by a morbid cause; under this supposition, it never assumes the inflammatory character common to other membranes: finally, I might say that this membrane, or pellicle,† bears the same relation to the cartilages or moveable joints, that the elongation of the conjunctiva bears to the transparent cornea. If these cartilages be subjected to the action of boiling water, they will soon be reduced to a substance that resembles albumen in appearance, and soon putrifies, when in contact with the external air, and after chronick diseases. Yet they are never affected by inflammation or obstruction, but in certain states of disease, they are dissolved and destroyed: most generally they become detached in lay-

* Nesbit, Hunter, Bichat, Portal, and Boyer, speak of this membranous expansion.

† I shall speak of it again at the end of the work, when treating of amputation of the thigh.

ers, or scales of various sizes, and separate from the bones, as I have seen after amputation at the joints, more especially at the shoulder-joint.

This exfoliation was very evident in the case of general Daboville, who had the operation performed after the battle of Wagram. The articular cartilage of the head of the scapula was struck by a ball that carried away two-thirds of the arm and of the prominence of the shoulder; it exfoliated in very thick lamellæ.

After the numerous extirpations of limbs, that I have performed in consequence of gun-shot, or incised wounds of the joints, I have never found the *diarthrodial* cartilages swell or inflame as has been generally supposed: for the same reason tumefaction cannot produce the spontaneous luxations at the coxo-femoral articulation that is often caused by rheumatick affections. On the contrary, this luxation is the consequence of a destruction and internal caries, as I have attempted to show in the preceding essay, and in this opinion I have been confirmed by examining a number of dead bodies. A gradual inflammation of the fibrous parts of the articulation takes place. The concretion of the cartilages is suspended when the exhalation ceases. The least friction grinds them down and dissolves them: the articular cavity is diminished in diameter, and the head of the femur in thickness. The round ligament becomes detached, in consequence of the internal inflammation. The head of the femur can then rest on the depressed edge of the cotyloid cavity, and become displaced, either totally or partially, by distending the ligaments that have already lost their tone, and a luxation takes place. This is a very rare circumstance. Most commonly, the caries of the bony pieces of the joint takes place as soon as the cartilages are destroyed, and the ligaments suppurate. Then follow abscesses and fistulas, which after having attack-

ed the articulation, make their way out in different directions. Instead of producing these symptoms, the rheumatick affection sometimes causes two bones to unite, or to ankylose, by the production and reciprocal adhesion of the *osseous* vessels of the two articular pieces, and by the ossification of the ligaments: but the *diarthrodial* cartilages take no part in it. This process I saw well explained on a very curious skeleton which my uncle, Mr. Larrey, chief surgeon of the general hospital of Toulouse, sent to the royal academy of surgery in 1787, and which is now deposited in the museum of the school: you will find on inspecting it, that the articular surfaces, far from being united, as would be the case if the cartilages which cover them had been ossified, were on the contrary separated, except where the condyles were in contact, and there no intermediate substance remained.*

The formation of these cartilaginous concretions is no doubt owing to some particles of the cartilaginous substance that are crystalized on the surface of the condyles, become detached and conglomerated in the cavity of the joint, or perhaps these crystalized particles are strained through the little vessels that arise from the synovial capsule, and the concretions thus formed, remain suspended by a *pedicle* that breaks when they have acquired a certain volume: new particles of albumen and phosphate of lime collect on these cartilaginous nuclei, and increase their size, as in urinary calculi. Every cause which injures the exhalant vessels of this fibro-cartilaginous substance, makes it liable to irregular action and effusion. This is the opinion of Alexander Monro. Sometimes this substance is entirely dissolved and mixed

* See the work of Choppart on diseases of the urinary passages, where may be found a circumstantial account of the preparation of this skeleton.

with the synovia, so that it disappears entirely. The absorbents then take it up with that fluid, and carry it into the circulation. In such cases, the cartilaginous concretions are not formed, but the articular extremities of the bones being stripped of their proper covering, acquire the density and polish of ivory on their opposing surfaces. The freedom of articular motion remains, but is attended with a kind of rustling noise that produces no inconvenience to the person. I have seen many cases of this singular disease. Dr. Fabard, former surgeon of the artillery of the guards, is a striking example. On opening his body after death, the articular surfaces were found deprived of their cartilages, and in appearance like ivory. It appears that these cartilaginous concretions are more commonly formed in the ginglymoid articulations, as in those of the knee, of the jaw, and of the feet, either because the inter-articular cartilages, and the sulci of these joints favour the conglomeration of the cartilaginous particles that are detached, or because the secretion is more copious in these articulations than in those which are orbicular. When these substances are produced, they are loose and moveable in the joint, and pass from one side to the other. If they form in the knee, they move round the patella, or its ligaments. In the first case, the person feels no pain, because the cartilages are insensible: but when they touch the ligaments or the capsule of the joint, the pain is acute and piercing, and obliges the patient to remain at rest. When there is but one concretion, it moves about, forms tumours on the exterior of the joint, escapes on the least pressure, and appears elsewhere: sometimes it becomes fixed between the condyles, where it remains a long time, without inconvenience to the patient, who supposes that it is dissolved; but it re-appears with new symptoms. To the acute pain, generally succeeds a swelling of the knee, in consequence

of the stagnation of the synovia, the absorption of which cannot go on, by reason of the irritation that takes place in the capsular ligament; and hence there is a stricture and stoppage of the absorbents. All these symptoms united, leave no doubt of the existence of cartilaginous concretions of the joint.

We are ignorant of the primary causes of this affection, which may be various: the exciting, and perhaps the *essential* causes, are blows, falls, and violent shocks, and in fine, every mechanical cause that acts on the *proper* substance of the cartilages, where these conglomerating particles lose their adhesion, and fall into the articular cavity, and give origin to the concretions. They are known by the pain that attends while they are forming, by the difficulty of moving the limb, by a swelling of the knee, and the protuberances at different parts of the joint, according to their change of place. The patient can point them out. When small and soft, they produce but little inconvenience; but when arrived to a certain size, they impede loco-motion to a great degree, and produce a sympathetick irritation that injures *internal* life.

To remove these symptoms, and to prevent unpleasant consequences, it is indispensably necessary that these foreign bodies should be removed. This operation has been performed in two modes: by cutting through the soft parts, directly over the cartilage, and extracting it by the shortest way; or by making the incision so that the opening of the teguments shall not be immediately over that in the capsular ligament. It appears that Simson, Alexander Monro, Reimarus of Edinburgh, and Gooch, have pursued the first plan; but they had to contend with symptoms so serious, that the attention of physicians have been called to the management of this *disease*.

Bromfield and Hunter were the first who adopted the second plan; and it has since been followed by Desault, who has brought it to perfection (vide his "Journal de Chirurgie." This consists in making the opening in the skin, as far as possible from that in the capsular ligament: in order to effect this, he directs the former to be drawn considerably beyond the part where the opening is to be made in the capsule. After the operation, he unites the edges of the wound, and retains them in contact by adhesive plasters. But this exact union is not free from inconveniences. The very strong pressure which the adhesive plasters and the retaining bandage produce, sometimes induces irritation and inflammation of the joint, with such symptoms as generally attend them. This re-union should be made with great care, and the dressings should not press too hard on any part of the joint.

CASE FIRST.

Jacques Antoine Merlin, a native of Mezieres, and one of our grenadiers, entered the hospital of the guards with an acute pain that he had experienced for a long time in his left knee. He also had an intermittent of an irregular type.

On examining him, I immediately discovered a hard, loose, moveable substance in the knee. I had no doubt that it was a cartilaginous concretion, and should have immediately proceeded to extract it, had the state of the patient admitted. I found it necessary first to remove the febrile affection, and to restore the strength of the patient. This was effected by suitable remedies, and after twenty days, he was in a condition to be operated upon. In order that the operation might be attended with the wished-

for success, I made the incision of the teguments at a considerable distance from the articulation. After having fully extended the leg, I pushed the cartilage from the internal to the external side of the knee. While passing under the patella, it produced no pain. I seized on this foreign body with my fingers, and by pressing it strongly upwards and outwards, caused it to make a protrusion under the *vastus externus*, about three fingers' breadth above the articulation. The articular capsule was pushed up. After fixing on the spot, I cut through the skin, and a portion of the subjacent muscle. I then cut the capsule over the cartilage, and it was instantly expelled through the incision. Without attempting to re-unite the lips of the wound, I applied a very simple dressing, taking care to dip the bandages which were to surround the knee in camphorated wine, which I have found useful to prevent pain and inflammation. No unfavourable symptoms ensued, and the wound was completely cicatrized in twenty-five days. His cure would have been more speedy, had his health been better.

The cartilage that I extracted was of a white colour, of the size of an almond: red on one side, and polished on the other. Mr. Vauquelin analyzed it, and found that it differed but little from common cartilage. This analysis proves also that this cartilage is formed of albumen and a concrete mucus; for it is observed that the same result follows when these two substances and cartilage are put into water or diluted acids.

CASE SECOND.

Berens, a grenadier of the imperial guard, was sent to the hospital with an acute pain of the left knee that had continued for some time. He was often obliged to stop suddenly while walking, by the removal of a hard body (which he said he could feel,) from one side of the joint to the other. Indeed, on examination, I found two moveable cartilages of the size of a large almond: their mobility was such, that on the least touch, they receded from the finger, and lay hid in the joint. In order to extract them, I was obliged to press them up with one hand, and to operate with the other; on this account, the operation was more tedious than the first, but it was equally successful. After extracting these two cartilages, the lips of the wound were placed in contact by means of adhesive straps: it was cicatrized on the ninth day, and the patient felt no stiffness in moving his leg. I am unacquainted with the cause which gave rise to the growth of this cartilage, but from all appearances, it was more the effect of a gouty diathesis, under which the patient laboured, than of any external cause. I had reason to suspect that the cartilages which surround the extremities of articulating bones, were in part absorbed; for, besides a distinct rattling noise, which was perceived on moving this joint, there was an incipient ankylosis in it.*

* For the shape and size of the cartilaginous concretions which were taken from the subjects of the two foregoing cases, see plate X.

Essay on Cerebral Epilepsy.

To conclude the account of the diseases which act principally on the osseous system, I shall detail some curious cases of a species of *cerebral* or *idiopathick* epilepsy. But before I enter on this detail, I beg to be indulged in some reflections on the means of distinguishing between the symptoms of *true* epilepsy, and of that which is simulated; and I shall then point out the efficacy of some remedies for this disease which have been successfully exhibited in analogous diseases.

It is not always easy for a physician who has not had great experience, to ascertain the difference between true and simulated epilepsy; because there are some men, who, in order to be exempt from military duty, will bear the most severe tests without evincing any signs of pain.

I think it will be only necessary to class the disease, and to reflect a moment on the manner in which voluntary and involuntary functions are performed; in order to distinguish *true* from *simulated* epilepsy. Let us suppose that it is the cephalick, which is the most common. What are the phenomena that accompany its paroxysms, and what difference is there between the accession of true epilepsy, and the accession of that which is feigned? These signs may be divided into those which are permanent, and into the signs which attend the paroxysm. The former are equivocal, if the disease be recent, as in simulated epilepsy. But if the disease be chronick or hereditary, it produces a uniform series of symptoms, more or less prominent, which the practitioner knows at

sight, and quickly analyzes. I shall lay them down in a few words, with some remarks that are necessary.

A celebrated professor of the university of Montpellier, says that the lengthening of the facial triangle is a uniform and pathognomonick symptom of this disease. Without pretending to deny an assertion from a source so respectable, the author of it will pardon me for observing that the disease must have existed from infancy in the patient, before such a change in the frame of the face could take place, and that it must be caused by an organick defect in the thick portions of the superiour maxillary bones, so as to make the facial angle more acute. But most generally, the cause of epilepsy resides in the bones of the cranium, in the meninges, or in the brain itself. Yet the alteration of these parts cannot influence the form of the face, unless in consequence of rachitis, or some other taint which affects the evolution of the bones that compose it. That this angle is more acute than usual in some epilepticks, we can easily conceive; for we know that in the negro, whose facial angle is more acute than in the European, the intellect is more limited: but it does not thence follow that the lengthening of this angle becomes a cause of epilepsy. At least it is useless to seek for the certain symptoms of a disease in the geometrical variations of the face, when we can distinguish it without trouble by means of other and more correct indications that anatomy and physiology furnish.

In the epilepsy, of which we speak, which has its seat in the head, the brain is either directly or indirectly changed: and hence the symptoms that mark its accession; such as a dull pain in the head, vertigo, and the falling of the person, if he be erect; a change in the intellectual faculties, in the voice, speech, and sight. The eyes are more or less distorted, the muscles contract involuntarily, and in a convulsive manner. All these

symptoms may be simulated, especially when the person has acquired that habit by practice. But he cannot, for example, imitate the emission of thick and frothy saliva, which is secreted during the accession, nor the dilatation of the pupils, which is not dependant on the will. In the real epilepsy, the pulse is slow, and seldom strong; in the other, on the contrary, like the respiration, it is hurried, and the contraction of the muscles is not simultaneous, as in the true epilepsy: and the person cannot distort his eyes as is done involuntarily in the former case. In proportion as the disease acts on the nerves of animal life, so does it disturb and paralyze the functions. In addition to the injury of the intellectual faculties, an involuntary hanging of the superiour eye-lids ensues, an inclination of the head forwards, on account of the small contractile power of the extensor muscles, which gives the face an appearance of stupidity, and the gait is irregular and tottering.

These symptoms are always more or less evident in epilepsy of the same species above mentioned, especially if the disease be hereditary and chronick, and cannot be mistaken by those who have a little experience.

But is it possible to prescribe for organick lesions of the cranium or of the membranes of the brain, with any success? I think it is, and the facts that I shall soon detail, confirm me in this opinion. For this purpose it is not necessary to regulate its accession, or to fix the period of its return. This is not in the power of the physician, unless the epilepsy be accidental or sympathick. But internal or external prescriptions, that have the property of dissolving osseous or lymphatick tumours, such as enlargement of the bones, exostoses, fungi, and indurations of the membranes, by removing this cause obviate the disease and its consequences.

The remarkable success that I have had in the treatment of inveterate venereal exostoses, by the internal use of the muriatick acid, and by the application of mercurial preparations and vesicatories on these tumours, has led me to believe that the same means might also be employed, with equal advantage, in exostoses of the cranium, or indurations of the dura mater, which often induce epilepsy. But it is not sufficient that these means be tried once or twice; they should be continued for a long time, with suitable variations: when the virus is destroyed, the repeated use of blisters should be persisted in.

The following cases may tend to inspire confidence in these remedies:

CASE FIRST.

Louis Lombardi, a grenadier of the guards, aged 22, was admitted into the hospital for two anomalous tumours on the head. They fluctuated, and were slightly red on the surface. This man felt constant pain in the parts affected: he was in a soporose state, and had frequent attacks of epilepsy.

The two tumours were opened with a cutting instrument. We discovered a deep caries of the cranium, opposite to these small abscesses. The internal table of the bone was perforated, and slight pulsations of the dura mater might be perceived below the openings. The discharge of pus from these abscesses had relieved the patient, as it had before pressed on the dura mater. The epileptick paroxysms were less frequent, and of shorter duration; but the caries advanced, and the symptoms became more acute. The epilepsy could be

re-produced at pleasure, by making gradual pressure on one of the fungi of the dura mater, which rose above the opening of the caries: these fungi were proportioned to the size of the apertures. The patient died about the thirtieth day after his admission. On opening the body we discovered two fungous tumours on the dura mater, that appeared to have been produced by the same cause* from which the caries arose. It was easy to see that the caries had perforated the cranium externally and internally. The two fungous tumours pressed the brain immediately opposite to these apertures, and brought on the epileptick paroxysms. The striking analogy that these tumours bear to those which attend caries of the cranium, in consequence of confirmed syphilis, for which I have often successfully prescribed antivenereals and muriatic acid, induces me to believe the fatal termination of the above case might have been prevented, if these remedies had been sooner exhibited.

CASE SECOND.

Barthelemi Thevenet, a fusileer, aged twenty-six, entered the hospital with two enormous tumours of a serofulous appearance, on his neck, attended with pain of the head and epileptick fits, to which he informed us he had been subject for several years.

On inquiry, I found that in 1802, he had had syphilis, which was thought to have been treated methodically.— A gun shot wound that he received six years after, while

* The patient had never been able to answer the questions put to him relative to this cause; but we supposed it to be the consequence of the venereal virus, as he had a *stigma* on the penis, which arose no doubt from a chancre.

with the army of Spain, in the anterior part of the thigh, was followed by the hospital fever, and the hospital sore. When the wound healed, he felt violent pains in the head that yielded to a spontaneous purulent discharge from the ears, in the fourth month of his stay in the hospital. Some time after, this discharge stopped, and a buzzing and deafness succeeded in the same ear. He had vertigo and slight epileptick paroxysms. In this condition he entered the hospital of the guards. The application of several leeches to the temple, blisters behind the ears, and internal remedies alleviated the symptoms, and promoted the formation of a bubo or abscess in the groin, which was unfortunately prevented from suppurating, by resolvents. From this period the paroxysms of epilepsy became more frequent and violent, the glands of the neck tumefied, and two or three of them burst. The patient was now removed into my wards. Always suspecting a syphilitick cause, I prescribed anti-syphiliticks, combined with such medicines as were proper in scrofula. The fluctuation being apparent in both tumours, I applied caustick potash to them. When the eschars fell off about the fifth day, the patient was suddenly surprized in the night by a violent paroxysm of epilepsy, followed by a complete hemiplegia of the left side, with a suspension of his intellectual faculties, and of the use of his senses. Notwithstanding this state of stupour, he pointed out a painful part at the hypochondrium of the paralyzed side. A large blister being applied there, immediately relieved him, and the epileptick fits were suspended. But the hemiplegia remained always the same, that is, the limbs remained incapable of motion and sensation. A few days after, the pains of the head increased with the epileptick attacks, and the patient being in great danger, I ordered a blister to the head. Having shaved his head, a considerable tumour

was perceived on the right side, formed by the *squamous* portion of the temporal bone, and the inferior part of the parietal. A second projection at the top of the cranium, gave it the shape of a cone. The first blister covered the crown of the head, and produced a sensible improvement in his symptoms. I then prescribed a diaphoretick drink for him, acidulated with muriatick acid: pills of camphor and opium in the evening, and an anti-syphilitick solution, one ounce to be taken in the morning in milk.* I gradually increased the dose of camphor to a gramme a day. The pain of the head moderated, the paralysis evidently improved, and the epileptick paroxysms were suspended. New abscesses having formed on the neck, I applied the caustick potash to their fluctuating points: a second blister was applied to the neck, and a third on the tumour of the temporal bone. The same regimen and remedies were continued.

Sensation and motion gradually returned to the paralyzed limbs. The patient daily recovered the use of his senses and intellectual faculties, but he periodically felt chills of the left side of the body, to which succeeded an undulatory motion of the extremities and of the head.— This phenomenon took place more especially in stormy weather.

The suppuration of the sore of the neck being suppressed by some unknown causes, he had a new attack of epilepsy, but it was of short duration. I lost no time in re-establishing suppuration in the serofulous ulcers, and in applying a fourth blister on the tumour of the tem-

* This solution is thus made: R. hyper-oxygenated mercury, muriate ammonia, opium, a. a. half a gramme, dissolve them in Hoffman's liquor, q. s. add this to one litre of aq. dist.

ple. I still increased the dose of camphor, and persisted in the use of the muriatick acid in the same ptisan, the dose of which was gradually increased. All these means produced excellent effects, and the patient was visibly improving. But in a short space of time he had frequent and very severe epileptick attacks, although they were short. The blister to the head was renewed, and one was applied also to his right arm.

One day while paying him a morning visit, he had a violent paroxysm of epilepsy, followed by convulsions, and an extreme prostration of the vital powers. I ordered the eighth blister to be applied to the temple: I also added bark in substance, ether, and generous wine to the powerful antispasmodicks that he was using. For the blister of the arm a cautery was substituted, and the discharge kept up. Since the above attack, Thevenet has had no more: the paralysis has entirely left him, and he has been gradually restored to the complete use of his physical and intellectual functions. The scrofulous venereal ulcers have healed, the bony projections of the cranium have disappeared, and his head has resumed its natural shape: in fine, I think that he is completely cured of a disease that is generally considered incurable, especially at a stage so advanced as in this case.

We may now inquire to which of the means that were employed, the cure of this disease is to be attributed. I believe that they all co-operated, but the chief benefit was derived from the vesicatories and the muriatick acid. The following case seems to confirm this opinion:

CASE THIRD.

——— Dutertre, a chasseur, 44 years of age, for a year past had been subject to attacks of cerebral epilepsy, which frequently returned. By falling on his head at the accession of a late paroxysm, he broke the vessels of the integuments that pass from the right temporal region to the aponeurosis of the crotaphite musele. The consequence was a sero-sanguineous effusion, inflammation, and a large abscess, for which he was brought to the hospital of the guards.

Emollients were used for several days, and when the fluctuation of the abscess became evident, I opened it by a large incision. A great quantity of pus was discharged, and the patient obtained immediate relief. I directed him to use a ptisan of valerian, to which was added muriatick acid: he also took pills of camphor and opium; the dose of the latter was gradually increased to a gramme each day.

The wound became clean and cicatrized: his countenance, which at the period of his admission was much altered, resumed its ordinary appearance, and this soldier, who never again had a return of the disease recovered as completely as the subject of the former case. In this the abscess which formed under the teguments produced no doubt the same effects as the vesicatories did in the former case.

The memoir on amputation, which formed a part of my surgical account of the army of the east, published several years since, is inserted here, because it contains many observations that were made during the campaigns of which I have already given a history. To it I have also added some facts that occurred in the subsequent campaigns, and properly belong to this dissertation.

MEMOIR
ON AMPUTATION.

AFTER the battle of Fontenoy, the royal academy of surgery proposed a prize question—"Is it adviseable to amputate immediately after gun-shot wounds, or should the operation be deferred." This question could not be answered in a satisfactory manner, except by surgeons who had performed the operation on the field of battle, and in the military hospitals. The academy in refusing to adjudge the medal to Le Comte, because his doctrine was not confirmed and supported by his practice, gave the publick to understand, that they wished the military and hospital-surgeons alone to be candidates for the prize.

The medal was given to Faure: but all practitioners have not adopted the principles of this author. Since twenty years of continued war has brought our art to the highest degree of perfection, we can have but one opinion on this subject. After having acted so long as surgeon in chief and inspector general of the armies, I have ventured to examine the various opinions that have issued from the academy, and to attempt to make a final settlement of this great question, which I consider the most important in military surgery.*

* The fundamental part of this memoir formed the subject of the thesis which I defended in the special school of medicine at Paris, in 1803, for the degree of doctor of physick. (See No. 1, "*Recueil des Theses*, 4to.")

If it be said that the amputation of a limb is a cruel operation, dangerous in its consequences, and always unfortunate for the wounded, who are left in a mutilated state, and consequently, that we shall gain more honour by preserving a limb, than by amputating it with dexterity and success, we shall answer triumphantly by proving that amputation is an operation of necessity,—that it affords a chance of recovery to those unfortunate persons who must certainly die under any other treatment,—and although there be no doubt that amputation is indispensable to the safety of the wounded, the difference of opinion relates to the nature of the cases which decidedly require it, and present positive indications for the operation. We can even add that the chance of success is much greater at present, than when the question was proposed by the academy. Indeed Faure informs us, that of near three hundred amputations, which were performed after the battle of Fontenoy, thirty only were successful, while more than three-fourths have recovered after our amputations, some of whom even lost two limbs. We ascribe this success, 1st, to a more correct knowledge of the proper time for amputating; 2dly, to more methodical dressings; 3dly, to a more simple, speedy, and less painful operation than has been heretofore performed.

Of Primitive Amputation.

When a limb is so much injured by a gun-shot wound that it cannot be saved, it should be amputated *immediately*. The first twenty-four hours is the only period during which the system remains tranquil, and we should

hasten during this time, as in all dangerous diseases, to adopt the necessary remedy.

In the army, many circumstances enforce the necessity of primitive amputation:

1st. The inconvenience which attends the transportation of the wounded from the field of battle to the military hospitals on badly-constructed carriages; the jarring of these wagons produces such disorder in the wounds, and in all the nerves, that the greater part of the wounded perish on the way, especially if it be long, and the heat or cold of the weather be extreme.

2dly. The danger of remaining long in the hospitals. This risk is much diminished by amputation: it converts a gun-shot wound into one which is capable of being speedily healed, and obviates the causes that produce the hospital fever and gangrene.

3dly. In case the wounded are of necessity abandoned on the field of battle: it is then important that amputation should have been performed, because when it is completed, they may remain several days without being dressed, and the subsequent dressings are more easily accomplished. Moreover, it often happens, that these unfortunate persons do not find surgeons sufficiently skilful to operate, as we have seen among some nations whose military hospitals were not organized like ours.

Of Cases which require immediate Amputation.

CASE FIRST.

When a limb is carried away by a ball, by the bursting of a grenade or bomb, the most prompt amputation is necessary. The least delay endangers the life of the wounded.

The skin then has been violently dilated and lacerated; the muscles broken and irregularly torn off; the nerves and vessels cut, and forcibly stretched: finally, the bones have been crushed and fractured more or less extensively. These first effects are followed by a general or partial commotion, by numbness of the injured part, and the greater part of the truncated limb, by a painful agitation of the wounded extremity, that is particularly distressing to the patient and by a local obstruction that precedes erethismus, which soon takes place. The *hæmorrhage* is more serious than is generally supposed; often commences in a few minutes after the wound has been inflicted, and would soon terminate the sufferings of the wounded, unless he received the most speedy assistance. I may even assert, *that without the assistance of the flying ambulance, by which the wounded were always dressed on the field of battle, a great number would have died from this cause alone.*

If amputation be not promptly performed, pain comes on, a fever is lighted up, and the functions are disordered: irritation continually increases, and shows itself by convulsive motions. If the patient should not sink under these first symptoms, the solids, after being forcibly dis-

tended, fall into a complete atony, gangrene takes place in the stump, and its injurious effects are with difficulty obviated.

From this short view it is easy to conceive, that in this case amputation should be performed immediately. If it be delayed, and a single dressing alone applied, the consequences above enumerated may be expected to succeed.

At Strasburg, during the bombardment of the fort of Kell, in 1792, three volunteers were wounded: one had his arm, another his fore-arm, and the third his leg carried away by the bursting of a bomb. They were removed to the hospital of that city, under the direction of Mr. Boy, a surgeon of the first class. He temporized with them several days before he amputated, and neither of them survived.

During the retreat from Mentz to Frankfort, many of the wounded who had their limbs shot off, had no amputation performed until some time after, and not one of them recovered.

When Saourgio was taken, two amputations were performed at Nice, in hospital No. 2, (one of the arm and the other of the fore-arm) *nine* or *ten* days after the wounds had been inflicted, and both these soldiers died:

On my arrival at Perpignan, I visited two soldiers at the Brutus hospital on whom amputation had been performed seven or eight days after the 14th July, 1791, when they were wounded. One had a leg carried away, and the other had lost his right arm. Notwithstanding all my care, one died of tetanus, and the other of gangrene.

In the month of August, 1805, two cannoniers of the guards, by discharging the artillery, had each one hand carried away, and the whole anterior surface of the body scorched. They were engaged in charging the piece, and as they were ramming down the cartridge, a spark of fire

that remained in the gun communicated with the powder. The right hand of one artillerist was torn off between the two rows of the carpal bones, and carried more than 200 paces. The left hand of the other artillerist was torn off with the fore-arm at the elbow-joint, and carried equally as far. The tendons and integuments of the muscles were also lacerated, and had not amputation been immediately performed, the most alarming symptoms must have ensued. As I was present in the hospital when the two men were brought in, I operated on them instantly. Both operations were successful, although the burns of the face and thorax in both were very severe and extensive.

I shall make some important deductions from these two cases, and on the speedy cure of their stumps; these deductions shall appear in a work that I intend to publish on gun-shot wounds.

CASE SECOND.

When a body is projected from a cannon, and strikes a limb so that the bones are fractured, and the soft parts violently contused, extensively torn and broken up, amputation should be instantly performed, otherwise all the disorganized parts will soon fall into gangrene, and the symptoms that appeared in the *first case*, will most certainly ensue.

CASE THIRD.

When a large portion of the soft parts and the principal vessels of a limb (of the thigh for example) are carried away by a ball, and the bone is fractured, amputation should be immediately performed: for besides the consequence of a great loss of substance, the limb must of necessity fall into sphacelus, in consequence of the rupture of its blood-vessels.*

* That a limb does not of necessity fall into a state of sphacelus in consequence of the division or rupture of its principal blood-vessels, every surgeon well knows. The success that follows the common operation for aneurism of the principal arteries of the extremities, would alone render the doctrine of our author on this point inadmissible. We are yet perhaps ignorant of the extent to which the large arteries of the body may be tied, without producing a fatal termination. Mr. Abernethy, and other surgeons of Europe, have reported four cases in which a ligature was applied on the external iliac artery for aneurism seated high up in the groin, and the patient recovered completely. Dr. Dorsey of Philadelphia has also given us the account of a similar operation by himself, attended with the same favourable results.

On the 27th of July, 1812, Mr. Williams of this city, aged about thirty years, was wounded by a ball which penetrated the abdomen, and opened the abdominal aorta. The hæmorrhage was profuse. Dr. Gibson, in presence of several physicians, dilated the wound, and applied two ligatures on this artery, above its division into the great iliacs; and the hæmorrhage ceased. On the third day after the operation, the circulation and warmth were re-established in the inferiour extremities: he survived the operation twenty-two days, and finally died of peritoneal inflammation. On examining the body after death, the aorta abdominalis was found to have been tied, and divided at the part before mentioned. Did the blood in this case circulate from the heart to the inferiour extremities, through the internal mammary and epigastrick arteries, as suggested by Dr. Cocke? The publick have the promise of a more minute account of this interesting case from Dr. Gibson.—Tr.

CASE FOURTH.

When a large ball strikes the thick part of a limb, breaks the bone, cuts and tears the muscles, destroys the great nerves, and yet leaves the principal artery entire, immediate amputation should be resorted to. It is rendered necessary by the destruction that has taken place in the limb, and by the concussion that has been given to its whole substance.

CASE FIFTH.

If a spent or rebounding ball strike a limb obliquely, without causing a solution of continuity in the skin, as often happens, the parts which resist its action, such as the bones, the muscles, tendons, the aponeuroses, and the vessels may be broken and torn. The extent of the internal injury must be ascertained and if the bones be fractured under the soft parts, and if there be ground to suspect that the vessels are lacerated (which may be known by the enlargement, and a kind of fluctuation) amputation should be performed without delay.* But sometimes the vessels and the bones have been spared, and the muscles alone have been almost totally disorganized. Then an incision should be made in the skin, according

* This is the opinion of the celebrated Percy, who has also met with such cases. See his reply to the board of health, inserted in his excellent work on "*Pyrotechnia*."

to the advice of Lamartiniere: by this means, the thick, black blood may be permitted to escape, and the consequences may be predicted. This incision is also necessary before amputation, in order to become acquainted with the extent to which the parts are disordered.

To such an injury of the internal organs, may we attribute the death of many persons who for a long time have been supposed to die by the commotion produced in the air by a ball that brushes past the different parts of the body, or changes or intercepts the column of air which serves for respiration, just as it is about to enter the trachea.*

Although this opinion has been admitted by a number of surgeons, and by a great portion of the physicians, we may be easily convinced of its fallacy, if we consider attentively, 1st. the direction and motion of hard solid bodies, and their action on the aerial fluid through which they pass. 2dly. the *internal* injuries which are observed in persons whose death has been attributed solely to the action of the air set in motion by the ball. 3dly. and lastly, the properties of elastick bodies, such as the integuments, the cellular membrane, &c. when touched by a ball.

All physicians agree that a solid body in moving through a fluid, acts only on a *column* of that fluid, the base of which is nearly equal to the surface of the solid body. †

Thus a common ball in passing through a space equal to its diameter, displaces a portion of air, that is, when compared to the volume of the ball as three

* See a treatise on gun-shot wounds by Ravaton.

† The memoir of Lavacher inserted among those of the academy of surgery.

to two. This fluid being divisible, and like the surrounding atmosphere in its properties, is divided, gives way on all sides, and mingles with the general mass of air. The effects of this aeriform substance can be of no consequence, and there can be no doubt that if the smallest solution of continuity take place in our bodies, it must be from the action of the ball itself.

Besides, if we consider that the rapidity of a ball from a gun diminishes in an inverse proportion to the squares of the distance, we shall find that the space which the bullet has traversed before it arrives at the mark to which it was directed, will have considerably weakened the velocity of this projectile, and consequently must entirely destroy the velocity of the column of air which precedes it.

Physicians who support the opinion to which I am opposed, support it by a particular experiment, of which I shall give a succinct account.

By means of an air-gun, they shoot a bullet into a soft mass of argillaceous earth, placed on a deal board, at two-thirds of the distance to which the ball can be thrown. Instead of finding a hole in this soft earth equal in diameter to the ball, we find an opening two or three times as large, and of an oval form. These physicians refer to the action of the air impelled forward by the ball, and they contend that it ceases to carry forward this air as soon as it passes through the mass: so that the particles of this paste are separated in every direction, and leave an excavation.

But is it not more probable that this phenomenon is owing to the oblique motion that the ball describes on two lines which it describes in entering this soft and non-elastic substance, and in passing out of it? For in the first instance, the ball has commenced its *parabola*, and when it rebounds, the new motion which the plank gives it by its resistance and elasticity, causes the ball to

vary from its first line, and to follow a different course. These two angles, which are more or less obtuse at the points of incidence and reflection, I think we may say, cause the separation of the particles of argillaceous earth; this is increased by the sudden projection which the part of the plank that is struck by the ball gives them; and they give way more easily because they have no elasticity.

The different motions which the bullet performs in its course, and the elasticity of the skin, may now explain how the internal injuries take place without an external solution of continuity, and often without an ecchymosis. The ball moves in a rectilinear course by the projecting cause. If at this instant it meets any part of our body, it would carry them away in proportion to the size of the projected body: but after the ball has passed to a certain distance, from the resistance of the air and the attraction of gravitation, it takes on an irregular motion that causes it to turn on its axis in a diagonal direction.

When it arrives at the end of its course, if it chance to strike a round part of our body, it passes over a large portion of its circumference by means of its curvilinear motion. In the same manner does the wheel of a coach pass obliquely over the thigh or the leg of one who is stretched on the ground: and in this case the result is the same as in the case above mentioned. The most elastic parts yield to the blow of the bruising agent, and such as resist, as the bones, the tendons, muscles, and the aponeurosis, are fractured, broken, and torn. It sometimes happens that the viscera are also torn.

At first sight, every part appears to be sound; but a more attentive examination leaves no doubt of the internal disorder. The ecchymosis under such circumstances cannot always appear externally, because the vessels which pass from the skin to the internal parts are broken

up, so that the blood is effused into the deep cavities produced by the rupture of the muscles and other parts, and cannot penetrate the texture of the skin. These effusions then can only be known by the touch.

Experience supports this reasoning. Have we not seen a ball knock off the helmet, the hat, the eartridg-box, and knapsack of the soldiers, and other portions of their dress, without injuring them? The same ball that carries away an arm, often touches the body of his comrade without doing him the least injury: thence it passes between the thighs of another soldier, and they scarcely have an ecchymosis where they have been slightly bruised, and in such cases only can ecchymosis take place. Again, a ball may separate the arm from the trunk, and the organs of the thorax may not be injured.

Captain Meget, while marching at the head of a column of infantry at the battle of Alzey, fought March 30th, 1793, by the army of the Rhine, had his left leg almost entirely carried away by a large ball, while the leg of his lieutenant that was in juxta-position with his, experienced no injury. The general commotion (which was very violent) and the rigorous cold of the season made the captain's situation very critical. The immediate amputation of the thigh arrested the progress of the symptoms, and he was able to support the fatigues of a removal to the hospital at Landau, about five leagues from the field of battle, where his cure was completed.

I shall omit the accounts of many other amputations that I performed in similar cases.

Captain Buffy of the artillery, in the army of the Rhine, was wounded by a bomb which disorganized his left fore-arm, and grazed his head, so that the lateral anterior brim of his hat was cut off close to the crown: his

nose was also skinned. Yet, he had the courage to command his company for some time, and was then brought to my *ambulance*, where I amputated his arm, and he was well on the 30th day.

When a bullet strikes a part of the body obliquely, it produces the effects which follow the partial stroke of a ball, but in a less degree. The various windings that a bullet makes in the fleshy part of a limb are also matter of surprize.

I return to the subject. I think that the case of which I am speaking requires immediate amputation: the least delay endangers the life of the wounded. I have observed that we can discover the ruined condition of the interior of a limb by the touch, by the want of motion, and the loss of sensibility in the parts that have been struck; and finally, by the incision which I have recommended.

In order that I may support the principle advanced in opposition to the opinion of many authors, I shall beg leave to make a digression.

At the seige of Roses, two artillerists were brought from the trench to my *ambulance*, with wounds nearly similar. Both their shoulders had been grazed on the posterior part, by large balls that had nearly completed their parabola. The first had a small ecchymosis on the whole posterior region of the thorax, without any apparent solution of continuity. He breathed with difficulty and spit a great quantity of frothy vermilion blood. His pulse was small and intermitting, and his extremities cold. He died about an hour after the accident, as I had predicted. I opened his body in presence of Mr. Dubois, inspector of the military hospitals of the army of the eastern Pyrenees, who honoured me with his presence during a part of this seige. The skin was sound, the muscles, the aponeurosis, the nerves, and the vessels

of the shoulders were broken and torn; the scapula crushed, the spinous processes of the corresponding dorsal vertebræ, and the posterior extremities of the neighbouring ribs were fractured: the spinal marrow was filled with blood, the parenchyma of the lungs towards these parts was broken, and there was a considerable effusion into both cavities of the thorax.

The second artillerist died with the same symptoms three quarters of an hour after he entered the hospital. On opening his body, I found the same internal disorder as in the first.

In the army of Germany, many similar cases came under my observation, and minute investigations have always convinced me that orbicular bodies when propelled by gun-powder have acted directly on the living body, where any part of it has been injured.

CASE SIXTH.

When the bursting of a bomb or the stroke of a ball has fractured the articular extremities, more particularly those which form the knee, or the ankle-joints, and when the ligaments which surround these articulations have been torn or broken up, immediate amputation becomes indispensably necessary.

The same indication will present, if the foreign body bury itself in the thickest part of one of the articular extremities, or become wedged into the articulation, so that it cannot be extracted by simple or ordinary means.*

* This advice should not always be followed; for in some cases where the ball is made of lead, and is no larger than

By this means alone can the acute pains which always succeed to fractures of the great articulations be obviated; and also spasms, violent convulsions, acute fever, and considerable tension and inflammation of the whole limb: but if the voice of experience will not be heard, and the amputation be postponed, the parts will soon be disorganized, and the life of the wounded endangered.

It is evident then in this case, that amputation should be performed within the first twelve hours, or within twenty-four hours at furthest, if we wish to save the patient from sinking under the consecutive symptoms.—Faure himself advocates this practice in some species of wounds.

CASE SEVENTH

Has a large *biscayen*, a small ball, or the fragment of a bomb passed through a limb; and denuded a large portion of its bone, without fracturing it? In this case, although the soft parts may appear as if they might be saved, yet amputation is not less indicated. Indeed; the violent shock which such a cause produces, has agitated and disorganized all the parts. The medullary substance is broken down, the vessels are lacerated, the nerves distended beyond measure, and rendered insensible, and the nervous fluid can no longer circulate in them: the muscles have lost their elasticity, and their circulation and irritability have ceased. Yet, before a decision be made, the symptoms which characterize this disorder

a musket-ball, it may remain many years in the joint, and, perhaps, during life, without causing much inconvenience after the first symptoms.—Tr.

should be attentively considered. This rule will not apply to the leg where the bone is very superficial, and is covered on its anterior part by nothing but skin.

The following symptoms will appear: the limb is insensible, the foot becomes cold, the bone partly uncovered, and if your inquiries are extended further, it will be found deprived of skin, and even of periosteum to a great extent. The concussion is propagated to a distance; the functions are disorganized: all the secretions are sensibly obstructed: the operation of the intellectual faculties is suspended, and the general circulation is retarded. The pulse is small and concentrated: the face falls, the eyes heavy and watry: finally, the wounded person is in such a state of anxiety, that he cannot remain long in one position, and requests that his leg may be speedily removed, because it is burthensome, and produces very acute pain in the knee-joint. When all these characteristick signs are united, we should not hesitate to perform amputation instantly; for otherwise the leg will sphacelate the same day, and the patient soon die. The following examples will fully confirm this:

Lieutenant Charles Henri Despres, thirty-two years of age, of the chasseurs of the Rhine, was wounded by a 3 lb. shot in his right leg, at the affair of September 12, 1793, in the forest of Beval. The ball passed through the skin and the gastrocnemii muscles at their inferior part, turned obliquely upwards round to the anterior surface of the leg, and carried away almost all the skin of the tibia. The fibula was shattered, and the tibia fractured near its condyles, without being displaced. The sensation and motion of the limb were destroyed. The ball had also carried away the calf of the left leg. This latter wound was dressed according to art, and I immediately amputated the right thigh. After having at-

tended this officer for several weeks at the house of his uncle, general Landremont, he was removed to Weissemburgh, where his cure was completed.

During the siege of Roses, of which I before spoke, an artillerist was brought to me who was wounded by a ball that had ploughed up the anterior part of the leg in an oblique line from its internal and inferior parts near the tendo Achillis, and about two centimetres from the malleolus to the superior and external part of the calf: so that the skin which covered the anterior part of the tibia, was entirely detached from the inferior to the superior extremity. The teguments of the calf had a wound which was small when compared with the size of the ball that had passed through them. Some portions of the muscles were torn and contused: the bone was fractured, but not displaced: the shock had been so violent, that almost the whole leg was disorganized: the foot was cold, and the pulse small, &c.

I wished to amputate immediately, but felt inclined to consult one of my colleagues who was at hand: he thought that amputation should not be performed, and that the limb might be saved. I submitted with hesitation to this decision, and only made some incisions in the *disorganized* skin, and applied the dressing for fractures, after wetting them in sea-water. The critical situation in which we then were, did not allow me to attend to this man, so that I might operate at another period. I therefore sent him to my friend Ribes, a surgeon of the first class at the hospital of Figueres, with a request that that he would amputate as soon as possible. Before he did so, he in his turn consulted the chief officers of the medical staff of the army who were then at Figueres. They advised that it should be postponed. The same night all his leg sphacelated, and he died the next day.

A case nearly similar came under the care of this young practitioner. The unfortunate termination of the first, induced him to propose the operation immediately in this: but the same surgeons opposed it, and decided that the *primitive* symptoms should be permitted to subside: the operation was then performed on the day appointed, but could not save his life.

After the battle of Eylau, I met with two officers of the imperial guard, whose cases were nearly similar to the preceding. The repugnance they had to amputation induced me to consult one of the most celebrated practitioners in France, who was then in the army; he also thought that the operation should be postponed, under the opinion that the limbs could be saved by treating them as in cases of wounds complicated with fracture. In one of these officers, gangrene took place on the third day, and he died on the eighth or ninth after the accident.

The other, after undergoing the most dreadful symptoms from erethismus, deep-seated suppuration, gangrene, and exfoliation of several pieces of bone, has retained his leg, but his foot remains withered, and deprived of motion, and the leg itself is considerably curved, is shortened several centimetres, and has chronick fistulous ulcers. He now regrets that his leg was not amputated.

CASE EIGHTH.

I shall add another case in which primitive amputation is requisite: that is, when a great ginglymoid articulation, such as the elbow, and especially the knee is opened by a cutting instrument to a very great extent, and a sanguineous effusion takes place in the joint. In

these wounds the synovial membrane, the ligaments, and the aponeuroses inflame, from their imperfect division, rupture of their membranes, and from the contact of the air.*

Tumefaction and erethismus of the parts soon ensue, and acute pain, abscesses, deep fistulas, caries, fever from absorption, and death follow. I have seen a great number perish from this species of wounds, because the operation has been postponed from a hope that the limb might be preserved. I shall report some cases which are in point.

Joseph Grandi, a horse-grenadier, was brought to the hospital on the second day after he had received a sabre wound in the right knee-joint: the instrument had divided the patella through its whole extent, and had affected the condyles of the femur. A very considerable hæmorrhage immediately ensued, which a surgeon of the village unsuccessfully attempted to arrest by compression; but this did not prevent the blood from being poured into the articulation, and into all the surrounding cellular membrane. It was not thought advisable to perform amputation then, on account of the existing symptoms; he died from an immense abscess produced by the effusion of blood, which extended up to the inferiour part of the thigh, with complete destruction of the soft parts, and denudation of the os femoris. The cartilages were totally destroyed, and the caries had already commenced in the spongy substance of the articulating bones.

* See a note, p. 179, vol. I. of this work, on the causes of inflammation in wounded cavities. Perhaps, by adapting our practice to the theory there detailed, the necessity of amputation in these cases may be advantageously dispensed with, and the limbs saved.—TR.

John Lapaix, a grenadier of the imperial guard, aged thirty, received a sabre-cut on the superiour part of the right knee. He came two leagues on foot to the hospital, where I saw him. The wound was about three centimetres in length, obliquely outwards and downwards. The tendon of the extensor muscles of the leg was cut at the edge of the patella, and the articulation opened: an unctuous fibrous fluid of a reddish colour was discharged from the wound, which I easily recognised as the synovia. I did not hesitate, knowing the danger of such a wound, to advise amputation before the invasion of the symptoms, which would of necessity ensue, but he objected to it. Being obliged to temporize with it, I drew the lips of the wound as nearly together as possible, to exclude the air from the articulation, and to prevent the effusion of blood into it. The common remedies were used, but were not sufficient to obviate the symptoms that soon appeared. The grenadier, himself, requested that the leg should be amputated, and the operation was performed on the fifth. A calm succeeded the operation: a copious suppuration took place in the stump, and his condition promised a favourable termination, when on the 15th day the suppuration ceased without apparent cause. All the means that I used to renew it were useless: *he died of ataxia two days afterwards.*

I have seen many others perish in consequence of similar wounds, because amputation had not been performed.*

* These cases are not to be admitted as conclusive evidence of the necessity of amputating, when large joints are wounded. In the first case, Grandi was brought to the hospital two days after he had been wounded; and in the second, Lapaix walked two leagues after having the knee-joint opened by a sabre. Is it then surprising that fatal inflammation should ensue, where, perhaps, every necessary cause is combined to produce it? What would have been

When wounds that penetrate into the articulations are small and unattended by internal effusion, they may be generally cured, provided the means that are used to unite the edges of the wound do not press so hard on the parts as to destroy their circulation. Whence arises this difference, since the air penetrates into the articulation in one case as well as in the other? On this subject I shall make a few observations in the sequel.

Amputation is not equally necessary after wounds of the same kind that affect the orbicular joints, such as the shoulder and the wrist. True, these wounds are followed by some unpleasant symptoms, but they are less violent than the symptoms of the above mentioned wounds. I am not fully able to point out the causes of this difference, yet I am of opinion that the ginglymoid articulations, being provided externally with a larger quantity of fibrous parts, without doubt receive a proportionate quantity of nervous filaments, and of the principle of vitality. Their interior surfaces are more susceptible of irritation and inflammation: and in proportion to their size is the danger to be apprehended from their wounds.

If the wounds which injure two limbs at the same time, require amputation, we should not be afraid to amputate them both immediately, and in quick succession. I have performed this double amputation with a success almost as uniform as in cases where one limb alone was removed.

I shall here confine myself to the report of a single case, as being the most remarkable.

the result in these cases, if their wounds had received immediate surgical attention in the comfortable and temperate wards of a hospital?—**Tr.**

Pierre Morgand, a volunteer, aged twenty-seven, was one of the first of his battalion who entered a redoubt just as it was blown up by the enemy, on the 6th of November, 1794.* He had his face and hands scorched: his right leg was carried away by a fragment of stone, near the knee-joint, the left leg was injured by the same blow, the skin was not broken, but the shock was so great, that the whole limb fell into sphacelus the same night.

I immediately amputated the right thigh, and my colleagues requested that I should defer the operation on the left, on account of the *apparent* soundness of the limb. Yet the leg was cold, of a blackish colour, and without sensibility or motion. We tried all the usual remedies: on the morning of the succeeding day, gangrene appeared in it. The alarming situation of this soldier brought over my colleagues to my opinion, and it was decided that amputation should immediately be performed. I took care to cut off this thigh as high up as the other, to keep up an equilibrium.

The slow fever and diarrhœa which had already made their appearance, with insomnia and with delirium at intervals, left me but little hope. I lavished all my care on this man; my visits were as frequent in the night as in the day, and I had the satisfaction of saving his life, and finally, completing his cure.

If a limb be wounded at the same time in two different parts, and one of these wounds require amputation, (suppose for example, a wound of the leg, with comminutive fracture of the bones, and a second of the thigh without fracture, or any severe injury) the simple wound of the *thigh* should then be dressed according to art, and

* See the campaign in Catalonia for an account of this explosion.

the fractured leg immediately amputated, if the articulation of the knee be uninjured. If it be necessary to amputate at the thigh, we need not attend to the wound of the leg.

But yet I may remark that the operation should be deferred if delirium or convulsions instantly succeed a wound. In such a case, means should be used to allay the symptoms, the efforts of nature must be attentively watched, and the operation may be resorted to during the first calm.

Amputation should be performed in a circular manner, and at several strokes. The section of the skin, of the cellular and other subjacent membranes being made, they should be drawn back by an assistant. This retraction of the skin and cellular substance, is favoured by cutting the *fræna* that confines them around the surface of the muscles. The plan which many practitioners adopt, of seizing the skin with forceps or their fingers, to dissect it up, of stretching it forcibly, and separating it by painful dissections with a bistoury, is to be carefully avoided. The muscles should then be cut down to the bone by a circular section, as high as the retracted teguments will permit. It is sometimes necessary to make a third cut, sometimes a fourth or fifth, to divide the muscles which adhere to the bone completely, and at a sufficient height to prevent its projection; the operation is finished by sawing off the bone, and the immediate application of a ligature on all the vessels, taking care to cut off the ends of the ligatures even with the stump.

A conical stump with an inverted base is the consequence of this operation, and it easily heals.* To retain

* Doctor Davidge has made an improvement in the mode of amputating the thigh and of dressing the stump, so that it shall not be conical. Instead of making the incision of the skin and cellular membrane entirely round the limb,

the edges of the wound together, nothing is required but a roller, applied moderately light, in a circular manner, and a piece of linen split to cover the wound. A pledget of lint is then placed below, which is kept on by two longitudinal compresses that cross each other at right angles. The dressing is completed by applying a bandage of a convenient length, without passing it over the end of the stump: by means of this bandage the action of the muscles is controlled, and their retraction prevented.

Uniting bandages, such as the double-headed roller, and others of a similar description, should not be used. They cramp and fatigue the parts, and prevent that favourable state of fulness which is necessary to produce a laudable suppuration. The subsequent dressings should be mild and simple, such as the digestive balsams, to which may be added those articles that are more or less tonick, according to circumstances. Particular care should be taken to keep the circumference of the wound very clear, in order to facilitate cutaneous transpiration.

he leaves a small space undivided on its inferiour and superiour surface, about an inch in width. He divides these portions of skin and cellular substance with a scalpel in an angular manner, so that the apex of an angle of about 45 degrees shall look towards the body of the patient, while the two sides of the angle shall meet the ends of the circular incisions at the base. The skin and cellular substance are then dissected up with greater facility to the patient and operator, and when the operation is completed, the edges of the soft parts are brought into contact in a line that shall be vertical when the patient sits or lies on his back. Doctor Davidge observes, that the ligatures may then be drawn down to the most depending angle of the stump, and through the same part the pus will be freely discharged, without fear of the consequences that follow its retention in the conical stump, or when the aperture of the wound is made horizontal; that union by the first intention may thus take place between the largest part of the divided surfaces, and the recovery of the patient be more speedy, while the extremity of the stump remains sightly and convenient.—**TR.**

The plan that I have just proposed may be adopted in all cases, even in those when amputation is performed with flaps; which in my opinion is attended with numberless inconveniences. I have had opportunities of comparing the two methods, and the uniform success that has followed the circular amputation, has convinced me that it possesses more advantages than the operation with the flaps, as still recommended by some modern practitioners.

Amputation at the articulations, or, to speak more correctly, extirpation of limbs, should be performed with flaps. These flaps will soon unite with each other, and adhere together over the articulating surfaces, which need not exfoliate, because they have not been changed by the contact of the air, nor touched by a cutting instrument.*

In short, after having amputated according to either plan, good attention should be paid to the treatment: for it is not sufficient that an operation has been performed with dexterity, but that the unpleasant symptoms which may succeed it, should be obviated or removed.

Of Consecutive Amputation.

If it be possible to point out the cases in which amputation should be immediately performed, it is impossible *a priori*, to decide on those cases in which *consecutive* amputation is necessary. For example, one gun-shot

* According to the opinion of Mr. Bell, this cartilage cannot unite with muscle; and although the air may not act on the cartilage, yet this substance will be removed by the operation of the absorbents whenever it is no longer useful.—TR.

wound may be cured by the usual treatment, while another that is less dangerous in reality, either on account of the unhealthy constitution of the subject, or on account of the *traumatick* fever, may require the adoption of the *ultima ratio*. In every case, if this general rule be observed, every indication will be properly fulfilled, which is, not to *perform consecutive amputation, unless every attempt to preserve the limb has become nugatory*. On this point of doctrine, I differ from Faure.

This practitioner delays amputation in cases which he calls *cases of the second kind*, not that he may attempt to save the limb, but that the primary symptoms may pass off. The operation between the fifteenth and twentieth day, appears to him less dangerous than when performed immediately after the wound. At this period, according to him, the effects of the concussion from the ball has ceased: the wounded man becomes reconciled to the amputation, the very name of which terrifies the *pusillanimous*: the debility of the subject removes the apprehension of the bursting out of the blood after the operation: finally, in summing up his opinions, he lays it down as an axiom that "*immediate amputation*" is generally very dangerous in its consequences. To support this theory, he reports the cases of ten wounded men whom he reserved after the battle of Fontenoy, in order that he might perform consecutive amputation on them with more success, and this he tells us was complete.

This division of cases requiring amputation into two kinds, is contrary to nature, and has done much harm; very frequently the partisans of Faure have not dared to resort to *primitive* amputation, the dangers of which they had exaggerated: and again, they have performed *consecutive* amputation without any success.

The effects of the concussion from the ball, far from being aggravated, diminish and insensibly disappear,

after the primitive operation. So long as this concussion continues to be violent, the solids are in a state of considerable tension, but afterwards undergo a complete atony. The circulation of the fluids is disturbed by the shock that follows on the re-action of the solids, and the system is so disordered, that all the functions are imperfectly performed. The proximate cause of all these symptoms is the violent percussion of the extraneous body that disturbs all the sensible parts, whether distant from, or contiguous to the seat of the injury. The rupture and wounds of the nerves and the obstruction of the vessels of all kinds, also form a part of the proximate cause. The speedy amputation of the limb must then produce a favourable change of the whole system. The distended nerves, being divided, are set at liberty, and the fluids circulate more easily: the irritation which is always attended by dreadful symptoms, is assuaged. The obstructed vessels empty themselves and contract: strangulation, inflammation, and erethismus, which are always complicated with extensive laceration, are thus prevented. It is then evident that the concussion, far from forbidding primitive amputation, should induce the surgeon to decide on it. This is also the advice of Lamartiniere and of Boucher.

John Carreau, aged fifty, was wounded at the same time with Maugran: his right leg was almost entirely carried away by a fragment of stone that produced a violent concussion in the right thigh; his left leg was fractured by the same blow. Like Maugran, he also had his face and hands burned. I immediately amputated the right thigh, and dressed the left leg according to art. The operation removed the effects of the commotion, and without doubt prevented the fatal symptoms that must have succeeded. The wound of the stump soon

cicatrized; there was a considerable necrosis of the fractured leg, which retarded his cure, but it was complete before the end of the fourth month.

Mr. Moreau, aged thirty, an officer of the *etat-major* of the army of the eastern Pyrenees, received a ball under the fort of Figueres, November 20th, which *disorganized* the left arm below the insertion of the deltoid muscle; hence I was obliged to amputate very near the shoulder-joint. The violent concussion that the bullet had produced was followed by a large ecchymosis in the stump, attached to the shoulder, which indicated the necessity of performing the operation at the scapular articulation: and I acknowledge, notwithstanding the successful result of this case, that I did not entirely fulfil the indication. The small stump that was reserved, was useless and very inconvenient. He also had more serious symptoms after the operation, that I believe would not have taken place, had the operation been performed at the joint. A singular phenomenon occurred during the treatment of this wound. The ligature of the humeral artery did not fall off, but was retained in the cicatrix of the stump. As this has occurred frequently since, in my practice, I have devised a mode of extracting it which will be seen in the article under the campaign in Austria.

I may remark that the cases which I have already reported, sustain my doctrine, because in every one of them the concussion was very alarming. Neither should the fears of the patient defer the operation; for the wounded will dread its consequences less, immediately after the accident than after the expiration of twenty-four hours, when he shall have time to calculate on all his chances.

Our illustrious Pare makes this judicious remark in his works:

Every one who is acquainted with physiology, may perceive the error of the last objections of Faure relative to the bursting out of the blood. The instantaneous discharge of the vessels of the limb, which takes place as soon as they are divided, prevents the internal disorder which might take place immediately on tying them: and as the globules of the fluid which fills them are in contact as far up as the heart, the slightest resistance diminishes the action of this organ, that is moreover deprived of a quantity of venous blood with which the capillary system would have supplied it had the arteries remained undivided. An equilibrium is established, and nature soon accommodates herself to the change that is produced, as experience has taught us.

I shall not speak of the obstruction that takes place in the capillary vessels of the stump, because it must precede suppuration, without which the divided parts cannot lay close and cicatrize. Yet, if inflammation be too great, it will prove injurious: when this is the case, its ill consequences may be prevented by venæsection, antispasmodicks, cooling internal medicines, and finally, by applying leeches and emollients to the stump.

Experience coincides with my theory, and demonstrates both to naval and land surgeons, that the first or primary symptoms that succeed wounds requiring amputation, are more to be dreaded than such as follow primitive amputation. Of an immense number of the wounded who were amputated within the first twenty-four hours after the terrible and memorable sea-fight, June 1st, 1794, but few died. This fact is attested by many of my colleagues, and particularly by Mr. Ferroc, chief surgeon of the *Jemmape*. I here subjoin an extract of his letter:

“ A great number of amputations were performed immediately after the wounds were received, in the naval engagement, June 1st, 1794. Sixty of these amputated men were taken to the marine hospital at Brest, and placed under the care of Mr. Duret: of these, only two died of tetanus: all the others were cured. One had both his arms amputated. The surgeon of the ship *Temeraire*, (taken by the English) by the advice of their surgeons, postponed the amputation of which many of the wounded were in need, until they should arrive in port; but they all died on the passage.”

When in 1796 I was sent to the army of Italy in capacity of surgeon in chief, I was also obliged to be a witness of the loss of many of the wounded, because the surgeons had embraced the doctrine of Faure. General Bonaparte perceived that in case hostilities were renewed, a *flying ambulance* alone could prevent similar misfortunes; and it was by his orders that I established the three divisions of *ambulance* that I have described in this work.*

Since this time, the army has always been provided during an engagement with such apparatus as is necessary to perform amputation in the shortest possible space of time. Even the sight of these *ambulances*, which are always attached to the advanced guard, animates the soldiers, and inspires them with the greatest courage. I shall here give an anecdote of Ambroise Parc.

* For the speedy construction of these *ambulances* I am indebted to the care and attention of his excellency count Regnault de St. Jean d'Angely, agent general for the hospitals of the army of Italy, who was specially entrusted with their organization.

Being urgently solicited by the duke of Guise, who was besieged in Mentz, to attend to his wounded men who were without assistance, this great surgeon was presented to the discomfited soldiers in the breach: they immediately exclaimed with the most lively joy, "Should we now be wounded, none can die; Pare is among us" Their courage was renewed, and their confidence in an expert surgeon contributed to the preservation of the place, and the destruction of a formidable army assembled before it.

In short, inquire of those invalids who have lost one or two limbs, and they will almost always tell you that they had been amputated shortly after the battle, or within the first twenty-four hours after being wounded.

If Faure still have followers, I invite them to repair to the field of battle during an engagement. They will then soon be convinced that without *primitive* amputation, a great number of the wounded must of necessity die. In Egypt, this truth was most completely demonstrated.

I here insert a letter on this subject from Mr. Masclet, a surgeon of the first class, who was detached to Alexandria:

"In the marine hospital of this port, I saw eleven sailors who were wounded in the naval battle of Aboukir: each had had a limb amputated within the first twenty-four hours. In five cases, the operation had been performed on the arm, in a sixth, on the fore-arm, in two others on the thigh, and in the three last on the leg. They were all in a fair way of recovery.

In our military hospital we have had but three amputations of the thigh, which were performed on the seventh or eighth day after the battle, and they all died a few days after the operation; although it had been methodically performed, and they had laboured under no

formidable symptoms before the operation was undertaken. Experience has confirmed your principles on this occasion."

I am, &c. &c.

(Signed)

MASCLET."

During the war in North America in 1780, the surgeons of the French army performed a great number of amputations according to the prevailing opinion in France, that an operation should not be attempted until the primary symptoms have ceased. The Americans, on the contrary, who had the courage to amputate immediately, or within the first twenty-four hours where their wounded required it, lost but a very small number: and yet, Mr. Dubor, then surgeon major of the regiment of Artois dragoons, of whom I learned the fact, asserts that the condition of the hospital in which the wounded French were accommodated, was in many respects superiour to that where the wounded Americans were placed.*

Even admitting that by a concurrence of fortunate circumstances, on which we cannot always depend, some of the wounded may escape the danger of the primary symptoms, it proves nothing in favour of *consecutive* amputation: it only shows how nature may possibly rise superiour to a disease.

After twenty or thirty days, the prognosis is equally unfavourable, and amputation is decided on: thus all the previous sufferings of the patient have been in vain: moreover, art now requires that nature, almost exhausted by her great and protracted efforts, should begin anew. Is it surprising then that the operation is dangerous!

* See the inaugural thesis of this gentleman, defended in the school of Strasburg, September 16th, 1803.

If nature rise superiour to all these obstacles, the success of the operation will doubtless be more probable, but in this case, instead of performing amputation, the surgeon should redouble his care to assist nature in saving the limb, under the supposition which I have advanced, that it can no longer be injurious, but may prove useful to the individual.

From this period, the future prospects of the wounded become more and more brilliant. I have often heard soldiers congratulating themselves on having opposed the advice of their surgeons who wished to mutilate them at this period of their hopes. I shall soon show that Faure is not exempt from blame in this respect.

When Consecutive Amputation is required.

CASE FIRST.

When the mortification is not circumscribed.—To proceed methodically, we should first inquire into the nature of gangrene, and the causes which produce it. If it be from an internal and general cause, it would then be rashness to amputate before nature had completely defined its limits. This species of gangrene is distinguished from that which I call *traumatick*, by the symptoms that precede and accompany it. These symptoms are such as are observed in the nervous *ataxia*, or *adynamia*. In this case, the operation should be deferred, and the general causes opposed by regimen and internal remedies.

But if the gangrene be *traumatick*, no time should be lost in removing the limb above the sphacelated part.

This amputation will terminate successfully, more especially when the deleterious principle has not been copiously absorbed. Many facts which support this doctrine are reported in my memoir on *traumatick gangrene*.

CASE SECOND.

When there is a convulsive spasm in the wounded limb.
—If a limb be cut off as soon as tetanus appears, all communication between the origin of the disease and the general system is cut off. This division of the vessels, by unloading them, removes the nervous pains, and destroys the convulsive mobility of the muscles. These first effects are followed by a general collapse, which promotes the excretions and sleep, and re-establishes the equilibrium of all parts of the body.

The momentary pain produced by amputation cannot augment the existing irritation. Moreover, the pains of tetanus far overbalance those which arise from the operation, make it more supportable, and diminish the intensity of the pain, especially when the principal nerves of the limb are strongly compressed.

CASE THIRD.

Vitiated suppuration.—It often happens in gun-shot wounds, complicated with fracture, that in opposition to the best directed care, suppuration becomes putrid, and the bony fragments are enveloped in pus, and have no disposition to unite; hectic fever and colliquative diarrhœa weaken the patient, and in this extremity amputation has

sometimes saved the life of the patient, by exciting pain, by re animating the languishing powers of the system, and by producing inflammation in the stump.

CASE FOURTH.

Bad state of the stump.—The cure of amputated stumps is sometimes arrested in the hospitals by a fever of an alarming character. The stump tumefies, the skin, which at first contracted over the surface of the wound, protrudes, is retracted, and becomes extensively *disorganized*. If this particular affection recur, the wound becomes changed into a fungous ulcer, the healing of which is prevented by a deep-seated change in the bone, and erosion of the soft parts. A projection of the bone frequently takes place, from a retraction of the superficial muscles that have not been divided sufficiently low down. This projection also takes place, when care has not been taken to keep the muscles in a proper position, as respects the extremity of the divided bone, by methodical dressings, and a favourable posture of the stump during the treatment of the wound. In either case it has been proposed, not only to saw off the portion of the denuded bone, but even to cut off the end of the stump on a level with the skin. To me this operation appears useless, and may prove dangerous :

1st. By the hæmorrhage which may arise from these vessels, which are deep, and tied with difficulty.

2dly. By the violent irritation which takes place in the remainder of the amputated limb, the sensibility and irritability of which have been increased by the previous injury. It will then be better to abandon the work to nature, which first separates the portion of dead bone, and

gradually restores the retracted and depressed muscles, by means of a vascular production, and a species of attraction common to living parts when they have been divided, and the irritating causes of their original separation have ceased to act. The cicatrix advances from the circumference to the centre, and approximates the skin by a circular fringe. About the fifty-fifth day after the operation, the conical form of the stump disappears, and the cicatrix gradually goes on to take a suitable shape. The duty of a surgeon then in this case is, to assist nature without interrupting her work, that would be prolonged by meeting with obstructions. I have seen many stumps of amputated thighs in this condition, which, after having thrown off their superfluous parts, resumed the proper shape. This disproves the utility of sawing off the bone a second time. In short, the conical form seldom takes place when the operation has been performed according to the method recommended by me.

In what cases we should attempt to preserve the limb, although amputation appears to be indicated, and has been advised by authors.

In general, if the body of a bone be crushed by a ball, and there be no loss of substance of the soft parts, or rupture of the principal nerves or vessels, amputation is not required and the preservation of the limb should be attempted according to the indications. These are incisions, extraction of the foreign substances, simple dressings, proper positions of the limb, the many-tailed bandages or rollers, cooling medicines internally, and suitable topical applications. Spirits, unguents, and oils should

be prohibited, and the most simple remedies alone adopted.

General Morangier, who was a second time wounded in Egypt at the last battle of *Aboukir*, was a striking example of the possibility of preserving a limb, notwithstanding the extensive comminutive fracture that may accompany a wound of it. His wound was in the inferior extremity of the right arm, very near the articulation of the elbow. By enlarging the wound, by extracting the splinters, and by dressing it methodically, he was completely cured. This, and many other cases which I could adduce, show with what circumspection we should act in such a case: we should spare the superior extremities in particular, which may be of the greatest importance to the individual, although disfigured. This general rule is not applicable to the inferior extremities. Indeed, when they are affected with *carious* ulcers of the articulations, they are rather injurious than useful.—*Loeo-motion* is performed with difficulty, and there is an attraction and stagnation of the fluids in the interior of the limb, by the constant irritation which is there kept up. The obstruction enlarges the ulcers, inflammation and gangrene often succeed, and these unfortunate invalids envy the condition of those who walk with artificial legs.

Authors have also recommended amputation when the principal artery of a limb is ruptured, although the soft parts may be spared: but the success which has attended the application of a single ligature, in many similar cases, commands us to try this means before we proceed to amputation. I have seen two cases of this kind in the practice of *Desault*; three under the care of *Mr. Billard*, at

Brest, and a fourth is given by Mr. Bourguet of Beziers. This case merits the attention of the surgeon.

A grenadier of the imperial guards had his humeral artery divided by a sabre, in a duel. His life was endangered by a gangrene of the fore-arm, which took place after the ligature had been applied on the artery. I hastened to amputate the arm above the wound although the gangrene was not circumscribed, and the patient was saved.

I shall report some cases of wounds of the superiour extremities, that were cured without amputation, although complicated with extensive comminutive fractures. I saw these cases in the hospital of Perpignan, and to the care and talents of my brother, Dr. Francis Larrey, do they owe their recovery.

A volunteer, aged thirty-four, had about one-third of the right humerus shattered, near its middle, by a ball; which also slightly injured the soft parts. He was sent to the military hospital of Perpignan, under the direction of my brother, a surgeon major. His wounds were in a bad condition; their edges were turned up, were callous, and filled with fungous flesh that discharged a foetid sanies. These signs induced me to suspect a caries of the bone, and the presence of splinters: by the introduction of a probe I ascertained the existence of the latter. I even found a kind of new bone which nature had produced to supply the want of the old. I extracted the splinters through suitable incisions, and he was discharged, cured, in one month and a half. The limb was slightly shortened, but retained almost all its motions.

John Fayolle, aged twenty-six, a volunteer in the battalion of Arriege, had the body of the left humerus shattered. He was cured in three months; the arm retained some of its movements.

William Fougere, aged thirty, a volunteer, had the bones of both fore-arms shattered by a ball, near the wrist-joints; yet he was cured in a short time, and retained the use of his hands.

Many other similar cases occurred in the different armies under my care, in which the same means were used, and with the same success.

I shall now prove that of ten who were amputated by Faure, long after the battle of Fontenoy, six, at least, might have been cured by the usual treatment, and the others should have been amputated immediately.

CASE FIRST.

Faure reports, that a soldier who had the head of the humerus carried away by a cannon-ball, which fractured the acromion, and destroyed a great part of the deltoid muscle, had the arm amputated at the articulation twenty-one days after the wound, and that he was completely cured in two months, counting from the day of the operation.

Admitting that the extirpation of the arm at the articulation was indicated as I suppose it was, it should have been done instantly, for the reasons I have before given: for the head of the humerus could not have been carried away by a cannon ball, without disorganizing all the parts which surround the articulation. Nothing then remained

but some flaps of the *pectoralis major*, *latissimus dorsi*, and *teres major*, that were attached to the portion of the humerus, separated from its head. It is then evident that prompt and complete removal of this dead limb would relieve the patient from a foreign body, and prevent the multiplied dangers which he must surmount to arrive at a cure. Admit that the wounded man, on whose arm Faure operated on the 21st day, was cured at the expiration of two months: the conduct of this practitioner on this occasion should not serve as a rule to his successors, because a single fact can never establish a principle. To his doctrine I oppose a series of cases, which prove that amputation should be performed immediately, and under other circumstances that the head of the humerus be extirpated entirely, or removed by fragments.

CASE SECOND.

He speaks of a simple fracture of the body of the femur by a ball, without considerable lesion of the soft parts, for which amputation was performed on the fortieth day.

I do not disapprove of this operation; for my experience has taught me, that all wounds with fracture of the thigh, are very dangerous, and in general demand amputation, which cannot always be done immediately, and then it should be performed afterwards.

CASE THIRD.

The subject here had the femur fractured at the condyles, and this fracture extended nearly up to the articulation. This man was not operated on until the 42d day, and was cured in three months.

This case required immediate amputation. The violent symptoms that took place a short time after the blow, and which, by the confession of Faure himself, made the situation of the patient extremely critical, confirm this assertion.

CASE FOURTH.

A ball had shattered the radius, and fractured the ulna near the elbow-joint, without destroying much of the soft parts. The wounded man was treated as in the preceding cases, until the forty-second day, when amputation was performed. Here, in my opinion, it would have sufficed, had the splinters been extracted, the aponeuroses cut up, and the wound dressed with care, according to previous direction, with a view of preserving the limb.

CASE FIFTH.

Consecutive amputation was indispensably necessary, because the hand of the wounded man was sphacelated. We cannot know whether the nature of this wound required an immediate operation, because Faure does not speak of the symptoms which were connected with it.

CASE SIXTH,

Would seem to have required immediate amputation, on account of the extensive laceration and the violent concussion of the parts; yet it was not performed until the forty-fourth day. We may easily conceive what dangers the patient had to encounter during such a tedious treatment.

CASE SEVENTH.

A ball struck the radial side of the metacarpus, fractured the first bone, and injured some tendons. Faure amputated the fore-arm, on the forty-sixth day, with complete success.

Army-surgeons often cure such wounds easily, without having recourse to amputation.

CASE EIGHTH.

A soldier had the os calcis carried away by a cannon-ball, which ruptured the tendo Achillis. His leg was amputated forty-six days after the accident.

I think that this case might be classed with those in which the operation should have been deferred, because I think the limb might have been saved by the usual means. I have seen examples of such a result.

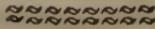
CASES NINTH & TENTH

These required immediate amputation : as they are similar to those which I have taken into consideration formerly, I shall pass them in silence.

Under any circumstance amputation should be the last resort : but when there is a decided necessity for performing it, there should be no hesitation in amputating immediately, that is, before the invasion of the primitive symptoms. If they have taken place when the surgeon is called to the assistance of the wounded, he should wait until they are removed. In short, talents and experience can alone make a profitable application of the precepts of good surgery.

CAMPAIGNS

IN SAXONY AND PRUSSIA.



IT was to have been expected that the result of the battle of Austerlitz would have deterred foreign nations from forming any new coalition: yet Prussia united with Saxony, and clandestinely prepared to march against France.

The grand-army had not yet left Germany, and the foresight of its commander had led him to halt in the territory of our allies. The sudden march of the Saxo-Prussian army induced the emperour, who had quitted Paris on the last of September, 1806, to appear, in a very short time, at the head of his troops. Having resolved to meet the enemy, he passed Mentz on the first of October; then, with the greatest celerity, crossed Southern Franconia, and directed his march towards Saxony, through Aschaffenburg, Wurtzburg, and Bamberg, commercial cities of considerable size, that are advantageously situated. Thence he advanced on Baruth and Schlaitz. Here the troops of our advanced guard encountered some detachments of Prussian cavalry, and the enemy then perceived the approach of the grand army, which advanced in three columns. The emperour was at the head of the central column, with the

infantry of his guard, that had come on by forced marches from Paris. His cavalry, which I attended with my *flying ambulance*, not being able to move with such rapidity, followed this column. It passed by Gera to take the direction towards Jena, inclining to the left, so that the other two columns, by describing a line converging towards this point, and by making forced marches, might come up with the centre.

The two armies were in view of each other on the evening of the 13th of October. The night was entirely occupied in leading the different corps to their positions, and in reconnoitering the Prussian army: The famous battle of Jena was fought on the following day. The commandant of the guard being directed to watch the enemy's movements at Gera, was unwilling that I should leave this corps: I regret that I was not in the engagement, and could not unite with my colleagues in assisting the wounded on the field of battle. Yet at Gera we received a large portion of those who were wounded by the shock of the opposite wings of each army. I had them collected together in the castle of this city, where, with the assistance of the surgeons of the *flying ambulance*, I operated on, and dressed them. Some severe wounds required great operations, which were generally successful, because they were done within the first twenty-four hours.

I shall dispense with observations on those who were wounded at Jena: I shall merely state what was reported to me, that the most serious wounds could not be dressed until some time after the battle, either because the divisions of *ambulance* were at too great a distance, or because the soldiers who were slightly wounded, and were able to walk, had entirely occupied the attention of the surgeons during the first day. The best plan that can be adopted in such emergencies, to prevent the evil con-

sequences of leaving the soldiers who are severely wounded without assistance, is to place the *ambulances* as near as possible to the line of battle,* and to establish *head-quarters*, to which all the wounded, who require delicate operations, shall be collected to be operated on by the surgeon general, or by expert surgeons under his inspection. Those who are dangerously wounded should receive the first attention, without regard to rank or distinction. They who are injured in a less degree may wait until their brethren in arms, who are badly mutilated, have been operated on and dressed, otherwise the latter would not survive many hours; rarely, until the succeeding day. Besides, with a slight wound, it is easy to repair to the hospital of the first or second line, especially the officers, who generally have the means of transportation: finally, life is not endangered by such wounds.

The brilliant victory of Jena decided the fate of Saxony and Prussia. The Saxons detached themselves from the coalition to make a separate peace.

The third day after the battle, our army marched in pursuit of the different corps which had escaped from the overthrow. The imperial guard, which had remained at Gera, also had orders to join his majesty at Naumberg, where I arrived with a part of the surgeons of the *ambulance* several hours before the imperial head-quarters. As the warmest part of the engagement had taken place near the latter city, a great number of the wounded had been transported thither, and several churches were filled with them. I had attended to all the wounded that I found on our route, and I should have continued to operate on those who were most severely wounded, had I not been obliged to follow the emperor, who, with the

* The flying ambulance alone has the advantage of being able to follow the rapid movements of armies.

imperial guard, was considerably in advance. **But my** colleague, inspector-general Percy, who had been in the battle, lost no time in giving the necessary assistance wherever it was required. **As** the guards had not been engaged we had no wounded.

We marched with rapidity to Mersburg, and entered Halle just as the enemy evacuated it. **Yet** our advanced guard had a severe action at the entrance of the city, in which the Prussians were defeated. **This** new disaster precipitated the retreat of the remainder of their army. **We** were ready to render the wounded immediate assistance.

Halle is one of the largest cities in Saxony, and is celebrated for its university; but at this time **I** had not leisure to take a view of it. **By** forced marches, in two days we reached Wirtemberg, a city famous for the reformation of Luther, whose tomb is still seen in the church of the university. The Elbe, which runs near this city, gives it a picturesque appearance, and renders its commerce flourishing. **After** remaining here one day, we left the fertile lands of Saxony, to enter the sandy territory of Prussia. **But** for the forests of pine and larch which cover this country, it would appear like the deserts of Lybia: no one would suppose that he was approaching one of the most elegant and brilliant capitols of Europe; nor would any person think that one of the greatest commanders of modern ages would have taken up his residence in the midst of these arid plains, without admitting, at the same time, that in surmounting this difficulty, he achieved one of his most important enterprises.

We soon arrived at Potsdam, a delightful little city, insulated by canals of fresh water from the Havcl. It has a royal palace, and magnificent parks. It may be compared to Versailles for its regularity, and for the elegance

and grandeur of its palace. In the Lutheran church of this city are erected the tombs of Frederick the great, and his father. I could not behold, without emotion, the arm-chair in which Frederick the great died; the furniture and effects which had been his, and the apartment which Voltaire had occupied.

After three days, we set out for Charlottenburg, which is but two leagues from Berlin. It is also a small royal city intersected by canals. It contains also a great number of barracks, a very fine palace, and an elegant park: this palace is one of the king's pleasure-houses. The French emperor remained in it several days, to reunite the different corps of his army which had been in pursuit of the enemy, who had made a stand at several places, fought obstinately, and then continued his retreat beyond the Oder.

While I remained at Charlottenburg, I took a view of its environs, and examined with the greatest interest the fortress of Spandau, which may be considered a *chef d'œuvre* in fortification.

On the 27th of October the emperor entered Berlin with his *etat-major*, and his guards. The magistrates, in a body, came to offer him the keys of this great city, and marched before him to the king's palace. This was undoubtedly one of the most glorious days the emperor Napoleon ever enjoyed.

While this monarch was occupied in regulating the administration of the Prussian government and that of his army, the marshals of the empire, his lieutenant generals, pursued the enemy, and attacked him in his last intrenchments on the Oder. Thus several fortified posts were taken by or surrendered to the French troops, viz. Custrin, Stettin, and Frankfort. Among these I may particularly notice the rich and commercial city of Magdeburg, which is advantageously situated on

the Elbe, at the confluence of several rivers: its citadel is one of the strongest fortresses in Prussia. After these places were taken, and a part of Prussian Poland had been invaded, the king of Prussia, who had already retreated to a great distance, and had but a small number of cavalry with him, made proposals of peace, and requested an armistice. The emperor acceded to his request.

Such was the result of this short but brilliant expedition, which the emperor proclaimed as a campaign, at the same time expressing his satisfaction at the conduct of his army, in his order of the day, issued on the 30th of October.

The imperial-head quarters and the guard remained at Berlin during the month of November. In the mean time, a second line of troops, under the command of the king of Holland, advanced into Hanover and Swedish Pomerania. Another, under the command of marshal Mortier, covered our rear, while the army of Italy took possession of the mouths of the Cattaro.

While I remained at Berlin, I visited the monuments and the curiosities of the city. I waited on the celebrated physicians who reside in it, and visited the academy of sciences; I presented to the royal academy a copy of my account of Egypt, and was received in the most flattering manner by its members. To the attentions of Messrs. Humboldt, Walther, father and son, Herman, father and son, and Forme, professors and academicians of celebrity, am I more particularly indebted.

At the house of the first, I saw the rare collection of animals and plants which he brought from the new world. Among them I noticed particularly, an uncommon amphibious animal, which holds a rank between fish and reptiles. At the house of the celebrated Walther, I saw the anatomical museum that the king had purchased for

400,000 francs. It is a rich and extensive collection of anatomical preparations of every part of the body, and of both sexes, together with the various products of conception. This museum contains also a series of pathological preparations of every description; but the preparations of the vascular and nervous system were not so interesting as those of the same kind in the museums of Sœmmering and Prokaska.

Among the most superb buildings of the city, are the Italian theatre of the Composite order, the arsenal, some Lutheran churches, and the king's palace. The city is surrounded and intersected by canals, which are always filled with the waters of the Spree. On one of the principal stone bridges is placed an equestrian statue of Frederick William, of bronze. The horse and its rider are of one entire piece.

While we remained at Berlin our army was very healthy. Here I had a part of the city hospital prepared for the reception of the imperial guard; and in it we received such as had fevers, external diseases, accidental wounds, syphilis, &c. I superintended every part of the service, and paid particular attention to the wounded.* With the exception of some severe accidents, we had no very interesting cases.

About the end of December; our soldiers, in order to avoid the severity of the cold, that commenced very suddenly, shut themselves up in chambers, well-heated by cast stoves, as is the custom in this country, and many of them were attacked by asphyxia: some who were immediately brought into the hospital, and received suitable assistance, were restored to life; but others fell victims to this cause.

* Dr. Castel, of the ambulances of the guard, had the care of those who were sick of fevers, and treated them with the greatest success.

On opening their bodies, I observed the same phenomena that I had long before remarked in those who died of asphyxia from water, and deleterious gas, such as the carbonick gas, &c. These appearances have been but imperfectly described by some late writers.

In those who died from the above cause at Berlin, the whole surface of the body was turgid, and of a violet colour; of a darker or lighter shade, according to the declivity of the parts. The cutis had lost its elasticity, and its functions were destroyed; its secretions were suspended, and when this membrane was divided, it was coloured here and there with collections of vessels that were filled with very thin black blood. (In persons who have been drowned, the skin which is in contact with, and is acted on by the water, does not undergo the same changes.) The subcutaneous vessels were likewise injected with black blood: the colour of the muscle was brown, and its fibre softened. The limbs were pliant, and the joints moved with ease, as is the case in drowned persons when they have not been affected by the frost.—The lungs were distended and filled with black blood; the mucous membrane was in a state of ecchymosis, and the bronchial vessels filled with gas that could be discharged by pressure. The arterial cavities of the heart were full of black liquid blood, the intestines were spotted, as in those who have been drowned. After these results it will be easily believed, that *animal* life had been first invaded, as I have already remarked in the campaign in Piedmont, when speaking of those who were drowned.

The organs of sense first cease to perform their functions: muscular power is paralyzed, and the first consequence is the fall of the person, if he be erect: all the animal functions are gradually arrested, and subsequently those of internal life. It would appear as

doctors Portal and Bichat have observed, that the brain and the nervous system which arises from it, are almost suddenly paralyzed by a rapid transmission and diffusion of the deleterious carbonick principle, that is in the first place absorbed by the lungs and carried to the brain with the arterial blood; and in the second place diffused through the apertures or pores of the skin over the capillary system, subcutaneous nerves, and in all probability, through the muscles.* The galvanick fluid is thus instantly decomposed and the sensible parts of *animal* life are destroyed. *Organick* life is still supported, because the red blood, although blackened by the absorption of the carbonick acid gas, continues to stimulate the heart, and supports the action of the internal vital organs. Hence the pliancy of the limbs continues even after death. The bodies of those who have died of asphyxia very soon putrify, and their decomposition is rapid.

When asphyxia does not terminate in this fatal manner, they who have been acted on by its causes are rendered liable to a *putrid* nervous fever, from which they have a tedious and difficult convalescence. When the disease has been very severe, the skin of the most prominent parts of the body falls into gangrene and sloughs.

As carbonick gas is much heavier than the atmosphere, it circulates on the floor of the chamber in which it is disengaged, and rises up on the sides of the room according to its quantity. In the place where the soldiers were seized with asphyxia, they who were nearest the stove and lay on the floor with a *small* quantity of straw, (which is scarce in large cities) were first, and most dangerously

* If carbonick gas be absorbed by the pores of the skin, as our author supposes, why will it not act on the hand that has long been immersed in it, or why does it not act on the more delicate coats of the stomach, and on its nerves in an injurious manner when taken into that viscus?—TR.

affected. The corporal of the detachment to which these unfortunate men belonged, with three other soldiers, escaped without injury, because they were lying on beds, or on the tables in the room near the windows, and at a distance from the stove. They were roused from this dangerous repose by the *reveillie*: but their faculties were benumbed, and they had violent pains in the head.

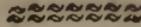
One of them was able to rise and open the window, and the air began to revive him; but he was alarmed when he found that none of his comrades answered him, and that those who lay on straw and on the floor, did not move. He called for aid; shook those who were on the bed, and with difficulty aroused them from their lethargy. Some soldiers came to his assistance, opened the doors and windows, called in physicians, and every thing was done that could be thought of. Three of them were soon resuscitated, but remained unwell for several days. Five of them were carried into our hospital, as I visited it in the morning: we were not able to re-establish the principle of life in three of these. We discontinued our attempts, and placed them in a well-ventilated chamber for twenty-four hours. At the expiration of this time, the bodies were opened in the presence of all my pupils, and we found the appearances that I have already enumerated. The assistance which was given to the other two, who exhibited but few signs of animation, re-established the organick functions, but in an imperfect manner. Frictions of snow over all the surface of the body, frictions with alkalis and alcohol, cupping and scarifications, moderate venæsection from the jugulars, with a view of gradually unloading the veins of the head; acidulated drinks, cordial stimulating draughts, and at times emetick potions were given: subsequently bitters; the bark and the canella was used with advantage: but in one of these men, gangrenous eschars were formed on the region of

the sacrum, and on the angles of the scapula, and retarded his convalescence. His comrade also recovered slowly, and the organs of speech and intellect laboured a long time under great debility.

As asphyxia from this cause occurred again in different parts of the cantonment of the guard, I took measures to prevent it in future; and at my request, some directions on this subject were inserted in the order of the day, which had the desired effect.

To the early and intense cold of the winter, succeeded abundant rains and thick fogs, which produced adynamick catarrhal affections and diarrhœas: in many of our men they easily yielded to the treatment that was indicated. But the most serious disease was the syphilis, which spread rapidly among our soldiers, and in many instances was of a serious character. It was necessary to combine febrifuges or tonicks with the antisyphiliticks, according to the complication. We lost but few of our sick, and the health report of the guards that was issued this campaign, might be considered as favourable. The departure of the army for Poland put an end to the action of these causes of disease, and the soldiers in general during the march, soon regained their strength and former vigour.

CAMPAIGN IN POLAND.



THE sudden march of the Russians towards the capital of Poland, and the certain information that had been acquired of a coalition between the king of Prussia and the emperor Alexander, hastened the renewal of hostilities. The campaign opened in Poland about the middle of November. The emperor Francis set out for Berlin with his guards on the 25th of the same month. We crossed the Oder at Custrin, a strong populous city advantageously situated on this river. The next day we entered Prussian Poland. Although it had rained incessantly since our departure from Berlin, the roads were yet passable, and we arrived at Posen on the 30th, whither the emperor had repaired on the evening of the 27th. The advanced guard with several corps of the army had reached the borders of the Vistula, and had taken possession of Warsaw and the cities on its left bank.

The magistrates and inhabitants of Posen received the emperor with acclamations of joy. We remained some days in this city, celebrated for the resistance it made to the troops of Charles XII, who took it in 1703. The principal convents were used as hospitals, and I had one of them appropriated exclusively to the reception of the sick of the imperial guard. I frequently visited the hospitals of the army and city, in order to become acquainted

with their diseases. In one of the latter, I first saw that remarkable disease of the hair which authors call *Plica*. (*Plica Polonica*.) I attended carefully to this affection, and acquired every necessary information concerning it from the physicians, and from the patients themselves. In short, I strictly attended to the progress of this disease during my stay in Posen, that I might decide whether it is factitious, and may be removed without difficulty. But I had need of a greater number of facts to establish my opinion in a positive manner. I postponed my researches to resume them afterwards at Warsaw. Before our arrival at Posen, our troops suffered but little, notwithstanding the bad roads and the severity of the weather. They had generally procured a shelter on their march, with good food, and good straw on which to sleep. The severe cold, and the dryness which succeeded during the first of December, contributed to their health during our stay in this city. We had but little disease; some accidents happened from the carbonick gas of the stoves, which were too much heated.

On the 2d of December, the anniversary of the coronation of the emperour was celebrated, and on the same day he announced to his army by proclamation, the arrival of the Russians on the right bank of the Vistula; the same Russians who on the same day of the preceding year had been vanquished at Austerlitz. By a solemn decree, he instituted the "Temple de la Gloire," and ordered that it should be erected on the scite of the church of Magdalen at Paris. On the same day, Glogaw in Silesia capitulated, and was given up to the French general.

Before the 15th of December, several corps of our army had crossed the Vistula and had reached Warsaw, Thorn, and several other important places, and hastened

to meet the enemy, whose advanced guards they immediately repulsed.

The emperor set out from Posen on the 15th of Dec. in the night with the imperial guards, and we arrived in Warsaw on the evening of the 22d, and forthwith passed through this city. One corps of our troops advanced to the Bug, and crossed it on the morning of the 23d. The batteries of the enemy, and the intrenchments that he had thrown up in places intersected by canals and by the branches of several rivers, were carried at the point of the bayonet. Every obstacle was surmounted, and our army advanced with an uninterrupted march into Lithuania, pursuing the enemy, who retreated on Pulstuck.

The imperial guard which I followed with my *ambulance*, did not halt at the passage of the rivers: the divisions that preceded us had forced them all, and re-established the bridges. We marched night and day, in order to join the imperial head-quarters. Our march was very difficult, on account of the frost and a violent tempest, attended with hail, which surprized us in the middle of the night. Copious rains succeeded these severe frosts and rendered the roads almost impassable. We arrived at Golominn on the 27th at night, after being obliged to halt on the way to dress some of the guards who were wounded in an affair that took place in the evening, between our cavalry and the troops of the enemy. Some of them received wounds which were severe, but terminated favourably. I shall speak of them again when reverting to Warsaw.

From Golominn the imperial guard continued to advance on Pulstuck. The roads became worse after we left that city. It continued to rain incessantly upon us, and we continued to march through a thick clay that came up to the girths of the horses, in which the artillery

was every moment mired, and a great number of the baggage-wagons stuck fast. Our army never performed a more difficult and tedious march. Under these circumstances, the advantages of our small *ambulance-carriages* were evident, as they were fixed on two wheels, and from their height and lightness, travelled more easily than the carriages with four wheels, or even than the bat-horses. A great part of the wounded above mentioned had not been dressed: they were attended to by the surgeons of my *ambulance*, and I had them conveyed to Pulstuck, which we entered on the 30th. The imperial guard remained here but a short time. Mr. Gale, chief surgeon of a corps, who had assisted me to perform the principal operations, attended them during our stay in this city.

The precipitate march of the enemy, whose rear guard only could be attacked at Pulstuck, at Ostrolokenka, and at other parts of the Nareuw, the bad roads and other reasons of which I am ignorant, caused the army to fall back on Warsaw. It took position on the right bank of the Vistula; the important advanced posts and the imperial head quarters returned to the capitol with the guard.

The frost which set in on the 31st of December, the day of our march for Pulstuck, improved the roads, and next day our wagons were borne by the frozen elay. I arrived with my *ambulance* at Warsaw on the 3d of January. The wounded from Pulstuck and Golomin were then removed hither, and I prepared a separate hospital for the wounded and sick of the guards. The frost did not continue long. A series of cloudy and rainy days shortly commenced, and left the roads in the worst possible condition. In general, this short expedition fatigued the soldiers more than that in Russia. The forced marches, the dampness and mire to which they were exposed

in *bivouac* for several nights, without food and comfortable drinks, had weakened them. We also had a great number sick of catarrhal and bilious or gastrick fevers, which in young persons were complicated with adynamia. But proper care, good regimen, and the salubrity of the cantonments removed these diseases, together with their causes, and the army soon became healthy. Our troops on the borders of the Vistula were generally in good condition. Their wounds were attended with no unusual symptoms. Those of the articulations, although severe, were cured by the means that are pointed out in my campaign in Egypt. I shall merely notice as I go on, some cases that appear to be most interesting.

A trumpeter of the corps of mamelukes, who with the chasseurs of the guard had charged on a strong, well-disciplined corps of cossacks armed with keen scimeters, was wounded by one of them in the right shoulder. The seapulo-humeral articulation was laid open: the head of the humerus entirely cut off from the body of the bone: in short, the arm was held only by the tendons of the latissimus dorsi and pectoralis major, and by the nerves and axillary vessels. We dressed him on the field. From the success which I had in a similar case at Salehyeh in Egypt, I entertained hopes of his recovery. After having extirpated the head of the humerus, I tried to reunite the wound: but a momentary success attended my endeavours. A tedious march and unfavourable weather, produced the most alarming symptoms. On my arrival at Warsaw, I decided on performing amputation at the first favourable moment. Counter openings were made in the fistulas which had formed round the joint. Mild dressings were applied, and warm camphorated or sweetened wine was used according to the state of the the parts. To my great and agreeable surprize, the

symptoms abated and finally disappeared. After several weeks' attentive treatment by Mr. Paulet, my adjunct, the wound healed and the humerus formed an ankylosis with the scapula. This mameluke returned to France perfectly restored.

Three chasseurs, who were less severely wounded in the joints of the superiour extremities, were also cured by the same treatment. The re-union was not exact, and the bandages did not impede the circulation in the capillary vessels of the articular membranes, nor in those of the lips of the wound. A supporting bandage and the simple means before mentioned were sufficient. A curious case was presented in the affair at Golominn.

A brigadier of cavalry, while charging, was wounded by a ball from the light artillery which grazed his left arm; but instead of a contused wound, the ball (which was nearly spent) produced only an ecchymosis of the part injured, and a small division of the skin that appeared as if made by the point of a sabre. This wound which appeared simple to my colleague, was dressed as usual, and the wound went on to suppurate without any unpleasant symptom. Towards the ninth day, the discharge became sanious, and of a black colour, which led the surgeon to suspect a piece of carious bone: he probed the wound, and to his great surprize discovered a hard sonorous body, deeply seated in the interstice, between the biceps and brachialis muscles. He dilated the wound, and by means of a pair of forceps, extracted this foreign body. A dreadful hæmorrhage immediately succeeded, which he arrested, it is true, by compression, but it soon returned. He had had three returns of hæmorrhage when I first saw him. The case seemed to me to require the application of a ligature on the artery, or the amputation of

the arm. The former operation was rendered more difficult, because the swelling of the edges of the wound was considerable, and the arm much tumefied and very painful. Under the circumstances which then existed, I could not perform the latter operation. I dilated the wound very deeply down to the artery, which was entirely divided by the bistoury: the hæmorrhage immediately ceased, and I entertained hopes of preventing its return by the application of a styptick, such as the digestive, acidulated with sulphurick acid, mixed with bark and camphor, and by an uniform and graduated compression on the arm and fore-arm by compresses wet with warm camphorated wine, sulphurick acid and alumine.* The hæmorrhage appeared no more: he regained his strength: the arm being long without pulsation in the radial and ulnar arteries had nearly withered: the skin had lost its epidermis and its animal heat. But the powers of the parts were gradually restored: the muscular and deep-seated vessels performed the duties of the humeral artery, which was obliterated. The pulse returned and the patient was quite cured on the 65th day after the accident. He has since been sent to the warm springs to re-establish the motion of the affected limb.

The foreign body which was extracted from the arm of this man proved to be a portion of the point of a sabre about three inches in length, and ten or twelve lines in breadth, which the ball had met in its progress, and had driven before it into the thick part of his arm. It is difficult to account for this phenomenon; but I vouch for the fact.

* No astringents can arrest the hæmorrhage from the brachial artery when divided: and it would be highly culpable to trust to them. In this case, compression alone, or the retraction of the artery could have checked the hæmorrhage.—TR.

In the affair at Golominn, some of our soldiers had wounds of the head, with division of the bones of the cranium and lesion of the meninges, and the cortical substance of the brain: these men recovered completely.

That part of the army which had passed the Vistula went into winter-quarters: but that part of it intended for the conquest of Silesia continued its operations until the surrender of the last fortified place.

While I remained at Warsaw, directing the service of the hospital of the guards, I examined everything interesting which that capitol presented. I realized the wish which I had of pursuing my inquiries on the *plica*, and on syphilis and gonorrhœa, which to me appeared more virulent in Poland than elsewhere. I endeavoured also to turn every remarkable appearance which the wounds or acute diseases presented in this new climate, to the advantage of the young surgeons of the army, and of the guards, by setting apart a day in each week for a clinical conference on the wounds and diseases of my hospital. Whatever could give us information relative to the topography of Poland, and the character and manners of its inhabitants, was introduced into our lectures, more especially if it could apply to the practice of our art. I was about to commence a complete course of military surgery, and had made every preparation for it, when at the end of January we were obliged to begin a new campaign. We left this city to follow the march of the army.

While at Warsaw, I employed the time which was not occupied by my numerous duties, in inquiring into the endemick diseases of Poland, and their causes. In order to become perfectly acquainted with the *plica*, I visited those persons who had this disease, both in the city and in the hospitals. The result of my inquiries, and of a series of experiments which were made under my own immediate inspection, and in the presence of several

French and Polonese physicians confirmed me in the opinion which I had already formed of the nature and causes of this pretended disease. I carefully collected all the facts which I observed, and made them the basis of a memoir which I addressed to the institute. This memoir is placed at the end of this campaign.

The month of January passed away without any remarkable occurrence. But some partial attacks of the enemy obliged the emperor to put his army into motion, and we left Warsaw on the first of February.

The snow was about three feet deep, and the thermometer about six or seven degrees below zero: with difficulty we recrossed the Vistula, as the ice had carried away the bridges. The imperial head-quarters were directed towards Wittemburg, where the advanced guards of the grand duke of Berg had already met those of the Russian army, that retreated after a very short resistance. Notwithstanding the rigour of the season, our troops pursued the enemy vigorously, and endeavoured to attack him. The imperial guards marched immediately after the advanced guards of the grand duke: the *etat-major* followed the guards at a certain distance, and halted at Liebstat to form establishments of various kinds. My colleague, Mr. Perey, took every measure which was necessary for the organization of the hospitals, and the reception of several hundred who were wounded in the first engagements; we had dressed a great part of them on the field of battle. On the 6th the cavalry of the grand duke of Berg attacked the enemy at Hoff, and made a most brilliant charge. We had but few wounded; they were immediately dressed and removed to the nearest hospitals: the Russians, on the contrary, left a great number of dead and dying on the field. The success of this affair seemed to promise the entire defeat of the enemy's army, when it should halt to fight a pitched battle;

but he rested on Prussich-Eylau, an advantageous position, fortified with redoubts and batteries of heavy cannon: his rear guard had halted in advance of this city, behind a village which stands on the road a short half league from Eylau. He was immediately reconnoitred, and before noon a battle was fought, which continued until night; but the imperial guards took no part in it. I was the only inspector that was present at this time: I was directed by the major general the prince, to have all who were wounded in this engagement conveyed to the above mentioned village, and to direct their dressings.— I had them collected in the most spacious house in the place, which had been hastily prepared to receive them, and we devoted the remainder of the day and all the night in rendering them the assistance they required.— There were several wounds that demanded amputation of the arm at its scapular articulation, and also of the thigh and leg. These operations were generally attended with success.

Being aware that the enemy had halted on the hill which commands Eylau, at the entrance of the forest, the guards and the corps of the army which followed it, passed the night in *bivouac*. The cold had now become more intense; the thermometer had fallen in the morning from the 8th to the 13th and 14th degrees below zero. At day-break, our troops having reconnoitred the enemy without being able to judge of his force, descended the hill that fronts the basin of Eylau, into which the entrance is through a very narrow defile. This basin, then filled with ice and snow, is a handsome lake of water in the summer season. The advanced guard advanced towards the enemy, and the imperial guard, with some other divisions of the army, *deployed* on this basin.

The Russians finding themselves strong, and in a favourable situation, prepared to make a general attack on

our troops. A brisk cannonade very soon commenced on both sides, the two armies approached, and the battle became very bloody. The victory was doubtful, when a vigorous charge from the imperial cavalry decided the fate of the day in our favour. This battle was as severe as I ever witnessed.

Although the infantry of the guard was not engaged, it suffered very much from the fire of the artillery. In the morning I had placed an *ambulance* in the barns which stand on the left of the road as you enter the city; but unfortunately they were open on every side, the straw having been removed for the horses. We were obliged to lay our wounded on the remains of this straw, mixed with snow, and a large number of the guards of the line were collected here. I then attended to the imperial guard, but according to a rule which I established dressing those first who were most grievously wounded, without regard to rank or distinction. The cold was so intense that the instruments frequently fell from the hands of the pupils, who held them for me during the operations. Fortunately I enjoyed an unusual vigour, doubtless produced by the great interest which I felt for the safety of so many brave fellows.

The desire which we all felt to save the lives of the wounded, enabled us to persevere in the discharge of our difficult duties. Night came on, and we had not been able to satisfy the cravings of nature. In the midst of such heart-rending scenes, how could we attend to any thing but the performance of our sad but humane task? While I operated on one, I heard the most pressing calls for similar services on every side. After the operation, a surprising calm, and a kind of internal satisfaction succeeded to the cries of these soldiers, which they expressed by the most lively acknowledgments.

In the midst of such endless obstacles as were here presented, by our local situation and the severity of the cold, I was still enabled to perform several delicate and difficult operations, such as amputation of the arm at the shoulder-joint, and of the inferiour extremities where it is not common to perform it: with numerous sutures of the face, for the complete division of the soft walls of the mouth,* also of the nose and ears.

Just as the spirits of our wounded began to revive, the right wing of the enemy made an unexpected movement to attack our left, where our *ambulance* was stationed. Those of the wounded who were able, fled, others attempted in vain to follow them, in order to escape this unexpected attack of the enemy. But we encouraged them, and resolved to die, rather than seek an ignominious safety. I made haste to finish the section of a leg which I had already begun, and declared to the wounded my fixed determination not to abandon my post. All my pupils rallied round, and promised not to desert me.

In this difficult conjuncture, Mr. Pelehet, the officer who directed the *ambulance*, arrested the flight of his invalids and wounded. He also found means, even during the greatest want, to procure the provisions which were necessary for our wounded and those of the line. Here also the flesh of the horse was advantageously used to make broth.

An impetuous and well-timed charge on this column of the enemy by the cavalry of the guard, through whirlwinds of snow, prevented the consequences so much dreaded by our wounded. All again became quiet, and we were enabled to resume our operations. All the severe wounds of the guard, and a great portion of those in the line were operated on and dressed within the first

* There were no salivary fistulas in consequence of these wounds.

twelve hours. Until then we could take no repose. We spent the remainder of the night on the frozen snow, around the fire of the *bivouac* of the *ambulance*.

I never passed such a painful period—never had my mind been so much affected; I found it impossible to suppress my tears, even while I attempted to support the courage of my wounded. I had the mortification of seeing several of them die, whose wounds required amputation of the thigh at the hip-joint, because the unfortunate circumstances in which we were placed, the excessive cold, and the want of room prevented me from performing these operations, which are in themselves difficult and dangerous. The loss of these brave fellows corroborates the opinion that I have advanced of the necessity of performing these operations in similar cases.

Next day at day break we resumed our labours among our wounded, and attended also to many of the line, and of the Russian prisoners. I had those of my wounded who were most severely injured conveyed to a large house in Eylau, with such as had amputations of the thighs and legs, and others who were dangerously wounded in the head and thorax, on many of whom I had operated with the trepan.

The French and Russian wounded could not all be received into this small town, where the *etat-major* and the imperial guard were, for fear that an epidemick might be produced by crowding them together, and by the copious suppuration which would take place on the third day. The extreme want to which we were reduced, in the midst of a country covered with snow, abandoned by its inhabitants, and destitute of every resource, enforced the necessity of removing them. The emperor foresaw that it would be better to expose our wounded to the vicissitudes of a tedious, long, and difficult journey, than to see them perish from causes which it would

be impossible to remedy. Moreover as yet he was ignorant of the march of the enemy. The removal of the wounded was ordered, and within the first twenty-four hours all those of the guard who were most severely wounded, were sent off.

I wrote to Mr. Paulet, surgeon general adjunct, who remained at Warsaw with part of the *ambulance*, forthwith to repair to Inowraklaw, to receive the wounded in an extensive castle, that had been appropriated for that purpose by marshal Bessieres. We again had an opportunity of observing the advantages of the form and lightness of our *ambulances*. They were able to follow the cavalry of the guard through the miry roads from Pultuska, and also to traverse the snow and ice fifty-five leagues from Eylau to Inowraklaw, beyond the Vistula.

I shall attempt to point out the advantages of removing the wounded immediately after a battle, when they cannot be accommodated in the vicinity of the field with security, and with the advantages which they require.

In advancing this opinion, I am supported by experience, and his majesty, without doubt, recollected the success that attended the removal of the wounded at the siege of St. Jean d'Acres in Egypt, when he directed this measure. I had found it attended with similar success in the army on the Rhine, and the Eastern Pyrenees.

Indeed the serious disadvantages can not be obviated, which must arise from bringing too many wounded into a hospital after an action. Adynamick affections and the hospital sore are caused by the abundant suppuration of the wounds, and other animal secretions: the grief and fears of the wounded, while reflecting on their condition and loss, depress the spirits of each other, and increase their distress. These causes induce simple wounds,

and *a fortiori*, large and complicated wounds, to assume an unfavourable character, and their termination is but too often fatal. The wounded should be removed to different places immediately after an engagement. The external and internal motion which takes place while transporting them from one place to another, excites and promotes the functions of the organs; all the muscles are in motion, the circulation is accelerated, and the secretions go on: suppuration takes place in a proper degree; the sloughs are soon detached by the increased oscillation of the subjacent vessels, the wounds become clean, their edges develope, and approach each other by the gradual expansion of the vessels; and by this general excitement they close together, or contract adhesions by means of the slight inflammatory swelling which succeeds. The external air, which is always more pure than that of close dwellings, imparts an activity to the secretions; the cutaneous transpiration is moreover continually taken up by the free current of air, and the wounded man has nothing to fear from its repercussion. Being less occupied with the danger of the wound or its consequences, than with their personal preservation, they care less for their misfortunes. Their attention is attracted incessantly by various objects, and their spirits are supported. In short, whatever vicissitudes may attend these removals, they are not, nor ever can be, as pernicious as the multiplied causes of accessory diseases which come into action in those establishments, where a great number of sick and wounded are united. The two extremes of temperature are also less injurious to the wounded when they are moving in the open air, than when they are at rest in the wards, that in general are badly ventilated. In the former case the wounded pass through the different degrees of temperature in a gradual and almost imperceptible manner, especially when they

take care to keep themselves well covered during the night, and to be well protected from moisture. In the latter case on the contrary, the transitions are sudden, and it is even impossible to prevent them.

To these physiological arguments in favour of removing the wounded, should be added others of a political nature. To the commander in chief alone it belonged to admit these, and to arrange such plans as would best serve the interests of the wounded, and support the spirits of the soldiers.

After the severe engagements which we had at the siege of St. Jean d'Acre, we were reduced to two dreadful alternatives, either to abandon our wounded on the shore, without a shelter, without food, or any resources, to be cut off by the Arabs of the desert, or to convey them, mounted on miserable beasts of burthen, or to march them on foot eighty leagues, beneath a scorching sun, where they might be deprived of fresh water: at that time we had but a small quantity of biscuit, and a goat skin of water, which they could have consumed in one day: we did not hesitate to adopt the latter: and though most of these soldiers were severely wounded, or had lost a limb, they arrived in Egypt either cured, or advancing towards a cure. We did not lose a fifteenth part of them; yet the heat of the desert was extremely great, and they experienced the effects of the *khamсын* on their route.

In Poland, notwithstanding the severity of the cold, the badness of the roads, the imperfection of our means of conveyance by carriages that were badly constructed, and travelled with difficulty on account of the thaws and successive frosts; in short, notwithstanding our want of provisions, and the fatigues of a long journey, my wounded men generally arrived at Inowraklaw in good condition, where their cure was speedy and complete. We

scarcely lost one of eleven, and yet there were a great number of them whose wounds were very severe and complicated with other diseases: * viz. certain wounds of the thorax and head and amputations of the thigh, with the hospital fever, which had appeared in the hospital at Eylau. It is probable, that if these men had remained in this city, they must have perished from this complication, which no doubt would have been epidemic, as it previously was at Brunn. I assisted in placing a number of wounded in the carriages, who were scarcely able to move on their beds; I felt apprehensive that they would expire in twenty-four hours: but they arrived at their place of destination without fever, and with their wounds clean and in good condition. A result so favourable must fully justify such a measure in the opinion of some persons who considered this removal as an act of barbarity: but they no doubt felt pity, as was natural for the condition of the wounded, and witnessed the repugnance with which they set out. Here the justness of the sentiment of the prince of physick was verified: "*ad morbos extremos, extrema remedia, &c.*" It is true our transportation was made with great care; each conveyance was attended by a number of the officers belonging to the medical staff, by sub-officers, and nurses who could render every necessary assistance to the wounded. Their lodgings and their soup were prepared before they arrived at their stations, by sub-officers who were sent before. The intendant commissary, Mr. Dufour, is entitled to the thanks of these soldiers, for his zeal and care on this occasion; and great praise is due to my fellow surgeons of the *ambulances* and of the guard, for their devotion at this crisis.

* Tetanus did not appear among the wounded guards. and I was informed that few of the line were attacked by it

I shall notice those wounds that were attended by uncommon phenomena, and required important operations.

Captain Labit, 69th regiment of the line, was one of the first wounded that was brought to my *ambulance*. A cannon ball disorganized his left arm at its superiour part. The injury was bounded above by the shoulder-joint, and I amputated this limb according to my plan.—The operation was prompt and successful: he was sent to Thorn, and in a short time after I was informed, had been perfectly cured.

A dragoon of the sixth regiment was brought to our *ambulance* with a wound of the left shoulder, loss of substance of the deltoid, fracture of the head of the humerus, and laceration of the braehial plexus, which doubtless caused the acute pain which he suffered. Notwithstanding the cold was then extreme, I retained sufficient firmness in my hand to remove the arm at the articulation. This was followed by a perfect calm; he soon fell asleep while enveloped in his cloak, and slept until next morning, when he was sent to Thorn.

A young officer of the light infantry was brought soon afterwards, with a wound nearly similar to the above.—A part of the head of the humerus was driven under the pectoralis major, which rendered the operation more tedious and difficult. The difficulty consisted in extracting this piece of bone, and in detaching it from the tendon of the subscapularis muscle that confined it on the side of the scapula, without injuring the axillary artery, which it pressed downwards and inwards. The operation was completely successful.

A captain of the sixth regiment of cuirassiers, who was among the first that were brought to my *ambulance*, presented one of those rare cases, in which limbs are carried entirely away by a ball, as if they had been amputated. The division of the limb had taken place about a centimetre above the elbow joint. Some of the surgeons who had before seen the wound, had applied a pledget of lint and a simple dressing on this stump, and had led him to believe that he might escape without an operation: but the acute pain which had succeeded, and a kind of painful numbness induced him to call loudly for it.

I made the section of the flesh about four or five centimetres above the accidental division, and the bone was sawed off much higher, near the insertion of the tendon of the *deltoid* muscle. He became instantly composed, and slept so soundly on the snow, that it was necessary to awaken him in order to place him on the horse that was to convey him to the hospital. I may observe that the humeral artery was torn off more than four fingers breadth above the end of the stump, and I had some trouble in laying it bare and tying it. This broken artery presented a conical enlargement of that extremity next the trunk, which might be called a true aneurism: a circumstance which induced me to use the needle to pass the ligature round it. This officer recovered under the care of one of his regimental surgeons.

Richard, a chasseur of the guard, also had his right arm carried away irregularly by a large ball near its middle: it was found necessary to amputate at the joint. In these cases, and even when there has been such a portion of the arm left as to allow of amputation, unless the bone can be sawed off on a level with the insertion of the deltoid, the wounded man will have a better chance for his life if amputation be performed at the joint, than

when performed on the arm above the insertion of this muscle. Experience has taught me the superiour advantages of the former operation, and I have since had an opportunity of confirming it. I shall make it the subject of particular notice, when speaking of consecutive amputations of the arm at the articulation. In the case of Richard the operation was very promptly and easily performed, according to my plan.* Suppuration went on very well in the narrow wound that was left after the operation, and the cicatrix was complete on the thirty-seventh day.

Amputation of the thigh was generally followed by success, and in those cases where I was able to operate immediately, the stumps were not at all *conical*. It often happened, when the precept which I have inculcated in my memoir on amputation, was not followed, and the operation had been postponed too long, that the stump appeared *conical* after the first dressings, because the muscles were irritated by the first degree of inflammation, and their retraction was much more violent, than when the section is made before erethismus takes place. The following cases will illustrate this:

Thomas, a corporal of chasseurs, had his right knee principally destroyed by a cannon ball. I immediately performed amputation of his thigh at the usual place: but I took care to carry the incision of the muscles as high up as possible, and to saw off the femur even with the last section, without re-uniting the edges of the wound according to my custom and principles. I approximated them by a split roller, and a narrow compress applied

* See in my campaign in Egypt the memoir on the extirpation of the arm at the shoulder.

circularly. He was removed to the hospital of the guard with others, and soon recovered.

I also amputated the thighs of **Julien** and **Hennequin**, of the same regiment, on account of wounds of the knee from grape-shot, that fractured the articulating portions of the bones. The former had his right, and the latter his left thigh removed. In this the femur was crushed at its lower part, and in that a large *biscayen* was found, wedged in the thick part of the two condyles of the femur. The operation was performed in the same manner, and with the same success.

The same operation was performed on **Messrs. Richard**, **Arnoult**, **Wauderkern**, **Bigot**, and **Varoelos** of the guard, for grape-shot wounds of the knee, with fracture of the articulating portions of bone and of the femur;—two of these died during their removal, from intemperance and the effects of the injury. The others arrived at their place of destination, and were all cured before the seventy-fifth day. As their wounds were attended with no uncommon appearance, I shall not detail their cases, and I shall also pass over a great number of other amputations of the arm, fore-arm, and leg.

I partially amputated the foot of **Mr. David**, whose toes were carried away by a cannon-ball, which fractured some of the bones of the metatarsus. This operation succeeded, as all others of a similar kind that I had undertaken; another argument in favour of amputation at the joints.

I was fortunate in preserving a portion of **Mr. Hannequin's** leg, which had been disorganized by a ball, as high up as the tuberosity of the tibia. I amputated

through the thick part of the condyles; the wound of the stump was healed entirely before the seventy-eighth day, and he walked securely, and very conveniently, on a wooden leg. I shall again speak of this mode of operating.

The 6th, 7th, 8th, 9th and 10th days of February were extremely severe, and the whole army suffered much, and particularly the guards, who were still in *bivouac*.—Almost all the soldiers, and a great number of officers, were more or less indisposed. Several who had been exposed to intense cold were so imprudent as to place their feet near the fires of the *bivouac*; or they who were unexpectedly affected by the cold during their repose on the 10th (at which time the temperature changed, so that the thermometer rose above zero, and a thaw succeeded) were affected by the *gangrene from congelation*. Our wounded escaped, because they could not approach the fire. In the sequel is given a memoir on this gangrene. They who escaped this accident were affected with diarrhoea, dysenterick flux, catarrhal and rheumatick disorders, which may be attributed to the sudden changes of temperature, to unwholesome provisions, and the use of the waters of the Eylau, that like the water throughout Poland, is scarcely potable. These mucous disorders continued until our return to the borders of the Vistula, and while the winds continued at the west and south-west.—They were also complicated, in a great many cases, with an ulceration of the gums and aphæ of the mouth.

A few doses of ipecacuanha, given at first as an emetic, and then in infusion, with the use of opium, bitters, wine, vinegar and brandy, (which we procured from the towns that are situated on both banks of the Vistula,) ablu-
tion of the ulcerated parts with diluted mineral acids,

and the return of the north north-east winds, removed all these symptoms, and re-established the health of the army.

After this battle her majesty was pleased to confer on me and my honourable colleague, Mr. Percy, the cross of the commandant of the "legion d'honneur;" on several surgeons, who well deserved particular marks of respect for the zeal with which they attended to the wounded, she conferred the order of knighthood. Of this number were Doctor Ribes, and his colleague, Mr. Jouan, of the emperor's household, who had rejoined our *ambulance* after several engagements, and had assisted me in dressing the wounded on the field of battle.

The head quarters and the guards halted at Eylau, while the main body of the army pursued the enemy across the immense forests that extend to Plegel, behind which the Russians rallied and took a position. The thaw which had rendered the roads impassable, and the exhaustion of our troops, no doubt induced the emperor to remand us to the banks of the Vistula, there to take up our winter-quarters. Accordingly we set out from Eylau on the 17th of February: during the first eight days the surgeons of the army were engaged, under the orders of Mr. Percy, in dressing the French and Russian wounded, to whom it was impossible to attend in the first twenty-four hours, and they were successively removed to the hospitals established in the cities on the left bank of the Vistula. The interment of the dead that covered the field of battle was attended to; they were chiefly Russian.

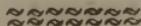
We passed by Lamberg and Liebstadt, and on the 28th of the same month reached Osterode. The imperial guard went into cantonments at this place, and extended itself to the neighbouring towns.

The main body of the army took post behind the Pasargue, on a line with Liebstadt, Morninghen, and Elbinghen: we were much in want of provisions and forage for several days; but in the cities near the Vistula, we found the resources for forming magazines, and especially good wine, of which we stood much in need.

It would be impossible to tell what fatigues, sufferings and privations we endured in this short campaign.

MEMOIR

ON THE DRY GANGRENE PRODUCED BY
FROST, OR THE GANGRENE FROM
CONGELATION.



ONE of the most unfortunate occurrences to which our troops were subjected after the battle, was the freezing of their feet, toes, noses and ears. But few of the advanced guard were able to avoid these consequences of the excessive cold.

In some cases the gangrene was confined to the epidermis, and to the toes and nails; in others mortification attacked the true skin to a greater or less extent: some lost their toes or the whole foot.

Physicians who have written on this mortification, consider *cold* as its exciting cause. But if we attend to the time when this disorder takes place, to its progress, and to the phenomena that accompany it, we may be convinced that cold is only its predisposing cause. During the three or four days of extreme cold that preceded the battle of Eylau, while the mercury was as low as 10, 11, 12, 13, 14, and 15 degrees below zero, (Reaumur) and until the second day after the battle, not a single soldier complained of being frost-bitten, although we had passed these days, and a great part of the nights of the 5th, 6th, 7th, 8th and 9th of February on the snow, and under the most severe frost. The imperial guard, in par-

ticular, remained on duty in the snow, without much exercise, more than twenty-four hours, and none of them complained of frost-bitten feet. The temperature was suddenly raised in the night of the 9th and 10th of February, so that the mercury ascended to three, four, and five degrees above zero. A copious fall of sleet on the morning of the tenth, was the precursor of the thaw which took place the next day, and continued for some time. There were immediately a number of the soldiers of the guard and of the line, who complained of acute pains in the feet, torpour, heaviness, and a disagreeable pricking in the extremities, which were slightly swelled, and of a dark red. In some I perceived a slight redness about the base of the toes, and on the upper surface of the foot: in others the toes had lost their sensibility, heat and motion, and were black, and in a manner dried. They all assured me that they had felt no symptoms of pain during the period of severe cold which they were obliged to support in *bivouac* on the 5th, 6th, 7th, 8th, and 9th of February, and that until the 10th, when the temperature was raised to eighteen or twenty degrees, they had felt nothing of congelation. Then they first felt a painful pricking in the feet, that was succeeded by numbness, stiffness, immobility, and weight, with a sensation of cold at the same time, but it was not severe. They who were able to go into the town, or to the fire of the *bivouac* to warm themselves, were most affected: fortunately the greater number followed the advice of my colleagues and myself. We directed them to rub the parts immediately with snow, and afterwards with camphorated brandy, which prevented gangrene in those cases where it had not already taken place; but it appeared almost suddenly in those who were permitted to approach the fire: its progress was rapid, but generally limited to the

toes: it sometimes extended over half the foot, but seldom rose above the ankles.

The sphacelus of the foot should not be confounded with gangrene of the skin. It often happens, and I have seen cases in which the skin of the foot, to a greater or less extent, has been deprived of life, while the vessels, the the deep seated nerves, the tendons, the ligaments, and the bones, have remained sound: in these cases, the patient feels pain when the subjacent parts are touched: the foot can be moved, and retains its internal heat. Moreover, this gangrene is superficial, and cannot be considered as similar to the sphacelus of the foot that deprives it of motion, of sensibility, and of all the phenomena of life. The patient cannot feel that he has a foot, and it appears like a foreign body suspended to his leg. In any case, the nature of the disorder should be well ascertained before amputation is resorted to, and general remedies should precede it.

I shall attempt to explain the progress and development of this gangrene, or rather the *modus operandi* of the causes which produce it.

Cold acts on the living parts by blunting the sensibility of those organs which are subjected to its immediate impression: the natural heat is absorbed, and a discharge and repercussion of calorick takes place: the pores are closed: the fibres and the capillary vessels fall into a state of contraction: the fluids are condensed, and flow more slowly. At first, the action of the cold is painful: the skin wrinkles and loses its natural colour. Yet, the animal heat and the vital powers resist this sedative and contracting power that opposes the return of the fluids: the capillary system is obstructed more easily when its extreme ramifications are *weakened*. The skin becomes red, its sensibility is blunted, and if the effects of the cold continue, it gradually becomes extinguished and torpor soon takes place.

The parts may remain for a longer or shorter period in this state of *asphyxia* without losing their life; and if the cold be removed by degrees, or the person affected by it pass gradually into a more elevated temperature, the equilibrium may be easily re-established with the functions of the organs, and the disposition that the parts have to fall into gangrene is removed: but if on the contrary, persons who are thus affected by cold pass suddenly from a temperature at the freezing point to one more elevated, an obstruction of the parts affected must of necessity be produced; and if it be considerable, the vessels lose their elasticity altogether, become paralyzed, and sometimes burst, or are torn asunder: and hence follow blisters and cracks, or fissures of the part. The course of the fluids in the vessels is interrupted; there is a redundance of carbon, the parts turn black, and gangrene is abundant. Infection is propagated to all those parts which have been seized on, or affected by the cold.* Thus the gangrene advances until it meets with resistance from the vital powers. Now the systaltick motion of the vessels, the irritability of the cellular substance of the membranes and of the skin, which had resisted the action of the cold, resist the principles of the gangrene, and far from absorbing them, the extremities of the capillary vessels which convey blood, and the lymphaticks being irritated by these heterogeneous qualities, become obstructed and inflamed: the gangrene is circumscribed, and a line of separation formed between the dead and the living parts. If the mortification be superficial, the sloughs are generally thrown off between

* Is it necessary in this case to resort to *contagion* to explain the progress of this gangrene? Cannot the extension of the disorder and death of parts be satisfactorily accounted for on the principles which have been laid down in explaining its first production?—TR.

the ninth and thirteenth days: they leave a wound or ulcer which soon heals. If the whole of a limb be deprived of life, nature of herself is not sufficient to remove the dead parts, because she has too many obstacles to surmount; at least she can seldom overcome them. The resistance almost always surpasses her power, and the patient sinks in consequence of the absorption that takes place when the sloughs are detached, and suppuration has opened the mouths of the absorbents. This absorption affects organic life: a slow fever ensues, with colliquative diarrhœa: the gaseous exhalations from the gangrened parts disorder the organs of respiration, and concur with the matter that has been absorbed, in producing a general debility of the functions, and death. After some time, gangrene may pass immediately to the neighbouring parts; but this can never happen before the ninth or tenth day, when the sloughs fall off: the vessels and the cellular tissue are then prepared to absorb, but that does not always take place, and then the disease may remain stationary: it becomes defined, and the dead parts separate from those which retain their vital power and action, and the general functions are not disturbed. The dead parts fall off, the sores which are the consequence, soon heal up, and the patient recovers.

Such was the progress of gangrene from congelation, and such were the phenomena which it presented in Poland, and I can assert that it never appeared until the temperature was suddenly raised from a very low to a high degree above zero. I am even of the opinion, that if persons be subjected to the influence of the cold a long time, even until they are seized with asphyxia, unless a second sedative or narcotick cause act internally in concert with it, that partial or general death can not take place from the severity of the weather. Indeed we see travellers who cross the Alps and Pyrenees

during the intense frosts without experiencing any accident, while the cold remains the same. I have had an opportunity of proving this fact myself. The Polonese choose the time of the most regular cold to undertake the long and difficult journeys with their sledges from Siberia: they avoid these journeys when the temperature is variable, because they are then afraid, as they have informed me, of the effects of congelation. While I was in North America, several persons who had been shipwrecked, and were found by us at Belle-Isle, near Newfoundland, about the end of May, 1788, had passed several days on this island, lying under the snow during a period of intense cold, without experiencing any accident. On the morning of our arrival, the temperature changed, and two of them died suddenly, and the feet of several others fell into gangrene.

About the end of the winter of 1795, when I was in the army of the Eastern Pyrenees, we passed suddenly from an extreme degree of cold to an elevated temperature: a great number of our soldiers, more especially of those who were at the siege of Rosés, had their feet frost-bitten: some of the advanced centinels were even found dead on their posts during the first 24 hours of the frost, and though we had remained fifteen or twenty days under the influence of the rigorous cold, none of the soldiers on the advanced posts presented themselves with frozen limbs at the *ambulances* over which I presided, until the thaw commenced.

During the conquest of Holland, a great number of soldiers had their feet frost-bitten, but according to the report of my colleagues, the gangrene did not appear

until the thaw commenced, although the soldiers had long been exposed to the snow and heaps of ice.*

Experience proves that this accident may be averted by taking care not to approach a fire, or to be subjected to the sudden action of heat on the parts benumbed by the cold. All this proves that cold is only the *pre-disposing* cause of the gangrene. Heat suddenly applied to the parts which have been rendered torpid by cold, may be considered as the exciting cause. Let this principle be once established, and it will be easy to prevent the effects of congelation.

When called early to a person who has suffered from severe cold, so that the parts have been deprived of motion and heat, and their sensibility blunted, no time should be lost in recalling vitality to the parts affected. Frictions of snow, or an ablution with water in which ice has been dissolved, should be immediately made. The pure oxygen that these substances contain, and the caloric which is set at liberty by the friction being absorbed by the blood in the capillaries, stimulate the vessels, and vivify this fluid. The vessels resume their action, and the blood its fluidity: the circulation is re-established, and its continuance secured by the successive application of spirituous and camphorated tonicks, by the gradual use of cordials internally, by dry warm frictions over the surface of the body, and by continued and moderate exercise.†

When snow or ice cannot at first be procured, red wine may be used cold, or vinegar and camphorated

* Mr. Paroisse, first surgeon to the king of Spain, made me acquainted with these facts.

† The theory of inflammation, as advanced by Lubbock and Allen, and published by Dr. Wilson, will fully explain the manner in which this gangrene takes place, and will lead to the correct mode of treating it, which consists in giving tone gradually to vessels and parts that are much debilitated.—T.R.

brandy, or the parts may be immersed in well-water, &c. But the sudden application of calorick should be avoided, and it must be admitted very gradually, or gangrene will ensue and advance rapidly. This shows that the saying "*contraria contrariis curantur*" is not always true. When gangrene has taken place and is well defined, no other means should be used than those which will prevent contagion, facilitate the removal of the dead parts, and strengthen the sound parts in contact with them. The strength of the patient should be supported, and febrile affections removed if they exist.

At first, emollients should be applied, while the cortex is given in combination with common bitters, good wine and good food in small quantities. If the mortification be superficial, these means, with the efforts of nature, will generally suffice: but if gangrene have seized on the substance of the whole member, the powers of nature and the means pointed out, will be sufficient. The organs become debilitated by the process of exfoliation, and before it is completed the patient dies of exhaustion, or in consequence of absorption from the sphacelated part. I have seen a great number of such cases, while spontaneous cures without the assistance of art are rare: besides, the stump that remains in such cases, after the loss of the foot is uneven and painful, and becomes inconvenient when a wooden leg is applied.

The best plan then will be, to cut off a portion of the mortified limb, after the sphacelus becomes defined and limited by the inflammatory line of which I have spoken above. Yet amputation should not be postponed too long, because the patient may grow weak and die, especially if the sphacelus be extensive, as was the case in Poland, and in our last campaign in Madrid. At the latter place, three young conscripts who had had a putrid nervous fever, were frost-bitten on a night of April, in which

the thermometer descended to eight degrees, after having been during the day at nineteen, and next day ascended to twenty. A cold north-east wind blew at the same time and produced the colick and rheumatism in every one who was in the hospital. The gangrene was defined, and the three young men with the exception of the debility in which their disease had left them, were in a state of improvement. I proposed the operation, but it was rejected, under an expectation that the powers of nature would cause the dead parts to be thrown off. They grew weaker, a slow fever from absorption ensued, and they all died before the twenty-first day after the gangrene came on. Amputation, when performed seasonably, shortens the labours of nature, and secures the patient, without increasing the loss which he must invariably sustain. The general effects of absorption are to be obviated by the use of cordials and antisepticks, and especially by good bark: that called *loxa* is the most effectual in gangrene.

The amputations that I performed, and the use of the means above detailed were resorted to in Newfoundland, in Poland, and in Spain with complete success.

This gangrene from congelation, is different in its progress from that which I shall call *traumatick*, and which will be the subject of another memoir.

After returning from Eylau, the army passed all the month of March in cantonments, between the Vistula and the Pasargue. But several corps were detached from this line to take possession of the principal cities situated on the mouths of these rivers, and on the borders

of the Baltick in Pomerania. Some of them required sieges of considerable duration before they were reduced.

During the first eight or ten days of March, we had rainy or foggy weather. This cloudy, moist weather prolonged the catarrhal and putrid affections: but as the sick and wounded were removed in succession from one hospital to another and to Thorn, and other cities, situated on the left bank of the Vistula, the appearance of an epidemic was prevented, and the strength of those persons was secured who had passed through the different stages of disease without difficulty. The mortality was inconsiderable: the snow and the intense cold which returned about the middle of March, contributed greatly, as we had already found, in preventing disease, in restoring our wounded, and in re-establishing the health of our troops.

As the resources of the cantonments of Osterode, and the places occupied by the guard and the army were exhausted, and it was probable that the lakes or marshes, which are common in Poland, would be opened by the thaw that now threatened us, his majesty was induced to remove some corps of the army and of the guard nearer the Vistula. In consequence of taking this new position, the emperor removed his head-quarters to Finkeinsten, and the guard took quarters in the surrounding cities, viz. Rosenberg, Reysemburg, &c. I fixed myself in the latter with the *ambulance*. We were here in want of every thing: the cold continued during the month of April, but when the sun became more elevated above the horizon, and the snow and the ice on the ponds was dissolved, it became necessary to leave these places, which might also produce disease among the troops. Camps for the guard and for the main body of the army were formed in the most healthful situations.

This removal, and the construction of barracks gave the soldiers a salutary exercise. From this time we had but few sick.

The camp of the imperial guard was placed on an elevated plain near Finkeinsten. It was remarkable for the beauty, uniformity, and internal distribution of its barracks: every soldier seemed suddenly to have acquired the dexterity of the architect, of the joiner, and of the mason.

The first warm weather of spring produced a number of cases of anthrax, or malignant tumour, in consequence of the imprudence of the soldiers, who lay on the grass in the heat of the sun, near some marshes. Some of these tumours, of a character like a carbuncle, would have proved fatal, if I had not speedily used the means that are pointed out in my campaign near the Maritime Alps. Perhaps this disease was caused by using the flesh of some animals that had been sick of an epidemick, which prevailed in the country at this period. At the request of the commissary general, I examined the different parks of cattle belonging to the army, and discovered that the animals received there from a distance, were from fatigue and bad pasturage, disposed to have a diarrhoea, with inflammation in some, and putridity in others. Anthrax appeared in a few. This epidemick was of short duration. I directed, that the sound cattle should be separated from the diseased as soon as they arrived, and confined in separate pastures. The return of good weather, with good pasturage, soon restored them.

I also inspected all the regimental hospitals of the guard that had been erected, and I established some depots for the reception of our sick on the route from the imperial head-quarters to the grand hospital of Inowia klaw, Marienwerder, Strasburg, &c. &c.

In these cantonments we spent the months of April and May that were very fine, and in the mean time Dantzick and several other fortified places were taken, or surrendered to the French troops.

Conferences had commenced, and negotiations for a general peace were about to be opened, when the Russians unexpectedly attacked our advanced guards. On the news of this first attack, which was followed by several partial affairs, the emperor marched with his guard. We passed Custadt and advanced on Heilsberg, where the enemy had taken a position. He occupied a hill that fronts the city, bounds its western side, and is protected by deep ditches and rivulets. On the 10th of June, we appeared before the enemy. In the evening a brisk action took place between some of his regiments of the advanced posts, and the fusileers of the guard: but bad weather and the difficulty of the ground prevented the success of the affair. Of the fusileers, about 200 were wounded, who were collected in the barracks of a neighbouring camp which the Russians had abandoned in the morning. In this engagement, general Roussel, chief of the *etat-major* of the guard, was killed by the bursting of a shell that fractured the right temporal bone and produced so violent a concussion of the brain, that all the functions of *sensitive* life were suspended. He was deprived of perception: all his limbs were paralyzed, and the sphincters relaxed: yet the functions of *internal* life continued for twenty-four hours. Here was an evidence of the relation which exists between the two principles of *general* life. Mr. Juville, one of my pupils, was wounded by the same bomb while assisting another general officer on the field of battle. They were both brought to my *ambulance*, and I passed that night and next day without quitting the wounded. We had

here forty wounded that required amputation of the arm at the shoulder, of the thigh, of the leg, and of the arm. Among those who required amputation of the arm, was one of the aids of the grand duke of Berg, Mr. De Segur. This wound was remarkable: the ball carried away his fore-arm above the articulation of the elbow, and touched the corresponding side of the chest: but as this projectile was in the midst of its course, it produced a result different from a ball which had arrived at the termination of its parabola. The skin was peeled off extensively, and the latissimus dorsi muscle divided, while the ribs remained unhurt, and the organs of the thorax had not for a moment been impeded in their functions. He did not even lose his perception, but was brought to the *ambulance* without dismounting from his horse. This would not have been the case if the ball had grazed after having nearly finished its course: the skin would have remained unbroken, while the ribs must have been infallibly fractured, and the lungs lacerated.* This wound was cured perfectly before the 35th day.

Colonel Vigni was wounded in the thorax by a ball that penetrated the belly of the right pectoral muscle obliquely, to the extent of three inches, and met a portion of the sternum, which it fractured; but as the fracture was not very considerable, the sternum, by its resistance and elasticity, gave this projectile a retrograde motion, which caused it to return through the same opening. It lodged in the clothes of this officer. The cure of this wound was tedious, on account of the exfoliation of the sternum.

* See memoir on amputation for my opinion on the course of the ball.

Colonel (now general) Jeannin had his lower jaw shattered by a ball which disorganized the soft parts of the left cheek in such a manner, that his features could not be recognized. Although the wound was severe, I had hopes of curing him without leaving a very great deformity. After having removed some of the disorganized flaps and extracted the loose fragments of the jaw, I made about twelve stitches and brought the parts in apposition, by means of a proper bandage: he was conveyed with others immediately to Thorn. By my advice, he, with his companions, remained five days without being dressed. In this time a great part of his wound united, and he was soon cured entirely, without much disfiguration. Had he remained a few hours without assistance, death would probably have ensued in a short time, or a fistulous wound and a frightful deformity must have been the consequence.

A soldier of the line had an enormous wound of the point of the shoulder, which disorganized the arm, and deprived it entirely of support. I undertook to amputate at the scapulo-humeral articulation, contrary to the advice of my colleagues, who were afraid he would die under my hands. The operation was soon performed without loss of blood, and this man, who was sent off with the others, to my great astonishment had entirely recovered when I saw him two months afterwards in the hospital at Marienwerder. The success of this case should encourage surgeons. It led me to save the lives of several others who were in equal danger. The spasm of the heart and of all the organs ceases when the causes of irritation are removed.

I was obliged a second time to make a counter opening in the cranium. A ball penetrated the projection of

the left parietal bone of a soldier, (in the same battle;) passed obliquely along its internal surface, and stopped about one centimetre from the occipital suture. The introduction of a small elastick probe, the symptoms which attended, and a slight ecchymosis that appeared on the skin near this place, induced me to lay bare the bone by a crucial incision. A small fissure was then apparent; and as he had symptoms of compression which continued to increase, I applied the crown of a trepan so as to cover the fissure. Immediately under it, I found a piece of flattened ball, partially surrounded by the bone. The dura mater was separated from the arch of the cranium along the whole course described by the ball that had followed the concavity of this part of the bony case. A considerable portion of blood escaped by both openings. He was sent the same day to Marienwerder, where he was five days without any accident, and was then siezed with the hospital fever, which carried him off.

I amputated the legs of three of the guard, on a level with the tuber osit of the tibia and through the thick part of the condyles; although according to authors, the fractures which made amputation necessary in these cases, required that it should be performed in the thigh. They recovered slowly, but this inconvenience should not be compared with that which results in general from amputation of the thigh, and the difference in favour of the wounded is soon perceived.

After the battle of Heilsberg, the enemy finding himself nearly surrounded by the French troops, abandoned his position in the night, and precipitately retreated to Friedland. Next day we took possession of Heilsberg, where we found refreshments and provisions for the army. Hence we hastened to meet the enemy, by crossing the forests in a right line towards Eylau. By forced

marches, our advanced corps arrived on the plain of Friedland, in time to prevent the enemy from crossing the river on the bridge near this city, and to bring them to a general engagement. Indeed the battle commenced as soon as the two armies met. As the columns *debouched* from the forests through which they had passed, they formed to increase the number of combatants on both sides. The engagement soon became general, and before all the imperial guards came into action, the whole Russian army was defeated. They left more than six thousand dead on the field, and we took a great number of prisoners. Their wounded, the greater part of their artillery, and several standards fell into our hands. There was a village in the vicinity, and a great number of large barns, in which we found a great deal of straw, and many cattle, and Mr. Percy was enabled to operate on, and dress the wounded with convenience. They were sheltered from the weather, and provided with good broth, while time was thus allowed to procure carriages for their removal.

I was afterwards informed that the operations performed on the field of battle during this affair were generally successful. The improvement of some wounds, and especially of the extremities, was retarded by tetanus which the sudden transition from the heat of the day, to the cold and moisture of the nights, produced in some of the wounded.

After this battle, which decided the fate of the Russian army, we pursued their remaining troops to the Niemen. The imperial guard followed the enemy's cavalry that crossed the river at Tilsit. The grand duke overtook the rear guard of the Russians, but they forced their passage, burned the bridge, and earnestly begged for an armistice and a peace. The former was granted, and the two armies approached the banks of the river,

and an interview of the two emperours and the king of Prussia took place. A *pontoon* was anchored in the middle of the river, and on it was erected a chamber inclosed with glass. The monarchs repaired thither at the same hour, each attended by his respective *etat-major*. The two armies were drawn up in order of battle on the two banks:—the scene was truly striking.

Preliminaries of peace were entered on in this first conference, and the two armies were immediately informed of the fact. Communications then took place between the French and Russians. The sovereigns visited each other. Alexander, Frederick William, and the queen of Prussia, occupied the palace of Tilsit. We remained here seven or eight days to complete the negociations for peace, and to give rest to the army. During this time *Koningsburg* surrendered to our troops, and abundantly supplied all the wants of our army. The imperial headquarters set out for this city, where we arrived on the 12th of July.

Among the curiosities of this city are the writings of Frederick the great, and of his ancestors; some curious arms and armour of several Teutonic knights, and celebrated warriors of the north. They showed us here the point of a javelin which chevalier Erasmus had retained in his cranium for fourteen years, without losing his faculties; an abscess then formed in the frontal region, and made way, without doubt, for the removal of this foreign body, and he recovered entirely. This piece or spear, after having fractured the frontal bone, probably remained in the frontal sinus, where it might continue a long time without injuring the wounded.

The same phenomenon might have taken place in the case of the French soldier, who some time after the campaign of Poland had his head pierced by a fragment of an iron ramrod which one of his comrades fired off by

accident. In the campaign of Austria, under the article "of wounds of the head," I shall give a case and a drawing of this species of wound. He had no bad symptoms, but they should be apprehended from the situation of the ramrod, that appeared to have penetrated the whole mass of brain, and yet no part of this organ had been injured.

We also saw a small knife which a farmer, named Andreas Guenheid, of Ancient Prussia, had swallowed in 1613. The violent symptoms which ensued induced Dr. Gruger, a Polish surgeon, to perform gastrotomy upon him; it was done on the 29th of May of the above year, and he lived afterwards ten years.

These facts are very rare. Authors give a great number of cases, in which foreign bodies of large volume have been introduced into the stomach, and have been discharged per anum, or have made their way out spontaneously: but they do not speak of operations on this viscus for the purpose of extracting foreign bodies that have lodged in this organ, and produced alarming symptoms. I remember, while a pupil with Mr. Frizac, professour of the college of Toulouse, one of the most dexterous surgeons of that city, that I saw him operate on a porter, by making an incision in the epigastrick region, parallel with the *linea alba*, through which he discovered the point of a knife blade, that had perforated the coats of the stomach. He seized this point with a pair of strong forceps, enlarged the opening with a curved bistoury, and took out the fragment, which proved to be about two inches in length. He then put two sutures into the lips of the incision of the stomach, and an interrupted suture in the integuments. This porter recovered: thread of different colours were used in the sutures, and on the fifth day the wound of the stomach had united, no doubt by adhering to the peritoneum. I can

bear witness that wounds of the stomach will heal quickly, and even without suture.

I shall here give a short account of the case of a soldier belonging to the guard, who received a wound of considerable extent in the left extremity of the stomach, by a very sharp point of a sabre, which first entered the thorax, between the seventh and eighth ribs, slightly injured the lungs, cut the diaphragm, and perforated the stomach at its large end. The local pain, vomiting of blood, and escape of the fluids which the patient had swallowed, through the wound, and in short the direction of the wound and its depth, left no doubt that the stomach was opened. For several days he was very ill, yet by means of cooling medicines, local and general venæ section, regimen, emollient enemata, and a uniform position on the right side, the wound healed, and he left the hospital, and entered among the veterans of the guard. He still had a hernia of the lungs, which appeared under the cicatrix, and was with difficulty repressed by a bandage adapted to it.

With real pleasure I sailed round all the western shore of Frischhafen to Pillau, where they fish for yellow amber. The fishermen sold us a number of rough pieces of this substance, in each of which we discovered divers insects, such as bees, beetles, ants, &c. We did not see them fish up any of this species of bitumen, but we learned from them that the amber was thrown on the sea-shore by the agitation of the waves, in the form of a liquid foam, that soon became hard, when exposed to the action of the air.

There is a diversity of opinion relative to the nature of amber, and its component parts: but when we consider the variety of insects which we discovered in the concrete lumps, and the difference between it and the bitumens, the resins and gums, it is probable, that it is formed

of the masses of honey and wax that are collected in great quantities in the trunks of aged trees in the immense forests of the western countries of Europe, such as we observe on the shores of the seas of old continents, where there is generally an immense number of bees. The hand of Time, and the violence of tempests overturn these trees, and their limbs, filled with these substances, are partially buried in the earth by the fall, and their contents, by remaining in that situation a longer or shorter time, become saturated with gaz and mineral acids, which they absorb, and the properties of the honey are changed. The rains, torrents or rivers, carry these masses in a liquid state to the sea. There they acquire a consistence by the action of the air on the saline principles with which they become impregnated, and they are formed into distinct masses of different sizes that float, or are driven on shore, and are there collected. The insects seen in this substance are entangled in it while it flows from the earth, or floats near the sea-coast in a liquid state, and are enveloped by it as it becomes concrete. Thus they retain their natural shape and colour:

These pieces of rough amber are cut at Koningsburg, to make various kinds of trinkets. The Egyptian physicians warmly recommend the use of these trinkets for women and children. They say that a necklace and bracelets of yellow amber, (which besides are ornamental,) will secure women against *hysteria*, and children against worms, and protect the wearer from the effects of lightning. This opinion may be founded on observation; perhaps the fair sex cannot choose ornaments that are more useful, more elegant, and less expensive.

The white amber is the best and most valuable. This substance is one of the principal articles of export from Koningsburg to the east.

On my arrival at this city, I prepared a hospital for the small number of our wounded and sick who were at Tilsit. For this purpose I procured a superb house, sufficiently spacious for 600 men, situated in the most elevated and healthful part of the city.

The arrival of new troops increased the number of sick. The corps of fusileers, who were young conscripts, and unaccustomed to the fatigues of war, suffered most. The prevailing disease was a dysentery, with violent *cephalalgia*, attended in many cases with *ataxia* or *adynamia*. We lost but few of them. The use of ipecacuanha, vegetable acids, good beer, (plenty of which we procured here,) cortex, good aliment, strict attention to cleanliness, and a kind of daily exercise that I obliged even the sick to perform, prevented the fatal consequences of this disease. I attended to the fever-wards and to the wounded, and entrusted those with syphilis and psorick affections, to one of my assistants. We remained at Koningsburg until the end of July. The number of our sick during this time, gradually diminished, because our soldiers were well fed and lodged, and had not been subjected to duty so fatiguing as in the last campaign. Before our departure, we sent our wounded and sick by water to Elburg, Marienwerder, Bamberg, Custrin, and Berlin.—Thence they were removed to Hanover, where their recovery was completed.

A peace between the belligerent powers was soon concluded and proclaimed.

After having sent off all our wounded, under the care of a proper number of health-officers, sub-officers and overseers, I set out for Berlin with Mr. Pilchet, the director of my *ambulance*. With pleasure we now revisited the smiling and fertile banks of the Vistula and the Warta, which we had left in a state of gloom during our first campaign.

From Berlin the imperial guard repaired to Hanover with its *ambulances*, and remained there during the fine weather. I gave up my situation to Mr. Paulet, and returned to Paris, pursuant to the orders of marshal Bessieres.

I passed through Wittemberg, Leipsick and Jena, and tarried a few days in these two last cities, celebrated for their universities. At Leipsick I beheld with veneration the amphitheatre, in which the immortal Leibnitz delivered his excellent lectures. Other eminent men now adorn the university of this city.

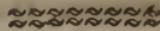
From Leipsick I repaired to Jena, and visited the hospitals, in which there were still some soldiers who had been wounded in the battle near this city.

I was much gratified with the distinguished attention with which I was received, by the professors of Jena, on my arrival there. They pressed me to remain some time among them. While there, I received the degree of doctor of physick from their university, after having defended a thesis, and submitted to the usual examinations.

I arrived at Paris on the last of October, and immediately resumed my duties at the hospital of the guard. The emperor had repaired to Milan to be crowned king of Italy. During this journey his majesty conferred on me the honourary title of "knight of the iron crown," and I received the insignia of this order on the first of January, 1808.

MEMOIR

ON THE PLICA POLONICA.



IN a letter of the 25th March, 1808, dated at Osterode, which I addressed to the secretary general of the *medical society of emulation*, I informed him that the inquiries and observations made by me on the *plica*, during the campaigns in Poland, and in Ancient Prussia, had convinced me, that this singular affection was not a real disease of the hair and beard, as almost all travellers and physicians assert, who have written on the endemic diseases of Poland. They consider the *plica* as a symptom, and as the crisis of a general disease, which they call *tricoma*: so in the plague, the buboes are viewed as a principal symptom, and often as the crisis of the disease. Accordingly in the works of physicians, the description of the *plica* is given in the table of general diseases. To show the error into which they have fallen, and to give the disease its true character, it will be proper to examine its principal features.

All physicians agree, that *tricoma* commences (like constitutional syphilis,) by a general debility, numbness of the limbs, and gradual or sudden loss of venereal desires, of sleep, and of appetite. Pains of the bones begin and continue, especially in the cranium, in the legs and joints: these pains increase during the night, and pro-

duce a fever, with heat and dryness of the skin. These epiphenomena are of a longer or shorter duration, and are various in their progress. Some physicians have assured me, that they have sometimes seen copious sweats take place, or spontaneous purulent discharges from the urethra, that have overcome the disease. When these favourable circumstances do not take place, the effects continue with more or less violence, according to the sex, age, and constitution of the subject, the season, local situation, &c., for all these produce changes in the nature of the disease, and in its progress.

The crisis finally takes place: the same authors tell us, that the hair becomes painful, tumefied, interwoven, and entangled, forming separate twists, or enormous masses; that it is dangerous to cut it off; and that this operation is attended with pain, hæmorrhage, or discharges of bloody and viscous humours. At the same time exostoses frequently appear on the cranium, tibiæ, and cubitus, with tumours on the joints, and ulcers or pustules on different parts of the body, frequently on the hands and head. The nature of these symptoms cannot be mistaken, and according to the same authors, they much resemble those which arise from syphilis: their progress and duration will be according to their treatment, and many other circumstances that may be easily conceived. Its termination may be fatal or fortunate, as in the syphilis of our country. Such is the sketch of the general symptoms of *trichoma*, as detailed by authors.—As to the particular change of the hair and beard, it is various, causing different species of plica. In short, it would be difficult to give all the external signs which characterize this *pretended* affection, with more interest than Dr. Alibert has done in his elegant work on diseases of the skin. He confesses that he was not in possession of the information relative to this disease that can

only be obtained, where it exists, and hence he is not able to speak decidedly as to its true character, causes, and progress: but he carefully gives the opinions of different authors.

The information that I received from enlightened physicians of Posen, of Warsaw, of Pultuska, and other places, led me to believe that this general disease, called *tricoma*, has been brought from Asia into this country by the Sarmatians, who, according to history, have descended from the Tartars and Scythians. The change of climate and of diet must, of necessity, have altered the symptoms of the disease they brought with them: it doubtless was a syphilis like that I saw in the interior of Egypt, that appeared to have had its rise or origin in the earliest ages. Indeed it cannot be denied, that the syphilis had been known in that ancient continent, as well as the small pox, long before the discovery of America. This is proved by a great number of authors, whose names I shall not mention. As the syphilis sometimes acts on the skin, membranes, and bones of the cranium, the roots of the hair may in this case be altered by it.— It cannot be combed without pain, interlocks, changes colour, and falls off. I have often seen these results in France. In Poland, from the same disease, the hair may experience a greater degree of alteration, and by means of certain practices, the plica is more completely developed. It is encouraged and promoted as a salutary crisis: with this view they confine the hair under a woolen bonnet, which has been used for this purpose; this hood is not removed until the plica is completely formed, and they wear it for a longer or shorter time, according to the season when it has appeared, and the degree of pain that the patient suffers. In any case they do not cut off the plica, if it have formed in winter,

except on Good Friday or on Easter Day. Although the advocates for the plica refer all the symptoms that precede or attend it to this affection, they still employ diureticks, diaphoreticks, and antimonial, sulphurated, and mercurial preparations. As a diaphoretick, they speak highly of lycopodium (club moss.)

Dr. Lafontaine, of Warsaw, showed a great number of persons who laboured under the plica: they were principally Jews, and had been previously, or were at that time afflicted with the symptoms above detailed: I remarked that these were venereal or scrofulous. Hence it may be concluded, that the plica is nothing more than an acquired or hereditary syphilis, or scrofula in disguise—for they are common diseases in this country, where, I doubt not, they have prevailed time immemorial.

The syphilis is disseminated by sexual commerce between a class of people who are never located, and lead a wandering, disorderly life: it is also propagated by the inhabitants of the boroughs and villages, where this intercourse is frequent. The Jews and artisans of the cities are also very obnoxious to it for the same reasons. But the plica is seldom seen in the higher circles of society, or among the agriculturists of the country; or if they accidentally contract it, they apply the proper remedies immediately, because they are not ignorant and prejudiced like the vulgar.

A number of our soldiers contracted the syphilis from the common people, but not one of them had a plica.

What then is the conclusion to be drawn from these facts? That this particular affection of the hair, although produced in some individuals by the nature of the above disease, arises chiefly from the neglect of the hair among the Polish Jews, and other persons of similar habits; add to their want of cleanliness the means that are used by them to bring their hair into a plait, or plica, under the

persuasion that this affection is a cure or preventive of all other diseases. They are encouraged to persevere in this error by the physicians, the majority of whom entertain a similar opinion.

It may also be possible that this thick animal hood, acting with the remedies that are indicated, may promote the crisis of a new disease, by increasing the heat of the head, and promoting the transpiration of this part. Under these circumstances the cutting off the hair may be productive of unpleasant consequences, if it be done during a season of severe cold, or during the paroxysm of another disease. It will be proper under such circumstances to exclude cold moist air from a sensible surface that has been suddenly stripped of a natural covering, that promoted a copious excretion. The sudden repercussion of the discharge might prove highly injurious to the brain; more especially in Poland, on account of the extreme coldness and moisture of the climate. This is one of the principal reasons for retaining the plica, in this country, until Easter.

I believe that the plica might be cut off at any season of the year without inconvenience, provided care be taken to cover the head with a warm fur cap. The tangled hair of lying-in women should not be cut off until the cessation of all the symptoms connected with their situation. Does not experience teach us that it is improper to cut off the hair of children in the winter-season, provided they have a discharge of humours from any part of their bodies, before the 20th day of the disease? It is not then unimportant to ascertain the time and circumstances that authorize us to cut off the plica or hair that is twisted or tangled, from any cause. But except the influence which diseases of the head may exert on the hair, I am convinced that the plica is a local and factitious affection, and almost entirely independent of the diseases from

which it is supposed to arise, as we shall prove by facts hereafter to be detailed.

I have always remarked, in every case of plica, though I saw it in all its stages and varieties, that the extremities of the hair remained uninjured, and it retained the natural colour, elasticity, and size; its roots were in every respect similar to the other extremities, and perfectly sound. If the substance or body of the hair had been diseased, the two ends would necessarily have partaken of the disease: but I never found this to be the case.

Not one of the Polish physicians who had cut off the hair in cases of plica, ever saw a discharge of blood, or sanguineous humour from its divided portions. I do not hesitate to deny the possibility of such an occurrence. the filaments that unite the bulb of the hair to its investing membrane are so fine and delicate, that it is very difficult to decide correctly on their nature: and it is still more difficult to become acquainted with the fluids which circulate in them: though we advance the opinion with confidence, that the red globules of blood never do circulate in them, because the finest injections cannot be thrown thus far. My experience in many cases of plica enables me to assert that no pain and unpleasant sensation is produced by cutting off the hair in this disease, and that if the person who undergoes the operation says that he feels pain, or seems to be uneasy, (as I have seen,) it is caused by the jarring and the distension that the investing membrane of the bulb or root of the hair experiences from the instrument used, more especially from dull scissors. The envelope, or investing membrane of this bulb may be considered as the organ that produces the hair, and is the only part of this production that can partake of the irritation or inflammation of the skin. Under such circumstances, far from being inflamed like the cutis, the hair dries away, shrinks, becomes

white, is detached from its capsule, and falls off. I cut off the hair in a number of cases of plica in the civil hospital *Saint Jesus* at Warsaw, and no inconveniences resulted from it. Twice I directed these persons who were the subjects of the experiments, to take the necessary precautions to prevent any unpleasant symptoms. These observations prove that this affection is the consequence of filthiness, neglect of the hair, and the means that the inhabitants of Poland use to produce plica. I have never seen the beard affected by the plica, a circumstance that corroborates our opinion, because the Jews take more care of their beards than of their hair. The plica that is seen in the hair of the pubis, and other parts of the body, may be the consequence of an inveterate chronick syphilis, which has charged the bulbs of the hair on these parts in such a manner as to prevent the circulation of the fluids that are necessary to soften and nourish it, until it resembles the wool of the negro. It may also acquire from the same causes the different shades of colour. In no case does this affection, which is but of short duration, constitute a disease of the hair: it is the temporary effect of the principal disease (the syphilis) which first produces an uncommon change in the growth of hair, totally destroys its excretory glands, and causes it to fall off.

Although the roughness of the nails has been attributed to a metastasis of the plica, caused by cutting the hair prematurely: yet, the Polish physicians assured me they had never seen such consequences from this operation. I have seen the nails become disorganized, and assume the most irregular shape, in consequence of the repercussion of a gonorrhœa or a chancreous ulcer that attacked their roots. I saw a striking case of the former in a soldier, who was attacked by a general erisypelas immediately after checking the discharge of a gonorrhœa. The cutis ulcerated, the epidermis fell off, and the nails of his hands

and feet were disorganized, and covered with irregularities of a yellow colour. His hair for a time was much tangled, and he soon after became entirely bald.*

The plica which we sometimes see in animals, is produced by neglect, by the peculiar arrangement of their hair, and the total abandonment of it to nature. Long, thin, and spare hair, soon becomes entangled like the long hair of animals. The length of the hair among the inhabitants of Poland is remarkable. The horses of this country, although of small size, have very long manes and tails, which are generally found entangled, or affected with a kind of plica.†

If we admit that this singular affection is not a distinct disease of the hair and skin, and that they are not entirely changed by some cutaneous disease, or a kind of virus, we shall consider it unnecessary to speak of its contagious character, which certainly can never exist. We are also of opinion that this affection never could produce a crisis in any other disease. It is an inconvenient, filthy, and oppressive burthen, and may eventually impair the integrity of the animal functions. The condition of the people would be much improved, and their disorders prevented, by cutting off the hair, by care and cleanliness. The Polish soldiers who submit to this discipline never have the plica. Finally, the cases of plica which now exist, might soon be done away by cutting off the hair, with proper precautions as above recommended, and by applying on the parts that have been shorn an

* We often find that a metastasis of the gonorrhœa to the eyes, destroys the eye-lashes and brows. This is an unpleasant occurrence, and proves injurious to vision: it may be prevented by a new inoculation in the urethra, with matter of the gonorrhœa.

† These animals are in the mud and snow two-thirds of the year, and in the dust and dirt during the other third.

unctuous aromatick pomatum, by keeping the head warm, by attending principally to any extraneous symptoms that may appear, and by keeping the hair straight, and preventing it from becoming plaited and entangled.

The inhabitants of Poland should be informed of the true character of their diseases. Under the sanction of their early prejudices, interest and empiricism have chained down their minds with fear. But the laws and institutions which they have lately received will destroy the bondage, in which two-thirds of the Polanders have hitherto lived, and will banish their ignorant prejudices, check the cupidity of empiricks, and introduce among this people that emulation, which, while it is the safeguard of a people, leads them on to the attainment of moral and physical perfection.

We have nothing to fear from a disease which is factitious, and therefore not contagious. It is sufficient that I have given its true character, and explained its causes, in order that it may be properly arranged among the diseases of the skin.

In order more fully to impress on the reader the opinion that I have just advanced, I shall take the liberty of inserting here the conclusion of a report made by the first class of the institute on my work, and on that sent at the same time to the academy, by Dr. Rousille Chamseru, a physician of the army.

“ If the memoirs of doctors Chamseru and Larrey, of which we have just given an account, be compared, it will be observed that they mutually corroborate the opinions advanced on the plica, its character and treatment. This concurrence of two respectable physicians whom we have long known to be entitled to our confidence, affords a triumph to truth.

“ They saw and described the same disease without holding any communication or intercourse with each other, and agreed in the same opinion and practice: a practice not only confirmed by their joint testimony, but by that of their brethren in arms, who visited the hospitals of Poland, and of many enlightened physicians of that country.

“ Established in their doctrine, they have effected a salutary revolution in Poland, by their firmness and perseverance; and we do not hesitate to say, that all Europe will concur in thanks, to which they are entitled for annihilating a disease hitherto considered as an alarming endemick, and for banishing the frightful spectres of ignorance and empiricism that have been conjured up by servile prejudice. They have described it simply as it appears, and pointed out the means by which it may be extirpated. They have secured the health of the Poles at a period when the will of a conquerour breaks the chains of their servitude, and raises them to the condition of freemen.

“ On account of this signal benefit, we may assert, that medicine and surgery are in a great degree associated with the glory of our victorious armies; and our physicians can boast of having co operated in the extension of the beneficent intentions of our sovereign.

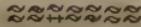
“ Under this impression, we propose that the class should give a distinguished reception to these memoirs, and that they be printed with the collection of memoirs received from foreign philosophers.”*

The class approved the report, and adopted its recommendation.

* I knew nothing of the memoir of doctor Chamseru;

FIRST CAMPAIGN

IN SPAIN.



MY stay at Paris was short. The campaign in Spain was about to open, and I received an order from the marshal, duke of Istria, to follow a column of the imperial guard that was destined to form part of the army under the command of prince Joachim, grand duke of Berg. I set out on the 11th of February, 1808, with my pupil, Mr. Frizac, one of the best informed surgeons of my *ambulance*.

As I wished to revisit the place of my nativity, I directed my course towards Toulouse, where I arrived on the 17th of the same month. On the succeeding day, I received an invitation from the professors and students of the medical school to undertake the demonstration of the system of Dr. Gall, which was then a subject of general interest.

Although I felt a repugnance to say any thing on this new doctrine in a city where the prevailing religious opinions must rise in opposition to it; yet I submitted to the wish of my brethren, and in four hours completed an anatomical and physiological demonstration of the encephalon, according to the principles of the German doctor, but with some variations.

A few days afterwards, the academy of sciences conferred on me the honourable title of corresponding associate.

Being in haste to join the guard that had repaired to Bayonne, I set out on the 27th, and arrived at Tarbes.

I again visited the mineral springs and baths of Bagnères, and the valley of Campagn. No country during the summer offers a more delicious repast to the eye in picturesque views, and in the variegated objects of natural history. The work of Mr. Raymond gives a full account of the topography of these places.

At Tarbes I was received in the most flattering manner by the members of the electoral college, and by the prefect, baron Duchazel. This city is watered through every street by rivulets of fresh water, and is the place of deposit for the neighbouring country.

Hence I repaired to Bayonne, taking Lourdes and Pau in my route. The strong castle of Lourdes, which is used as a state-prison, is built on an inaccessible rock, of a pyramidal shape; it commands the principal pass through the mountains. We tarried a short time at Pau, to visit the castle where Henry IV was born. Although this building is verging fast to a state of ruin, it excites sentiments of admiration and awe.

A part of this city incloses it, and it is separated from the other half by the Gave. Being built at the foot of the mountains, it affords a prospect of the most picturesque kind. From Pau to Bayonne are no places worthy of notice. Bayonne, situated at the extremity of the chain of Pyrenees, may be considered as one of the most important mereantile cities of the empire, on account of its direct and easy communication with Spain.

The two departments of Upper and Lower Pyrenees that we passed through, were formerly the provinces of Bigore and Bearn, and once constituted a large part of

the kingdom of Navarre. Their inhabitants then differed from those of the other inhabitants in the south of France. The costume, which is still retained in some villages at a distance from the high road, bears a strong resemblance to that of the Celtiberians, who for a great length of time dwelt in the defiles and valleys of the Upper and Lower Pyrenees. The costume of the men consists of a bonnet made of fine stuff of various colours, called *berret*; of a round short ample vest, with pieces to extend from the wrists to the shoulders; a large girdle to fasten before with a buckle, &c.

The women wear a plain cambric bonnet, and a small scarlet mantle called *capulet*, that forms a point over the head, and falls over the shoulders. They also have a short vest which extends to the waist, and is fixed to a laced bodice before. They wear short petticoats of various colours, &c. &c. All the women of these ancient provinces, which extend from east to west along the course of the mountains, from Bagnères-Adour, Tarbes, Lourdes and Pau, to Bayonne inclusive, dress in this manner. The men are of moderate stature, well-made, athletic and robust. Their port is dignified, their eyes sparkling, and their appearance fine and bold. The women, although generally below the ordinary stature, are well formed, have agreeable and regular features, fine black eyes, good teeth, and blooming cheeks. But the inhabitants of some hamlets disadvantageously situated in the valleys and ravines between the mountains, are afflicted with a tumefaction of the thyroid gland, that constitutes the disease called goitre. It appears to be the consequence of the common use they make of snow-water, and to arise in a great degree from an unwholesome gas that emanates from the bottoms of the deep valleys between the mountains during the heat of summer. These exhalations are more copious where the

mountains are covered by thick forests, and the soil of the valleys is boggy and moist. Improper aliment also contributes to the production of this disease, which is often followed by cretinism or fatuity, as I before witnessed in the valley of Maurienne. The goitre may perhaps be considered as incurable, more particularly in its advanced stage. It may be prevented or obviated in its forming state, by removing the patient from low, moist situations, by filtering all the water that is used, through charcoal, and by respiring none but the purest air. Women who are subject to this disease should not be permitted to carry heavy burthens on their heads, as is customary in many places where it prevails.

This tumour generally appears about the age of puberty: care should be taken at this time to keep all the ordinary secretions in their natural state, and more particularly the catamenial and salivary evacuations. Mercurial frictions, either local or general, under proper management, might fulfil this indication, and promote the resolution of the tumour. To the foregoing remedy should be added, resolvent aperients internally, to which may occasionally be added, muriatick acid in small doses, and cupping, and vesicatories to the tumour. With these means, varied according to circumstances, I have in many instances removed this disease, after it had arrived at its second stage. If the chief magistrate of a department would carefully watch over the people, and follow the directions of enlightened physicians, he might prevent or remove this endemick disease. In order to effect this, every prefect should be assisted by a committee of health, to act under his direction, and oblige every individual to submit to publick and private regulations for the preservation of health.

The inhabitants of these two ancient provinces speak a very agreeable language, compounded of Spanish.

Italian, Arabick, and French. Their morals are pure, and manners mild and social. They are much attached to each other, know little of the affairs of government, and are much offended by flattery. Their character is gay, petulant, and bold. Courage is common to both sexes. At the commencement of the French revolution, a number of their young women accoutred themselves like amazons, and went forth to battle with their husbands, to repulse the Spaniards who had entered the defiles of their native mountains.

These mountaineers generally breath a pure atmosphere, enjoy the advantage of the best water and food in abundance. The continual state of activity in which they live, and the particualar education which they receive, according to the customs and manners of their forefathers, contribute to render their intellectual and physical powers of a superiour order.

In the autumn the wood-pigeons are very numerous here. As soon as the spring appears, the flocks of sheep are driven to the mountains, where they are kept while the weather is moderate.

I arrived at Bayonne on the 5th of March, and received an order from prince Joachim to take the direction of the medical staff of his army, in the capacity of inspector general, and to visit the hospitals of the line from Bayonne to Burgos, and thence to Madrid.

About two or three leagues from Bayonne we entered a deep narrow valley which winds among the mountains and is fertilized by numerous streams and rivelets. The sides of the mountains which overlook it are remarkably fertile and well cultivated up to their summits. The Biscayens, who inhabit this valley and the neighbouring mountains, cultivate the soil in a manner which is ingenious, and well adapted to their country, and its ancient customs and usages. They also use small carriages with

two wheels, in the shape of the ancient cars, that are easily drawn by heifers or oxen over their mountains.— These are useful in transporting the wounded and baggage of an army.

The inhabitants of these regions bore but little resemblance to those we had lately left. Their language and dress is entirely different. We soon bade adieu to these frightful mountains, whose passes are so narrow, that a single company of soldiers might arrest the progress of a whole army.

Tolosa was the first principal city that we visited on entering the territories of Spain. Although Bayonne is separated from this city by a space of fifteen leagues, we found ourselves in a new world; for Spain differs from every country in Europe in its buildings, and in the physiognomy and character of its inhabitants. Travellers who have passed through its different provinces, assure me that it bears much resemblance, in several respects, to parts of the coast of Africa. On entering Tolosa, I was struck with the similarity of appearance which the inhabitants bore to the people of Alexandria in Egypt.

In this city, as in the generality of the cities of Spain, the windows of their houses are built with grates and projecting balconies that intercept the rays of the sun, and prevent those who are in the streets from looking into the apartments, while the inhabitants can see what is transacting on the outside. The same mode of building is common in Egypt. The narrowness of the streets, the irregularity of the houses, their internal arrangement and want of chimnies, also confirm the similarity of which we have just spoken. The people also resemble some of the eastern nations in their character, manners, and dress. Hereafter I shall speak of these more in detail, when giving an account of my stay in Old Castille, which may be considered as a fair specimen of the rest of Spain.

From Tolosa, where I rejoined the guards, we passed rapidly to Vittoria, and crossed the Ebro at Miranda.

I employed the short time of my stay in these cities to visit the hospitals, where our advanced troops had left a number of sick. By my direction several new and useful arrangements were adopted in these establishments, which I shall notice in the sequel.

From Miranda we travelled over a rough and rocky road to Old Castille, where we found the publick roads spacious and well kept. It is delightful to behold the excellent state of cultivation and the fertility of the country on the road to Burgos. You do not see this city until you enter it, because it is situated on the declivity of a hill, which hides it from the view of a person coming from France. It is one of the most ancient in Spain, and the curiosity of a stranger is attracted by its castle, cathedral, Carthusian convent, and the tomb of Rodrigo, surnamed *the Cid*.

The castle, formerly the residence of the kings of Old Castille, is built on the summit of a hill: it commands the city and the avenues leading to it. It was in a ruinous condition at this time, but the French have since repaired and put it in a state of defence. Notwithstanding it had lost its ancient grandeur, it recalled to remembrance its once illustrious inhabitants: it was also the birth-place of queen Blanche.

The cathedral is one of the finest gothick monuments now extant. The style of its architecture, the elevation of its arches, and the boldness of the cupola, excite admiration. All its internal ornaments are of immense value.

The Carthusian convent, situated in a charming valley, a short half league from the city, is remarkable for the tombs of the two last princes of Castille. They are made of alabaster, of most exquisite workmanship;—few monuments can compare with them in elegance.

On my arrival at Burgos, my first care was to visit the hospitals, and to make such arrangements as were necessary for the convenience of the sick: we remained several days in this place while the troops of prince Joachim advanced towards Madrid. Here we first heard that a revolution had taken place in Aranjuez, and of the accession of the prince of Asturias to the throne of Spain.—The magistrates, on this occasion, ordered a bull-fight, at which the inhabitants officiated with transports of joy. I now for the first time witnessed this curious spectacle. I attended to it minutely through all its various stages, and shall here attempt to describe it in a few words:

In all the principal cities of Spain there is an amphitheatre or circular area, appropriated to this kind of exhibition. The spectators are arranged in balconies, projecting from the windows over it, or placed on stages constructed round its circumference. A double barrier separates the area from the place which the spectators occupy. The *tauradors*, or men who are prepared to fight the bull, lead him into the amphitheatre; some of them are on horseback, covered with coats of mail, and armed with long sharp lances. As soon as the animal is introduced, he is irritated on all sides by the horse and foot men, who appear before him in a red dress. He soon becomes furious, plunges at them with the greatest impetuosity, and tries to catch them on his horns. In this contest I saw two of the men dismounted, their horses were embowelled, and the men owed their safety to their agility and address. One of the pedestrian *tauradors* was also severely wounded, and left for dead on the ground: at the sight of these horrible accidents the Spaniards made the welkin ring with their acclamations and applauses. The *tauradors* concluded the scene by plunging a sword into the heart of the animal. If this blow be properly directed, as is generally the case, the animal falls, and instantly expires.

A new occasion is then afforded for the shouts and plaudits of the spectators: when the taurador is very adroit, he plunges his dagger into the posterious part of the animal's neck, to wound the spinal marrow, and to kill him instantly; but this a very dangerous undertaking.

If the bull do not possess great vigour and fierceness, they pierce his skin with arrows: he then becomes outrageous, and attempts to break down the barriers.— Sometimes bull-dogs are let out upon him, and he is soon taken if they be not destroyed on the first rencontre by the horns of the animal.

When a certain number of bulls have been killed in this manner on the field of battle, the conquerours receive a stated reward, and the reiterated plaudits of the publick, and the most affectionate testimonials of satisfaction, more especially from the fair sex. It is much to be wished, that sports like these were proscribed, for the lovers of tranquillity much disapprove, while humanity condemns them.

Having received orders from the director general of the war department and prince Joachim, to superintend the surgical staff of the army of Spain, I obtained permission from the duke of Istria to follow the division of the imperial guard attached to his person, as far as Madrid, there to await his orders.

We set out for this capitol on the first of April, and passed by Lerma, Aranda, Boussequilles, Summa Sierra, and Buytrago. I inspected the permanent and military hospitals established in these cities for the reception of the troops while on their march. The route was rough and barren. As soon as we left Burgos we encountered a succession of hills that gradually rose towards the chain of mountains called Summa Sierra; while crossing these hills I remarked a great number of silken bags hanging from the summits of the pines which cover the heights.

These bags are the cocoons, of a species of caterpillar, which feeds on the pine. At the commencement of winter they unite into a family, and build an asylum, where they undergo their metamorphosis. They appear as butterflies in the month of May. The quality and quantity of these cocoons might render them an object of commercial importance.

We reached Summa Sierra, the most elevated point of the mountains that bear this name. I climbed up one of its projections that was still covered with snow; here the thermometer fell several degrees.

From Summa Sierra, we arrived in a few hours at Buytrago, a small but ancient town, which separates New from Old Castille. It is situated in the entrance of a defile of the mountains, and protected by a castle that the Romans and Moors fortified in succession. Before our arrival, this castle was exclusively appropriated to the reception and shearing of the numerous flocks of Merino sheep that were kept three-fourths of the year on the neighbouring mountains. I had an opportunity of witnessing the process of shearing on the finest of these flocks that entered the castle just as we arrived. The Spaniards are very adroit in performing this operation.

As we advanced from Buytrago, the mountains gradually declined, and formed a circular plain of three or four leagues in diameter. This plain, in the centre of which stands the capitol, would be dry and sterile, on account of a substratum of silicious rock, were it not covered with manure, and cultivated with great care. In this plain there is not a tree to be seen; for the Spaniards are unwilling that any should be planted, as they afford shelter to birds that injure the crops. For the same reason we seldom find trees here in any fertile fields, and only in the immediate vicinity of their houses, and in the gardens.

When I arrived at Madrid, I received my instructions from the commissary general, with a copy of the order from his excellency the minister at war. I visited and inspected the hospitals of the capital, and such situations as were suited for the erection of others, should they be requisite. I had wards prepared in the large city hospital for the reception of sick of the guard and the line.— This hospital is situate on the north-east of the city, at the extremity of the *prado*, and is well built. It is four stories in height, of a regular form, well lighted and ventilated, sufficient to contain 3000 sick. The wards communicate with each other by corridors, or galleries, that run quite round the edifice. It also contains an amphitheatre, with every convenience for the instruction of students of physick.

But there are two important objects of which this hospital is much in want. These are, houses of office and reservoirs for the fluids that run from the wards. The nurses are obliged, frequently during the day, to throw the sor-des into a kind of canal which communicates with the bottom of the hospital, and proves very unwholesome and injurious to the sick. I proposed such alterations as would render this establishment one of the most perfect of its kind.

In order to systematize the operations of the medical staff of the army, I formed a board of health, which was composed of my colleagues, the apothecary general Laubert, and the chief surgeon and physician Bardol and Talabere: we drew up a system of rules and regulations for the government of the permanent and military hospitals, and they were approved by the commissary general and commander in chief. This board held their sessions three times a week. A general arrangement was made of the health officers, in distinct classes, and the *ambulances* completely organized. For the benefit of the

numerous surgeons who were at Madrid, we established a school of medicine and military surgery. The several members of the board gave lectures on the different departments of the science.

Every week I added a lesson on clinical surgery to my demonstrations. I improved the short intervals that my professional duties allowed me to enjoy, in visiting the botanical garden, and the cabinet of natural history.— This garden is contiguous to the park of Buono Retiro, and is, without exaggeration, one of the finest in Europe. Here I saw a number of rare plants from every part of the world: with pleasure I recognized the *mimosa Nilotica*, the cedar of Lebanon, &c. &c. From this garden I entered the immense park of Retiro, that contains numerous pools of fresh water, filled with wild aquatick fowl: here also are delightful groves and thickets, the haunts of fallow-deer and other game. The air is also temperate and agreeable I may further observe that I saw here a hybrid animal, the offspring of the stag and the heifer, partaking evidently of the appearance and nature of both these animals. This was a second proof of the fact that came under my notice, of a successful sexual union between the stag and the heifer.

The palace of Retiro is sinking under the weight of years, but still contains some magnificent pictures. It was once the residence of the kings of Spain, being the most healthful situation near Madrid, the most advantageously situated in a military point of view, and commanding the city. It has a number of most delightful walks in its vicinity. Between Buono Retiro and the botanick garden, is a superb monument of gray granite, presenting the three ancient orders of architecture. It is intended for the hall of the academy and museum of arts and natural history. Further on, behind the botanick garden, is the observato-

ry, that contains one of the largest telescopes of the present day.

The new palace of the king, situated on the south of the city, on a calcareous plain, is remarkable for its grandeur and fine architecture: but it is dangerous to reside in it during the spring (the season of the colick) and very inconvenient during the heats of summer and the rigorous cold of winter. The prince generalissimo fell sick while his quarters were here.

On entering this castle I observed a gallery filled with armour of curious and rare appearance.

The cabinet of natural history is without doubt one of the richest in Europe, more particularly as respects its mineralogical collections. I saw the skeleton of the famous mammoth. I made an exact drawing of it and sent it, with a description, to professour Cuvier.

I observed, that the large concavity in the bones of the the pelvis was not a natural consequence of the form of the animal, nor a peculiarity that would authorize us to refer it to a distinct class.*

I also sent several other preparations of natural history to the same academician. Among them was a Peruvian sheep, with the skin preserved and its skeleton mounted.

I saw this animal alive: it may be called *camelus Peruvianus auribus erectis*, because it closely resembles the camel, except in height, length of ears, and fineness of wool. It is deposited in the museum of natural history at Paris.

The successive arrival of troops and consequent augmentation of the number of the sick, obliged us to multiply our hospitals. The commissary general requested me to extend my inspections to the distance of 12 leagues. I then

* This concavity is the consequence of mutilation.

repaired to Alkala, a small city, celebrated for its university: hence I went to Aranjuez, one of the pleasure-houses of the king. The park which is large, is well laid out, and intersected by a branch of the Tagus that irrigates the several plantations. Nothing can be finer than the *casa del Labrador*, that is situated in the midst of this park, and surrounded by smiling groves and delightful parterres.

In the spring and summer seasons this pleasure-house is very healthful; but at the beginning of autumn, intermittent fevers of various grades prevail here, and sometimes assume a malignant character. But the city of Aranjuez is not particularly liable to disease. It is built on the eastern declivity of a hill, on a foundation of calcareous rock. The leaves that fall early in autumn from the trees of the park, are the cause of occasional disease, when the effluvia that arises from them acts on the inhabitants. The spring is at first sudden, and the foot-stalks of the leaves, even while green, are detached by the slightest north wind, which is very cold during the nights. This is also hastened by the continual moisture that rises from the Tagus. I paid particular attention to these circumstances when I visited this royal mansion a second time, about the latter end of July. The leaves, as they fell, accumulated in the winding canals that intersect the park in various directions, where they soon undergo the putrefactive process, from the excessive heat of the sun.—Hence noxious exhalations are carried by the south winds that blow during the day, into the city, where they produce fevers. The castle, and the houses contiguous to the park, are then forsaken, and the royal family, during this season, remove to the *Escorial*. I also visited this magnificent palace; but as a description of it has often been given, I shall pass it by.

The departure of the royal family to Bayonne excited the murmurs of the people, and gave us reason to fear an insurrection. Several unpleasant occurrences had already taken place in the cities through which I passed. I therefore determined to carry my inspection no further, and I returned to the gates of Madrid on the second of May, the day of the revolt, at eleven o'clock, ¹A. M. It was a most alarming and dangerous crisis: the report of musketry and cannon was heard on all sides. I did not hesitate to enter the city, where I had left my nephew under the care of my host, the marquis of Belgida; moreover I was anxious to attend to the surgical arrangement and security of the hospitals. I rode through our troops and the insurgents, without attending to the dangers that surrounded me, and arrived at my quarters with my pupil, Mr. Frizac, and Mr. Fabar, surgeon of artillery, whom I met at the entrance of the city.

Having found my nephew safe under the protection of the marquis of Belgida, I remounted my horse, and, followed by my two companions, repaired to the hospital, now menaced by a horde that had escaped the swords of our battalions. We passed several groupes of the insurgents that I should not have recognized but for the muskets they discharged at us. We arrived at the hospital in time to secure its gates, and to arm all the surgeons and convalescents who could handle arms. We arrested several Spanish nurses who had already committed violence on some of our sick, and on two or three of the health officers: Dr. Houneau, in particular, was severely wounded by them.

This efficient support, and a few discharges of musketry through the windows and over the gate, obliged the insurgents to retreat from a position which they had just taken under the walls of the hospital. Our troops marched

to every part of the city, put an end to the contention, and it soon became tranquil.

We received the wounded of both nations into the hospital immediately, and gave them every necessary assistance. Before night, we had admitted more than 300, of which number seventy belonged to the imperial guard.

Among the latter, were several wounds of the head, with a division of the cranium, the consequence of sabre-wounds. In one of these the right parietal projection was cut off obliquely, with the integuments, the dura mater, and a superficial portion of the cortical substance of the brain. The bony piece was detached, the membranous flap re-applied, and it united without any unfavourable symptoms. We were also successful in curing wounds that penetrated the thorax, and others of the abdomen through which the intestines were protruded unhurt. Several amputations were also performed on the extremities, and two at the shoulder-joint, or scapulo-humeral articulation. The subject of one of these latter operations recovered completely, and the other fell a victim to the colick of Madrid, which attacked him during a cool night.

A severe but equitable proclamation was issued by the prince generalissimo, which awed the inhabitants of Madrid into submission, and restored order and tranquillity.

A great elevation of temperature in the atmosphere, with storms and rain, checked the rapid progress of our men towards a cure. A gangrenous affection suddenly appeared among the wounded of the line, who occupied the wards on the ground floor, on the south south-east side of the hospital. Almost all who had been wounded

in the large articulations, or had fractures of the thigh, were carried off by a complication of this disease.

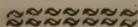
I was so fortunate as to arrest its progress among the soldiers of the guard, who were placed on the third story, although it had appeared among them.

Mineral acids, combined with bitter diaphoretick drinks, cortex mixed with ether, and antisepticks applied externally, removed this gangrenous affection in the majority of our wounded: but I found it necessary to amputate in two cases, where these remedies did not arrest the progress of the *traumatick* gangrene.

The minute care with which I attended to the progress and character of this gangrene, and the unexpected success that followed amputation in several cases of a similar kind, induced me to make it the subject of the following memoir.

MEMOIR

ON TRAUMATICK GANGRENE, OR GANGRENE PRODUCED BY WOUNDS.



WHEN the particular species, progress, and causes of a disease are not well defined, the different therapeutick plans are often confounded and mistaken for each other. For a remedy may be advantageously exhibited in one species of a disease, which would prove ineffectual or even pernicious in another, though it appertain to the same genus of diseases; the want of success, or the unfavourable results of an injudicious prescription, often induce a physician to pause, and to remain satisfied with palliative means; or the patient is abandoned to the resources of nature, that are generally insufficient: the disease advances, terminates in death, and science remains stationary. In this manner may we account for the gradual advances of medicine, and many other sciences, towards perfection.

Physicians who have written on gangrene, or sphacelus of the extremities, advise us, without making proper distinctions, never to amputate a sphacelated limb, until the mortification has become defined by a reddish circle, forming a true line of demarkation between the dead and living parts. This demarkation will not take place ex-

cept in cases of spontaneous gangrene from an internal cause; or if should happen, which is rare indeed in gangrene from wounds, (where it would be very imprudent to wait for it,) its progress is quite different; for *traumatick* gangrene almost always continues to advance, a general infection of the system is the consequence, and the patient dies.

Before we enter into a detail of the species of gangrene that now occupies our attention, we shall briefly point out the nature of gangrene in general, its causes, and its varieties.

When a part of the living body is cut off from the general circulation, deprived of sensibility, and of all the characteristicks of life, it is said to be dead, or in a state of gangrene. Then gangrene is, as all authors admit, a perfect or imperfect death of a part of the animal body; and whatever destroys all the vital functions of a part at once, produces gangrene. It is known by the absence of heat, by a sense of weight, by insensibility, loss of motion, and cessation of arterial action; spontaneous putrefaction almost immediately ensues, and is known by a fœtid, nauseous odour, by blackness of the part, and a decomposition of its whole substance. The muscular fibre, the arteries and the nerves are the last to yield to the mortification.

We shall attempt to explain this phenomenon, of which authors have not spoken.

The progress and character of gangrene varies according to its causes. When they are external, and mechanical, and immediately injure the vitality of the parts, it is always preceded by an inflammatory obstruction, erithismus and rupture of more or less of the capillary system: the parts are tumefied by their vital action, which is not yet extinct. The epidermis is separated, and forms

phlyctenæ, filled with a serum that should have been discharged from the part by transpiration. The cutis grows soft, becomes black, and putrefies; the cellular substance is decomposed, with all the membranes; a redundant quantity of fluids is found in the parts; these have escaped from the vessels and the adipose substance: hence this species of mortification is called *moist gangrene*. Yet in the centre of this sphacelus, more especially when the destruction of the limb is not complete, or the injury has not been uncommonly violent, we find muscles, arteries, and nerves possessed of life. Such also is the fact in the *hospital sore* or *sphacelus*, which decomposes and melts down all the adipose substance, while the muscular fibre, and the arterial tubes remain of a red colour, in the midst of dissolution. All practitioners can confirm these facts. What is the cause of this phenomenon? These parts, without doubt, retain their life longer than others, although deprived of their mobility, because they contain a larger portion of calorick and oxygen.

The nerves have also the power of resisting the action of deleterious substances, by reason of the fluid that passes through them, which, doubtless, by its electrick or galvanick properties, enables them to retain their life. From this fact, deductions may be made of the first importance in the practice of physick.

Such are the principal phenomena that are presented to us by gangrene the consequence of wounds, which I have designated under the name of *traumatick gangrene*. Hereafter I shall explain its development and progress, but first it is proper to notice *spontaneous gangrene*, or that produced by an internal cause, or the abstraction of heat from a part.

This spontaneous gangrene generally appears in those parts furthest removed from the heart, or in such as are debilitated, or have their vital power diminished, as

the feet, the nose, the ears, and the fingers; while traumatick gangrene can take place in any wounded part. In the former, a deleterious cause acts on the parts distant from the centre of life; in the latter, the injured parts have suffered a certain degree of disorganization. In either case, the part dies: but as the vessels in dry gangrene have experienced no change, they are not obstructed as in traumatick gangrene; more especially, if in the former, the subjects of it have been exposed to intense cold, or have been debilitated by some disease. Here the part affected turns black, and instead of puffing up, as in traumatick gangrene, it shrinks, dries, and sometimes hardens like horn. This is the dry gangrene, which differs from the former in having no effusion or discharge of fluids. Thus we explain why in the latter, the vessels remain entire, and why in the former, a solution of continuity takes place. Dry gangrene is more readily defined, because the parts are supplied with large vessels that communicate with the centre of life, and are enabled by their vital powers longer to resist the action of morbid infection. A well-defined inflammatory line appears, separates the sound from the gangrenous parts, and prevents the propagation of the gangrenous principle towards the former, in consequence of the obstruction produced by inflammation in the mouths of the vessels, in the cellular substance, and lymphatick system. In this case then, no inconvenience can ensue, if we choose to wait when amputation is indicated *until the mortification be defined*. In my memoir on "congelation or gangrene from frost," I have explained its production and effects.* It is quite different from traumatick gangrene, which propagates itself rapidly, and in succession through the

* See the campaign in Poland.

parts, from one limb to another, seizes on the trunk, infects the organs of life, and destroys the patient.* We can easily conceive, notwithstanding the vessels and cellular substance are disorganized when the gangrene first appears, that a sufficient degree of action may still remain in the deep-seated parts, to enable them to absorb the gangrenous principle, and at the same time to partake of the erethismus, or latent inflammation that is going on. Thus I explain the progress of the disease, and point out the impropriety of trusting to the powers of nature to arrest it, and to throw it off. But in addition to the local and gradually-extending inflammation, a metastasis of the gangrenous principles to the brain is induced either through the cellular substance or vascular system, and the most alarming symptoms ensue. The intellectual faculties are disturbed, and the animal functions impaired. Paleness of the face, anxiety, delirium, and all the symptoms of ataxia make their appearance: and if this infection continue, the patient must soon expire. On opening the dead body, I have found the arteries of the brain replete with black fluid carbonated blood, and the heart filled with liquid blood of the same appearance.

In dry or spontaneous gangrene, the absorption is effected with greater difficulty, the disease remains latent for an indefinite time, and it is not unusual to see this sphacelus or necrosis separated from the living parts by the power of nature alone, without a change in the general functions.

* On this subject, says Boucher "if mortification threaten to seize on a part above which a section of the flesh cannot be made, it is evident that no other resource then remains but immediate amputation, although this is uncertain." See *Memoirs of the Academy*, Vol. II. 4to.

From this view of the subject, it must appear that an essential difference exists between traumatick and spontaneous gangrene, or, if you please, between the *moist* gangrene from an external cause, and the *dry* gangrene that generally depends on an internal cause.

The prognosis in these two species of disease is more or less unfavourable; for in either case, the patient must lose the sphacelated limb by a process of nature, or by an operation of art; and life must consequently be endangered. Yet, what is the indication in each of these species of gangrene? I refer to my campaign in Poland for the treatment of dry gangrene, or that produced by frost, and we shall now attend exclusively to the means of preventing or arresting the fatal consequences of traumatick gangrene.

A ball, or the bursting of a bomb without producing extensive disorganization of a limb, may do such violence to its vessels and nerves, that death of the part must be the consequence. We have witnessed many such cases. I have also remarked that violent percussive of a bone, (although not attended with fracture) and the shock which the osseous membranes, supplied with nerves appertaining to organick life undergo, generally produce gangrene, more especially when the ball strikes the articulating extremities of bones, and lodges in their substance.

We are yet unacquainted with the extent of the disorder that commonly follows considerable injury of the periosteum, aponeuroses, (the white parts) and articulating surfaces of a joint, because we are yet ignorant of the distribution and extent of the nerves of organick life, which we are induced to believe, from diseased sympathy, physiological experiments, and anatomical dissections, are not very limited. Bichat, Scarpa, Chaussier,

and Ribes, are the anatomists who have thrown most light on their connection with the animal economy at large, and on the peculiar phenomena of organick life.* According to this opinion, we believe that the change of the membranes, or aponeuroses of the ligaments, cellular substance and skin, which appear to receive their vitality from a continuation of the nerves of the great sympathick, must be followed by a change and disturbance of the organick functions in the injured limb, viz. in the process of nutrition, in those of the synovial and adipose apparatus, and in the respiratory function of the skin. When there is a suspension of power in these functions, a reflux of the nutritious juices, obstruction, atony, and dryness, erysipelas, and tumefaction of the skin take place. Disorganization of the epidermis, phlyctenæ, and effusion of serum are the consequences of a rupture of the capillary vessels, and the accumulation of a gas which should be discharged externally by transpiration. The absorbent vessels being deprived of action, the oily and lymphatick fluids that are effused, remain quiescent in the adipose cells, and disorder and obstruct the cellular membrane, which soon undergoes a change, and falls into a state of putrefaction. The local irritation or torpor,

* In dissecting the fœtus of the cow, I have easily traced the nervous branches given off by the great sympathick running together with the umbilical arteries, as far as the placenta. Other smaller branches accompanying the crural and axillary arteries, form congeries that are discernible by the eye, and appear to unite in different places into small white masses that are doubtless so many ganglions. It is probable that filaments much more delicate than these, follow all the arterial branches to their termination. This doctrine enables us to account for the pain that a patient feels, when a ligature is applied on an artery, more especially if it be in a state of disease, and for the appearance of certain symptoms that sometimes attend the application of these ligatures.

extends its effects to the whole system of organick life, and febrile affections of various complications and grades are the consequence. The principal vessels of the affected limb speedily partake of the disease, and their actions are destroyed, the blood ceases to circulate in them, more particularly in the capillary system, becomes carbonated, and loses its calorick. This carbonization extends through all the membranes, and produces the black colour, which is one of the characteristicks of gangrene. Putrefaction takes place, and advances with a rapidity proportionate to the quantity of adipose membrane, the high temperature, moisture, and insalubrious state of the atmosphere. This local affection is sometimes complicated with an ataxick fever, and adynamia takes place at the same time, as was the case in Egypt, when our soldiers were attacked with the yellow fever. There the progress of traumatiek gangrene was so rapid, that in a few hours it extended its ravages over the whole extremity to the trunk, and the wounded often died in six hours.*

It will easily be conceived that in this species of gangrene, it would be dangerous to wait until it had become defined by this reddish circle, or line above-mentioned, because putrefaction advances without any opposition, not only by contagion, but by the absorption or transudation from the part first affected. We should not then hesitate whatever authors or practitioners may say, to perform immediate amputation, when once the necessity for it is well established. We need not fear that gangrene will succeed in the stump, as in spontaneous mortification, which is not defined; for traumatiek gangrene, after being produced by a local cause, is propagated or extended by absorption and a disorder of the membranes, which is

* See memoir on yellow fever, campaign in Egypt.

gradually propagated through vessels that are continuous.

In fact, amputation performed in a proper part, arrests the progress of this species of gangrene, and prevents its fatal consequences. Admitting then that the lower half of the leg were in a state of sphacelus, in consequence of a severe contusion by a ball, and that the vessels, nerves, and ligamentous membranes were injured to such a degree, that gangrene had already attacked the cellular substance on the superiour part of the limb, it might be amputated in the most advantageous part, if the skin remains sound, without any apprehensions of an attack from gangrene in the stump: but when the skin of the whole leg is sphacelated, we should lose no time in performing the operation on the thigh. The same rule will apply to the superiour extremities. A limb that is merely rendered torpid, should not be treated or viewed as one affected with legitimate sphacelus. In the former, the heart, sensibility, and power of motion remain, although the skin may be black, and its vessels obstructed. Besides, in this case, when the disease is doubtful, repertient tonicks and cordials should first be given internally. The scarifications recommended by the generality of authors are commonly more injurious than beneficial, and accelerate gangrene, without removing the torpor of the part. I have spoken of this last affection in my memoir on amputation.

Amputation first removes the contagious matter when performed above the parts in a state of real gangrene; that is above the parts which are disorganized. The nerves and vessels are set at liberty when divided by a sharp instrument. and they are thus relieved from fluids that are in a state of stagnation. Their action is re-established, and far from performing the part of syphons by absorbing heterogeneous principles, they are enabled to expel

these principles, and the fluids which they contained, and subsequently to receive the invigorating principle of life. All the membranes are relieved from obstruction, and resume their vital powers. The effect of amputation should be assisted by the internal exhibition of chincona, generous wine, tonicks, &c.

The facts that shall be adduced at the conclusion of this dissertation will, I think, prove incontestably the truth of the doctrine I have supported—that we should amputate in gangrene without waiting until it be limited, provided it be caused by a mechanical injury, and the life of the person so injured be in danger from it.

I have often been a witness to the death of persons who rigidly adhered to a contrary doctrine, and I have long since been induced to abandon a rule which I had always believed pernicious, and according to the precept of Celsus, I chose rather to adopt an uncertain remedy, than to abandon my patient to certain death. “*Satius est enim anceps auxilium experiri quam nullum.*” (CELS. CORN.)

I first made the experiment at Toulon, in 1796, on a soldier who had a gangrenous ulcer of the foot from a violent contusion. The whole limb was soon attacked with sphacelus which continued to advance. I determined to remove his leg. The success of the operation surpassed my expectations; the stump cicatrized, and in less than forty-five days, this man was completely cured.—This case was sufficient to encourage me.

During the siege of Alexandria in Egypt, in 1801, a second case of a similar character presented in my practice.

A dragoon of the 18th regiment was wounded by a ball in the articulation of the left arm, and his fore-arm and arm fell into gangrene in succession. The sphacelus approached the shoulder, and the life of the man was in jeopardy, when I resolved to extirpate the limb at the scapulo-humeral articulation. The disease continued to advance perceptibly, and he already felt an affection of the brain, with symptoms of ataxia: but the operation checked the approach of death: he recovered, and was completely cured at the conclusion of the siege of Alexandria.

After the capture of Ulm, Mr. Ivan, surgeon to his majesty the emperour, amputated the thigh of a soldier in my hospital, and under my own eye at Elchingen, whose leg had been disorganized by a ball, and afterwards fell into sphacelus. The gangrene was not defined, and evidently continued to advance, but infection was prevented by the operation, and he had completely recovered, when we returned from Austerlitz.

The fourth case occurred in an officer of the same regiment who was wounded in the ankle-joint by a ball. He was brought to the same hospital to be dressed, on the third day after the accident; his foot was in a state of gangrene, and his leg tumefied and threatened with similar destruction. The cellular texture of the remaining portion of the limb was of a dark yellow colour and already infected with the gangrenous principle; but the operation arrested the progress of the disease, and suppuration was established in the stump. Some gangrenous eschars were produced, but they sloughed off. The wound became clean, and the cicatrix was completed on the 52d day. He had been walking on a wooden leg for some time, when he contracted the hospital fever, then

epidemick at Ulm, where he waited for his regiment, and to my great regret he fell a victim to this disease, after having escaped the dangers of his wound and its consequences.

After the battles of Austerlitz and Jena, several of my colleagues and surgeons of the first class also undertook to amputate sphacelated limbs according to the example I had set them, though the gangrene was not defined, rather than abandon the wounded to a fate that seemed inevitable. They were in general as successful as I had been. I regret that I am not able to report many cases of similar cures which one of these surgeons sent me while I was in Spain, where they were lost: but the case of young Barre that I have detailed here at full length, appears to me sufficient to fix the opinion of surgeons on the subject of my memoir.

CASE.

Anthony Barre, 18 years of age, a fusileer in the first regiment of imperial guards, a man of the common size and delicate constitution, was wounded by a bullet in the revolt of Madrid, May 2, 1808. The ball, after having penetrated deep into the angle of the elbow on its radial side, was lost in the parts. It made its way downward and inward, so that, after perforating the skin and the pronator teres muscle, it met the point of the radius, contiguous to the cubitus. On account of the resistance it met here, the ball passed in an oblique direction, glanced on the interosseous membrane, and continued its course between the two bones under the flexor muscles of the hand, following the course of the interosseous vessels, as

far as the articulation of the wrist, where it stopped. He informed us, that when wounded, he felt a violent shock which obliged him to let his arm fall: he also felt a painful numbness and total loss of voluntary motion in the wounded limb. He was conveyed to the hospital the same evening, where I received and dressed him immediately. In vain I sought to discover the situation of the foreign body. The wound was then dilated, covered with a spit roller, and dipped in salt water, and the fore-arm was bound up with compresses moistened with the same fluid. He was kept on a proper regimen and used acidulated and antispasmodick drinks. He slept none that night; was restless, and much agitated: a livid paleness of the countenance, and haggard appearance of the eyes seemed to indicate something unpropitious.

On the 3d, in the morning, his arm was immoveable, slightly tumefied, and threatened with torpor. Apprehending danger from the subsequent symptoms, I directed the whole extremity to be covered with compresses dipped in hot camphorated or ammoniated wine. I ordered him to take an anodyne antispasmodick draught at night, and to use an infusion of camomile flowers, as his drink. He passed a restless night, and on the morning of the 4th the hand and fore-arm had lost their sensibility and heat; the dark colour of the skin and the tumefaction of the hand left no doubt of the accession of gangrene. We applied camphorated brandy, heated nearly to the boiling point, over the whole limb, except on the wound, which was covered with a plaster of digestive salve.—Camphor and chineona were also added to the foregoing remedies. But in opposition to all our care, when I visited him at half past four o'clock, P. M. the sphacelus was complete, the whole hand was dead, and its epidermis converted into phlyctenæ, as was also a large part of the fore-arm. The elbow-joint, and the lower third of the

arm were inflamed and much swollen. Scarifications on the hand and fore arm, the use of antisepticks internally and externally, could not arrest the progress of the gangrene, and on the 5th it had ascended as high as the most elevated part of the wound. To me, the scarifications appeared to favour the progress of the sphacelus, as I had several times previously remarked; hence I considered them as injurious. On the morning of the 6th, when I visited him, the sphacelus had extended round the whole articulation, and gangrenous radii seemed to pass off towards the middle of the arm. The patient was much debilitated, and his pulse small and intermittent: he laboured under mental aberration or delirium, his eyes were dull and wild, and his countenance exhibited the paleness of death. Seeing him thus in the most imminent danger, I wished to amputate the arm that evening, but my colleagues were apprehensive of the consequences, as the gangrene was not defined; but I resolved to adopt this last remedy rather than abandon the patient to a death that seemed inevitable. Before I commenced the operation, I called a consultation of the best informed physicians and surgeons to consider his case. The consultation could not be had until four o'clock P. M. and in this short period the gangrene had ascended several millimetres, and invaded almost the whole of the arm. I proposed to operate, although my prospects of success were by no means flattering, relying as I did on the arguments and principles detailed before in my memoir, on my experience, and on the opinion of the Roman surgeon. My proposition was opposed by all the gentlemen who were in consultation, except one.* Notwithstanding this formal and general opposition, I believed it my duty to sacrifice motives of personal interest and convenience

* Mr. Talabere, chief surgeon to marshal Moncy's corps.

to save the life of a citizen, if by means of an unusual practice, I had the most slender expectation of effecting it. There was not a moment to lose: the ataxick symptoms grew more and more alarming, and the mortification advanced with uncommon rapidity; in two hours this young man must inevitably have died.

In a few moments the dressings were prepared for the extirpation of the arm, which was now barely practicable, and the patient removed into a ward where his companions could not see him. At the period of the operation, his vital powers were almost extinct, yet I persisted in going through with it. One of the assistants observed that the operation was performed in the space of seventeen seconds, exclusive of the time employed in applying the ligatures: I operated in the manner that I have described in my campaign in Egypt. I tied the arteries with care, so as not to include the nerves accompanying them, in the ligature, a precept much more important than is generally admitted. The fleshy parts of the two flaps were of a brownish colour, and almost dry; the cellular substance of the arm-pit was diseased. I approximated the flaps without bringing them into contact, and covered the whole wound with a split roller of fine linen, steeped in very warm camphorated wine. Several pledgets of lint, sprinkled with camphor, were immediately applied, and retained in their situation by long compresses dipped in hot wine, and continued up to the shoulder, and the whole dressing was supported by a long and broad bandage.

He was conveyed to his bed, in a ward appropriated to the imperial guard: he suffered but little pain during the operation, because the shoulder had in a great measure lost its sensibility; no syncope followed, as he lost but a small quantity of blood; on the contrary, the ope-

ration seemed to have restored his strength, at least, the delirium was less, and the pulse immediately improved.

I sent him a portion of chicken-broth, prepared by my cook for those who were most severely wounded, he drank this and some good claret. He became tranquil, the animal heat was restored, his pulse became more full and natural, and he slept two hours, and passed the remainder of the night in tranquillity.

At five o'clock next morning, I found a perceptible amelioration in his condition. The dressings which I inspected had imbibed a yellowish serum. I prescribed for him a stomachick potion composed of claret, chinchona *loxa*, and Hoffnian's anodyne mineral liquor, in suitable proportions, a spoonful to be taken every quarter of an hour.

The amputated limb, which was entirely black, was opened in the amphitheatre immediately after the operation, in presence of a great number of surgeons and physicians who had assisted me. The skin, the cellular substance, the membranes and ligaments were black, and in a state of sphacelus; the muscles were soft, and injected with black carbonated blood. The aperture made by the ball, was filled with a black, foetid, ichorous serum, the ball had stopped under the annular ligament of the flexors of the fingers: the contiguous articular ligaments were disorganized, and the articulation broken up. The ball had been flattened by the resistance it had met with.

At the second dressing, I covered the wound of the shoulder with a piece of flannel, dipped in very warm camphorated wine, mixed with bark. He took at intervals good broth, seasoned with cinnamon and cloves, and after this a glass of good claret. I ordered the surface of his body to be washed with very warm etherated vinegar, and then to be covered instantly with pieces of warm flannel. Towards the evening I directed an enema to be

given, made with a decoction of chinchona, strongly camphorated. He took a draught as on the former evening, and I had him removed to a bed that had been fumigated with oxygenated muriatick acid gas.

The seventh was a more favourable day. His pulse was more expanded, the heat of the body more general and natural, and the paleness of the countenance less cadaverous: he had several black, bilious, and fœtid evacuations by stool, that seemed to relieve him. His urine was not copious, but he discharged it without pain. The same remedies, &c. were continued.

During the night of the 8th, a paroxysm of fever came on, and was followed, about four o'clock in the morning, by a slight hæmorrhage. I was called to his assistance, removed the dressings, and soon discovered the vessel that had bled, which was a branch of the circumflex.—The ligature had been torn from it by an involuntary motion made by the patient in his sleep, in consequence of dreaming that the Spaniards were pursuing him. I applied a ligature on this small artery, dressed the wound with a pledget of lint, and covered it with digestive. I ordered him to be removed to a fresh bed, and prescribed the remedies of the preceding evening, having first taken care to give him some good broth, and a little excellent wine.

This new accident had again reduced him to a state of debility and inquietude; but the functions of his organs were gradually re-established, and in less than two or three days, his evident improvement inspired us with the most flattering hopes and expectations. I dressed the wound every day myself with the above-mentioned articles. Suppuration was established on the seventh day, and his strength sensibly returning.

The gentlemen who had been concerned in the consultation, could scarcely believe that a change so extraordi-

nary, had taken place in him. It also attracted the attention of all the health officers of the army.

On the 9th day after the operation, a second hæmorrhage took place from a vessel deeper seated than the first. On raising up the dressings, it immediately ceased: not being able to discover whence it issued, I dressed the wound again, and ordered the usual remedies to be continued with such changes as circumstances might require. He was again much debilitated, but he soon regained the strength he had previously acquired, and continued to improve till the 13th of the month. The wound had become clean, and the flesh was of a good red colour, except a part of its lowest internal surface, that was tumefied, and of a livid colour. On the 13th, about four o'clock in the morning, the hæmorrhage returned, but immediately disappeared when the dressings were removed.— This appeared to be the effect of the contact of cool air. A repetition of these accidents at this critical period, gave me much uneasiness; I sought in vain for the open vessel: the ligatures of the arteries that had been first tied, had now come away, except that on the axillary artery, and I felt certain that the blood flowed from no artery that had been previously tied. As the hæmorrhage had now ceased, I determined to wait. The wound was now dressed with colophonia, mixed with powder of bark, and I ordered the stomachick draught to be repeated; at night I prescribed a grain and a half of opium in sweetened wine. No accident occurred, and Barre continued in the same state as on the preceding evening; he took rich broth, light soups, and good claret.

On the 21st day, at the same hour, a fourth hæmorrhage occurred, after a paroxysm of fever of a similar type with the first;—but this last was more acute, and at my arrival, I found my patient in a syncope, that threa-

tened to prove fatal; without loss of time I removed the dressings, while Mr. Frizac, my pupil, supplied him with vol. ammonia. He revived, and I discovered the part from which the blood issued: this was a fungous tumour at the lower and internal part of the wound before-mentioned. I plunged my finger into the middle of it, and after a slight resistance, discovered a large abscess, from which was discharged a considerable quantity of purulent matter, mixed with flocculi of black cellular substance. This abscess communicated by a fistula of considerable size with the substance that lay below the pectoralis major muscle. I divided and separated the walls of this cyst on its external side, and discovered the orifice of the artery that had bled, and with a crooked needle, I applied a ligature on it. I examined the whole extent of the fistula, sponged it clean, and removed all the sloughs of the dead cellular substance, filled up the opening with pledgets of soft lint, sprinkled with camphor and bark in powder: I applied a suitable dressing, and prescribed a cordial draught. He appeared, during the operation, like one who was in *articulo mortis*, and I had no hope of his recovery; we were even on the point of throwing the sheet over his face, supposing that he was dead. But in opposition to the opinion of the assistants, I still ordered stimulants to be applied externally, and administered internally. The warm ethereal frictions appeared to be advantageous, and finally, after these means had been continued ten or twelve minutes, he revived. We were encouraged to continue our labours, and before night, I again entertained hopes of seeing him recover. He was very weak, but much better; his strength gradually returned, suppuration and the other secretions were restored, and in a few days he could take light food. This was fortunately the last accident of the kind that occurred to disturb the tardy restoration of nature.

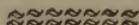
The purulent abscess, in the middle of which the vessel had opened, soon became clean; the flaps sunk down to their proper level, and approximated to contract mutual adhesions. The cicatrix was soon formed, and advanced rapidly from the centre to the circumference.—The occasional symptoms of adynamia that succeeded each of these critical periods, were successfully combated with the chinchona *loxa*, preceded by gentle emetics. The strength of our patient improved daily, but just as he was recovering completely, he was suddenly attacked by the colick of Madrid, after exposing himself to the effects of a cold frosty night, and imprudently overcharging his stomach by the immoderate use of cherries and sallad. His wound was at this time, fortunately for him, almost healed over. I was now much alarmed for his safety, but he speedily recovered, though he had two or three severe paroxysms of the colick, that made him roll over the floor, and scream most dreadfully. His convalescence was tedious, yet I had the satisfaction of sending him off to France on the 30th of July, the ninetieth day after the wound was received, and the eighty-fourth after the operation. I afterwards heard that he arrived safe, and continued well.*

The foregoing case, with those previously reported, appear to me sufficient to remove all doubt of the propriety of performing amputation of a limb when it is affected with *traumatick gangrene*, although it be not defined, and it therefore goes far to decide the question that has arisen on the propriety of adopting this practice.

* This man is now with his family at Castelnaudary.

MEMOIR

ON THE COLICK OF MADRID.



BEFORE I arrived in Spain, I learned that several diseases prevailed there, which the greater part of the inhabitants and physicians of this country denied to be caused by the climate; one of these was the colick of Madrid, which justly attracted our attention.

Dr. Thierry, who travelled through this country, has given us a series of very interesting observations, and the satisfactory results of his inquiries, relative to the climate of Madrid, and the causes of this disease. His work was useful to me as a travelling companion, and served to confirm his observations, while it pointed out the consequences of this distressing colick.

If we accept the opinion of this member of the faculty of Paris, either in whole, or in part, we must stand in opposition to that of the royal academy of medicine of Madrid.* Most assuredly the writings of this celebrated society demand the veneration and confidence of physicians: but if accident or experience should lead to the discovery of errors in the opinions of the most exalted

* *Memorias de la real academia medica de Madrid. Disertacion sobre el colico, del doctor Luzuriaga.*

authorities, must they, through respect for their authors, be concealed, to the detriment of science and humanity? On the contrary, I am of the opinion that every ray of light which can be thrown into the labyrinth of science, is important to its cultivators, and may lead to the discovery of truth. On this ground have I opposed, with unexpected success, the opinion generally adopted in the army, *that amputation of a limb should never be performed until the consecutive symptoms have ceased.* I think that this question has been decided in my "memoir on amputations."

I shall now give some account of the colick of Madrid, as it appeared in the hospitals, or in different parts of the city where our sick were quartered.

I was assisted in my researches into the nature of the the climate, and into the causes and character of this disease, by my associates doctors Herminier and Ribes, physicians to his majesty the emperor.

Upon our arrival at Madrid, early in April, a great number, both of the army and of the imperial guard, entered our hospitals with all the symptoms of the colick of Madrid.

Doctor Thierry, who attended closely to this disease for several years, has given us, as I before remarked, a satisfactory account of it.* And we found the same symptoms prevailing among our sick, with such variations as were produced by the age and constitution of the patient, and by the occasional causes of the disease itself. Without referring to the description of this disease as given by the doctor, and as found in Spanish authors, I shall faithfully report from my journal its phenomena as they came under my own observation. With the greatest possible precision, I shall attempt to point out its causes, and the

* Physical and Medical Observations on Spain.

effects which were produced by the action of these causes, and then shall frankly give the success that followed the adoption of certain curative means, and the precautions that appeared necessary, to fortify the human system against this formidable disease.

The disease commences by constipation and dull pain in the right hypochondriack region, with borborygmus, and pain of the abdomen. The sick feel a sensation of weight in the region of the stomach, accompanied by eructations and nausea: the eyes become languid, the skin of the countenance and vessels of the conjunctiva assume a yellow colour: the base of the tongue is covered with a yellow mucous fur: the appetite fails, and sleep is imperfect.

At first our soldiers paid no attention to these symptoms of incipient disease, and, not suspecting their danger, exposed themselves to the operation of its causes, and lived as usual. A repetition of such lessons as experience inculcates, was necessary to induce them to apply early for medical assistance, to arrest the alarming symptoms that soon made their appearance. On this account, and in consequence of the state of the weather, the disease was most severe during the first months of our stay in Spain.

The foregoing symptoms generally continued without increasing in violence, during the first two or three days, and were then followed by acute pains in the intestines. The colick was sometimes so acute, that the sick rolled over the floor, and uttered the most dreadful shrieks. In some cases, the pain came on without any particular premonitory symptom. When the colick pains are acute, the efforts to vomit become more frequent, and vomiting ensues, by which the contents of the stomach are first discharged, and afterwards, a quantity of thick, bitter bile. Every emesis is preceded by an intense pain about the umbilical region, whence it ascends

up towards the stomach and thorax. The patient is agitated, sheds tears, sighs heavily, and suffers great anguish until the vomiting ceases. A painful stiffness of the limbs then succeeds, with pandiculation, and irregular rigours that are sometimes terminated by a perspiration, although this is by no means general. The bowels become more and more constipated, and the walls of the abdomen are slightly painful when touched, and fall backwards towards the spine. The urine is diminished in quantity, and of a yellowish red colour. The animal powers are lessened, and the patient feels anxiety and sadness: he is deprived of sleep, from the continual state of pain in which he is. But the pulse remains nearly in a natural state, and even during the paroxysms of vomiting scarcely shows any symptoms of nervous disorder. If these evacuations afford a temporary relief to the patient, the pain returns again with increased severity. He then utters the most acute and discordant cries, like the roaring of animals, followed by deep groans, or a sullen silence. The constipation becomes more obstinate in proportion to the continuance of the vomiting. I have seen many persons labouring under this disease who have had no stools for seven, eight, nine, or ten days.

These symptoms continue gradually to increase, more especially when the disease is trusted to the resources of nature alone, or when baths, antispasmodicks, anodynes, and mild laxatives are employed to the exclusion of other remedies.

In the month of May, I saw several soldiers die of this disease a few days after they entered the hospital, in consequence of neglecting to apply for assistance at an early period of the disease. In such cases, the disease was complicated with symptoms of a bilious remittent, or rheumatick fever, according to the temperament of the patient, or the action of additional causes. When

the bilious remittent attacks, which is not frequent, except in irritable and sanguineous habits, the abdomen is inflated and becomes painful, the urine diminished or suppressed, the patient experiences a sensation like a burning heat through the whole abdominal region. Fever increases, the skin is dry and hot, the colick pains diminish, but the vomiting continues, and towards the conclusion, bloody fluids are discharged from the stomach, the alvine evacuations take place involuntarily, the vital powers decline, and the patient dies.

But when the rheumatick fever attacks, the intensity of the colick diminishes; the pain is translated to the extremities, which tumefy and lose their powers of motion: the rheumatism then continues the usual time, and almost always terminates favourably.

In some cases, the colick was followed by a putrid nervous, or malignant fever, more or less acute. On opening the bodies of those who died of this complicated disease, we could perceive no marks of inflammation. The vessels of the epiploon and mesentery were injected with a black liquid blood: the intestines were in some measure inflated, and contained a black bilious matter: their mucous coat was free from inflammation, and the stomach distended and filled with gas and such fluids as had been swallowed before death. In the sigmoid curve of the colon, we found the fœces hard, and formed into balls, the liver tumefied, and gall-bladder with bile of a dark green colour: in short, every symptom indicated the exhaustion of the vital powers, and the effects of adynamia.

Such are the principal phenomena observed by us on inspecting the dead bodies of three soldiers, who died after several relapses of the colick, which finally became complicated with adynamia or ataxia. We opened a fourth in presence of Dr. Herminier. This man was an

ostler at the imperial stables, and had previously suffered violent attacks of this colick, which reduced him to a state of extreme emaciation. He was suddenly attacked with symptoms of adynamia, and carried off before the seventh day. On inspecting the dead body, we found the phenomena the same as in the three foregoing cases: the epiploon was yellow, the vessels filled with black liquid blood, the intestines distended, but not inflamed, and their mucous coat sound. The duodenum and a part of the ilium was filled with a quantity of fœtid bilious matter. The cavities of the heart contained black liquid blood, and its fibre was soft: the lungs presented nothing remarkable.

In a few cases the colick disappeared spontaneously, and without the interference of art. When this is the case, or when the means of which I have spoken prove successful, the pains descend, and seem to disappear in the inguinal regions, instead of ascending from the umbilicus towards the œsophagus, a symptom that Hippocrates observed to be favourable.* The vomiting then ceases gradually, the secretion of urine becomes more abundant, and of a paler colour: the bowels are free but painful: tenesmus is felt, and black hard balls of fœcal matter covered with a yellow mucous substance, are discharged. After these evacuations, the patient enjoys a delightful calm: the pains cease, tranquillity and sleep are restored, and he may now be considered as safe. If these first operations of nature be assisted, he speedily recovers. In many cases, a miliary eruption of the abdomen, loins or thighs, and sometimes an erysipelatous affection of the parts or of the extremities, suddenly removes the colick and all its symptoms. In other cases, after passing through its different stages, intermittent fevers of various

* De humoribus, Sect. 2d. Vol. I.

types ensue. I have several times remarked that these paroxysms suspended the colick, which returned during the intermission.

The duration of this colick is irregular. It seldom withstands a well-directed plan of treatment, if it be persevered in nine or ten days; but the sudden impression of cold, or the least irregularity of regimen causes a relapse which may be reiterated twice, thrice, or four times. After the second or third relapse, the patient is much debilitated, and falls into a state of marasmus, hypochondria, or nostalgia. The limbs, and the legs in particular, remain stiff and feeble for a long time. The prognosis of this disease is generally favourable, although the sick suffer much, and are slowly convalescent: unless the disease be complicated with a febrile affection, but few patients die with it.

I shall now proceed with my inquiry into the true causes of this disease.

Is it produced by metallick substances, as the physicians of Madrid believe? It will be easy to show that such causes cannot be concerned in the production of a disease, presenting, at least till its third stage, no symptoms of inflammation which is commonly observed in the painter's colick, or in that caused by corrosive substances.

1st. The solid or liquid aliment that our soldiers used was not prepared in copper or glazed vessels: their utensils for cooking were made entirely of tin. The glazed earthen vessels in which they sometimes kept their drink, could not be acted on, as it contained no acid, and the activity and changes of a military life did not permit it to remain in these vessels more than twenty-four hours at furthest. Besides, the soldiers generally put a quantity of water in the wine and vinegar which they use while at their meals. They kept their drink in tin cans, and rarely used pitchers, except to carry water.

From the experiments that I have made to ascertain the degree of decomposition produced by applying different acids on the glazing of these pitchers, I am led to believe that persons may drink lemonade or oxirat which has been kept in them for a considerable time, without much inconvenience. I drank intentionally of these fluids after they had been in glazed pitchers, and experienced no unpleasant symptoms; and I then gave them to a number of dogs, and they were not affected in the least degree. This proves that the portion of the oxide of lead, which is separated from this glazing is very small. The common people of Madrid, who are well aware of the dangerous effects of this metal, wash these pitchers with vinegar before using them, or boil in them this or some other acid fluid; and the sellers of this ware always recommend that this precaution be taken before they are used. Yet, it is possible that the colick may be produced by this metallick substance; but when this is the case, the symptoms differ from those that characterize the colick of Madrid. Again, the generals, the superiour officers, and many other people in the army, I am certain, never used these glazed vessels, and they were as obnoxious to the disease as the soldiers, and suffered in a greater proportion, although provided with every convenience. Finally, why is this colick confined to Madrid, when the same glazed ware is used in almost every part of Spain? The French physieians, who, as well as myself, lived for a long time, at different seasons of the year, in the cities of Burgos, Miranda, and Vittoria, never saw this species of colick in these places.

2dly. I satisfied myself by an examination of the kitchen-apparatus of many of the inhabitants of Madrid of all classes, that owing to the prudent custom of covering all their copper vessels with tin, no injury need be apprehended from verdigris, or oxid of copper.

3dly. In France it is no uncommon thing for wine-merchants, who are actuated by a spirit of cupidity, to mix foreign ingredients with their wines (as litharge, or oxide of lead) to sweeten and give them a more agreeable taste: but in Spain, or at least in Madrid, the merchants have no need to resort to the same expedients, as their wines are much milder than those of France, and do not so easily become acid. Mr. Laubert, the apothecary general of the army, analyzed several kinds of wine purchased indiscriminately at several of the inns of Madrid, and he could detect no metallick substances in them, but he obtained a considerable quantity of narcotick substances in extracts made from some of these wines.

To a cat of about three months old, we gave about a scruple of this narcotick extract in a piece of meat, and the same quantity to a large dog. The former died in a few hours in a lethargick state, and the dog continued in a profound sleep for twenty four hours. Several unfortunate circumstances that followed the immediate use of this wine, induced us to extend our inquiries further. An account of these cases shall form the subject of another memoir. The wine does not take up metallick substances from the vessels in which it is kept, and it is generally carried in leather bags that cannot impart to it any unwholesome quality; yet it may still predispose to colick. Finally, can the chocolate, which is much used in this country, and is prepared in vessels of copper, produce this disease? I think not: for our soldiers were not able to procure it; and besides, the inhabitants of Madrid who continually use it would be injured: but on the contrary, they consider chocolate as a wholesome article of diet, and experience confirms their opinion. It was then necessary for us to ascertain whether the chocolate could take up the verdigris, or oxide of copper from the

vessels in which it was prepared, and the examination of these vessels and experiment proved that it could not.

It now remained for us to inquire whether the potable water of Madrid contained metallick substances. These were supposed to be taken up by the water while passing through the leaden tubes that convey it from the fountains. It was also suspected that the water-porters, or *aguadores* carried it about in copper vessels badly tinned. The former supposition was easily refuted, for I was assured that the conduits were nearly all made of brick, and but very few of lead. Could the water of Madrid (which is very well known to be soft and limpid) dissolve the lead while passing through these conduits? It cannot. On the contrary, it deposits the few earthy particles which it holds in solution, on the sides of these tubes, and thus forms a lamellated covering on their internal surface, as I have often seen in the pipes that conduct the water from Arcueil to the suburb St. Germain, at Paris. Thus the water is soon prevented from coming in contact with the lead. Again, if the water of aqueducts produced colick, this disease would prevail in all great cities where lead is used in their construction. As respects the copper vessels, although they may be badly tinned, they cannot impart any portion of the oxide of copper to the water, because it is permitted to remain in them so short a time, and the sides of these vessels are covered with an earthy or calcareous deposition, like that on the sides of the leaden aqueduct. Besides, many of the *aguadores* carry water in casks, or in gray pitchers that are not glazed.

The foregoing facts and inquiries prove incontestibly that the disease called "colick of Madrid," which attacked our soldiers, does not necessarily depend on the action of metallick substances, and that the inhabitants are less obnoxious to it only because they are *seasoned* to the cli-

mate. Moreover, the colick produced by these substances is easily distinguished from the endemick colick of Madrid, which I have called *bilious* or *rheumatick*, that bears a great resemblance to the rachialgia in its cause and symptoms. In the colick that is caused by metals, the symptoms of irritation being rapidly followed by those of inflammation, are by no means equivocal. The pain commences in the region of the stomach, is acute without intermission, gradually extends towards the pelvis, and the umbilicus is forcibly retracted. The first effects of the pain in this disease are, vomiting, diarrhœa, and tenesmus, which take place together. There is sometimes an obstinate constipation, but it does not continue long. The efforts to vomit are more frequent, and do not relieve the patient, as in the colick of Madrid: the pulse becomes febrile, there is a suppression of urine, or the small quantity that is discharged is sanguineous. The abdomen is not so painful to the touch, but becomes inflated before the third day, and if the patient be abandoned to the unassisted resources of nature, more especially when a considerable quantity of metallick substances have been swallowed, the inflammation continues to advance, and runs its course in a longer or shorter time. When the disease is mild, resolution may be effected with great difficulty: if it be violent, portions of the mucous membrane of the intestines are disorganized by the poison, and thrown off and discharged by stool. If the inflammation be very acute, and the poison active, a general death of the animal and organick system is inevitable. In the colick of Madrid, the progress and termination of the disease is quite different. The characteristick signs of the latter* are, the approximation, contraction,

* Doctor Libron, who experienced a most severe attack of the Madrid colick, gives a correct account of the symp-

and pain of the abdominal walls: obstinate, and long-continued constipation, a hardening of the fœces, and their formation into scybala (a symptom that sometimes takes place in the painters' colick, but continues for a short time only) a natural state of the pulse, yellowness of the countenance, eyes, and tongue, with an intermission in the pains of the colick, and progress of the disease. I have observed that these pains increase during the cool weather of the night, and moderate during the heat of the day. The sick have none of these tremours, convulsive motions, and paralysis of the superiour extremities that take place in the saturnine colick.

Still it is possible that these two diseases may attack the same person at the same time, and advance together; the one may be complicated with the other. This was probably the case formerly at Madrid, when metallick substances were more common causes of disease.*— While I remained in Madrid, I saw but two cases of such a complication of disease, and the colick was of short duration.†

This disease may then be considered as endemick in Madrid and its environs, and throughout the plain on which this capital stands, and to the north north-west, as far as the mountains of Guadarrama and Summa Sierra, and to the east and south as far as the Tagus, and to the

toms of this disease in his inaugural thesis. He contends also that it does not depend on a metallick cause. See collection of theses, 1809.

* The art of manufacturing earthen ware was then in an imperfect state.

† There were two of our hospital overseers who suddenly drank about a litre of strong lemonade, prepared the preceding evening in a new glazed earthen vessel. They had attended to the sick, during a cold night, without being dressed as usual, and I am of opinion the cold was the *principal* cause of their disease.

distance of seven or eight leagues in other directions. At Aranjuez, it is scarcely known; at Toledo the physicians say they have never seen it; at Alcala it has seldom appeared; but it appears in the country between Madrid and Aranda, by the way of Buytrago, no doubt, because this route is so highly elevated among the mountains.

I divide the causes of this disease into predisposing, and exciting or essential. The former act immediately on the organs of digestion, and weaken or irritate them:—such are unwholesome drinks and aliment, that injure both by their quality or quantity. For, delicate persons, such as are of a bilious temperament, who make use of rich and oily articles of diet, or meats that speedily fall into a state of putrefaction, are most obnoxious to this disease. The flesh of the veal and lamb is particularly disposed to putrefy during the summer season. The watery fruits are also unwholesome; these articles soon undergo an acid or putrid fermentation in the stomach, and of necessity disturb the functions of this organ: its mucous membrane is disordered by the presence of the gas that is generated, and by the gastrick, pancreatick, and bilious fluids. The small intestines are irritated, and become contracted by spasm, an antiperistaltick motion takes place in them: this irritation is propagated by sympathy to the hepatick apparatus, which now supplies an increased quantity of bile. The fluids are diverted from their usual channels by this inverted peristaltick motion; they are accumulated in these intestines, and poured into the stomach, whence they are ejected by vomiting. If, in addition to the foregoing, a new exciting cause act on the muscular and nervous coats of the stomach and intestines, it is clear that these effects must be increased, and assist in checking cutaneous transpiration, which may be completely destroyed by a sudden transition from a warm to a cold atmosphere. The heterogeneous constituents of

this transpiration being translated to the internal organs, (in a manner that I cannot exactly define,) attack the moving fibre of the stomach, intestines, and abdominal parietes in particular. The rheumatick principle appears also to be produced by a repercussion of cutaneous transpiration, and acts in a similar manner.

Finally, this irritation is extended to and disturbs the whole nervous system of *animal* life, by the communication that exists between the nerves of the eighth pair, and this province of the body: this also goes to prove that the stomach partakes of *animal* life. Do not herbivorous animals ruminate at pleasure, and have there not been men who also possessed this faculty?

These principles being laid down, we shall be able to follow the progress, and point out the causes of the disease with more certainty. When these effects, which may be considered as the *predisposing*, have been produced, the patient feels an anxiety and weight at the stomach, a slight but painful compression in that part of the abdomen, below the umbilicus, attended with acrid and bitter eructations.

All the Spanish wines being sweet and mild, are still susceptible of fermentation, and give out a quantity of carbonick acid gas that disturbs the intestinal canal.— For when they are taken pure, and in large quantities, they are seldom well digested, and particularly if the person be unaccustomed to their use.* Many other articles as I have remarked, produce the same effects, even when taken in the quantity that is usual in other parts of Europe; because the loss of the body by transpiration and other excretions is greater in Spain, and the stomach is thus debilitated and rendered unable to perform its func-

* Cider produces the same effects, especially when used during the first warm weather of the spring.

tions with a due degree of vigour; hence indigestion and its concomitants follow. My experience has taught me that a small quantity of food and wine should be taken in hot climates; the rich sweet wines in particular should be used with caution. In such climates also immoderate venery is to be particularly avoided. Physiologists are well aware that inordinate irritation or excitation of the genital system produces a sympathetick disorder of the stomach.

The peninsula of Spain being separated from the continent by the Pyrenes, and washed on the remainder of its circumference by two seas, rises gradually from its base to its centre, in the shape of an irregular flattened cone, on the summit of which is situated the capital, so that you gradually ascend to it from either side. The summit of this plain is the most elevated part of the peninsula, if we except Sierra Guadarrama, of which I shall speak hereafter. According to the barometrical observations that have been made and repeated by me with the Spanish barometer, Madrid stands at an elevation of four hundred toises above the level of the sea, and two hundred above the level of Paris. At Madrid, during the first fifteen very dry and serene days in the beginning of July, the mercury in the barometer never rose above 27 or 28 degrees; at least I never could perceive a greater variation during several weeks. This elevation prevents the atmosphere from being impregnated with moisture and vapours from the two seas, while the mountains in the vicinity of the sea, and in the neighbourhood of Madrid, arrest the vapours, so that it seldom rains in the summer in New Castille. From the city of Madrid you enjoy an extensive prospect: it is built on the summit and east south-east side of a hill. The Monganares, a small river that rises in the mountains of Guadarrama, runs at the base of the promontory on its north, south, and east.

About six or seven leagues from the city you may see Sierra Guadarrama and Summa Sierra, or the Carpentos mountains, generally covered with snow. These mountains separate Old and New Castille. They bound the horizon of the city of Madrid, and appear like an extensive curve on the east, north, and south, at a distance of seven leagues. The city, from the nature of the ground on which it stands, is arranged like an amphitheatre, and intersected by large irregular streets. The houses are built of brick or granite, four or five stories in height: their interior is of white plaster, or painted in fresco, and the floors of brick or marble to increase their coolness;—these floors, during the winter, are covered with Persian carpets, which are removed in the spring. The sides of the streets are paved with slabs of granite, and their middle with silex or fragments of granite. Every publick place is ornamented with a fountain. The city has an arid appearance, because there are no gardens in its interior, and I saw but three gardens in its vicinity—the *Buono Retiro*, and the botanick garden on the south-east, and the *Casa del Campo* on the south-west. The soil here is thin and sandy, and on digging into it, we find thick strata of silex running in different directions.

From this short topographical description, it might be supposed that the heat at Madrid is excessive between the vernal and autumnal equinoxes. The city is about the 40th degree of north latitude, and has no trees in its vicinity, or in the surrounding country, to afford it shade or retain moisture: add to this that the granite and silicious soil reflect the rays of the sun, and increase the intensity of the heat. Yet the north winds that usually blow, moderate the heat, and render it tolerable. The mercury in Reaumur's thermometer, during the months of May and June, from ten A. M. to twelve o'clock, be-

tween the 23d and 25th degree, and during the month of July, between the 25th and 30th degree, in a gradual manner. When exposed to the light of the sun, the same thermometer rose, during the latter month to 35 and 40 degrees. In the two former months, the mercury fell during the night and until six o'clock in the morning, as low as 15, 14, 13, 12, and 11 degrees. About the beginning of July it never fell below 18 degrees, though the cool winds suddenly sprung up, as is usual at that season.—About the end of July and beginning of August, the mercury rose to 31 degrees, and upwards.

When our army, on its return during the summer, was crossing the arid and scorching Carpentos mountains, the mercury in my thermometer always rose in the shade, at noon, to 32 and 33 degrees.—Our troops were much distressed by this heat.

From these thermometrical observations, the difference between the temperature of the day and night may be perceived. This difference of temperature also obtains in India, and in several other countries of the new world, which from their position and natural topographical situation, have a climate similar to that of Madrid.* During the day the whole animal economy is relaxed, and the capillary system of the skin in particular; a dilatation of the exhalant pores takes place, with a partial fusion of the adipose substance, the copious perspiration thrown out is speedily evaporated or absorbed by the dry air, which passes over and cools the whole surface of the body. The heat of the body is thus reduced to an equilibrium with that of its surface, and the internal are di-

* It appears that a colick, bearing a strong analogy to that of Madrid, prevails in these southern countries, and particularly in Surinam, during the spring.—See the account of Capt. Stedman, Vol. I.

minished in proportion to the increase of the external secretions: the organs are thus fatigued, and rendered obnoxious to the action of morbid causes. The liver in particular, being powerfully stimulated by a superabundant afflux of adipose fluid, must furnish an unusual and disproportionate quantity of bile, if it retain its vital power unimpaired. If in this state of rarefaction and dilatation, the whole body be exposed to a current of cold dry air, or in cool apartments during the night, the skin, which is very sensible, must certainly be acted on in proportion to its sensibility and the intensity of the cause, the pores are closed and contract, the capillary system undergoes an extensive and confirmed constriction, and a species of metastasis or reflux of the perspirable matter and returning fluids of the vascular system ensues: and these heterogeneous principles fall on some part previously excited, change its sensibility, and produce disease. The colick is thus produced after the stomach and intestines have been debilitated by intemperance, passions of the mind, bad food and wine, external rheumatism or febrile dysenterick affections, &c. Then the legitimate symptoms of the disease commence, such as pains in the affected organs, &c. If the intestines be its seat, the inverted peristaltick motion that ensues seems to carry the pain from the umbilicus up towards the cardia and œsophagus. Vomiting soon ensues, with anxiety, constipation, delirium, tears, and sighs. The patient is alarmed, and expects to die. This shows that this disease attacks the nervous system of animal life in a particular manner.

If this first appearance of disorder be not removed, the disease advances, nervous shocks (if I may be allowed to use the expression) are communicated through the medium of the eighth pair, and extend to the limbs: hence rigidity and muscular spasms follow, the large intestines are retracted, and their contents formed in scybala.

the, which are forced towards the transverse colon and the cœcum. The constipation is thus rendered more obstinate and a particular form given to the fœces.

The principal functions of organick life continue almost unimpaired, viz. the secretions, the general nutrition and circulation; the pulse remains in a natural state. The patient becomes emaciated very slowly, the bile is redundant in the primæ viæ, because it is not evacuated by stool: the secretion of urine continues to go on, but this fluid assumes a deep yellow colour, for the bile, in consequence of its remora in the small intestines, is absorbed, and carried to the kidneys by the blood-vessels or lymphatick. By the same process, I doubt not, the whole surface of the body is tinged with a yellow colour; but if the disease continue long beyond its usual period, *organick* life will be affected. Paroxysms of an intermitten, putrid, nervous, or malignant fever then succeed. The malignant fever is a rare attendant on this disease, and the bilious remittent fever seldom occurs in combination with it.

During the first months of our stay in Madrid, the colick was much more frequent and acute than about the end of June and month of July, because our soldiers were encamped under bad tents, that neither protected them from the heat of the day, or coolness of the night. They were also so imprudent as to bathe in the Mancañares immediately after going through their exercise. Among the troops quartered in the city, we had a great many cases of colick, because they were under arms all night without cloaks, and suffered from the action of the cold air.* They also used the wines of Spain immoderately, and they are known to be particularly injurious to

* The Spaniards who adopted the French costume, and laid aside their cloaks, were also attacked with the colick.

those who are not *seasoned* to the climate; and they paid no attention to the instructions given them for the preservation of their health, and to put them on their guard against sudden changes of temperature from warm to cold. When these deviations of temperature were less frequent, and our soldiers abstained from wine and ardent spirits, we had but few cases of colick. The nights of the 10th, 11th, 12th, 13th, 14th, 15th, and 16th of July were cooler than usual, in consequence of the prevalence of the north-east wind in this month. This wind blew with considerable violence during the night, and a great number of our soldiers and our invalids, whose wounds had nearly healed, were attacked at the same time by the colick, from being exposed without covering, while asleep, to the action of these cold winds.

I might here report several unfortunate cases, if they were not known to all our physicians and to many of the Spanish gentlemen of the faculty. I am led to conclude, that the spring, or rather the first season, (for the climate of Upper Spain should be divided in two seasons only, the summer and winter) is the period most favourable to the production of the colick, which attacks new comers in preference to those who are *seasoned* to the climate. Young people and adults are more obnoxious to it than those advanced in age, and persons of a dry and bilious more than those of a sanguineous and phlegmatic temperment: — males more than females, and especially such as are debilitated and convalescent. Persons whose wounds were in a full state of suppuration, were seldom attacked by it, while few escaped this dreadful disease if they were exposed to its causes just as their wounds were healing.

The injury that the nerves of *animal* life sustained, and the pain which continued to affect them, more and more debilitated the intellectual powers, and left a stiff-

ness in the organs of loco-motion. On this account, the convalescence was painful and slow, more especially, if the sick continued still in the same climate. The best means of speedily re-establishing the health of such persons, is to send them to a more mild and moist climate, where the temperature is more equable.

Having made ourselves acquainted with the true causes of this disease, and attentively followed its progress, we shall find no difficulty in meeting the indications that may present themselves in its different stages. When it first attacks, we should endeavour to allay the irritation of the stomach and its dependencies, to re-establish transpiration, and the alvine evacuations. Diaphoretick, antispasmodick, and anodyne drinks should now be used. Camphorated enemata of cassia, theriacal and antispasmodick draughts at night, bolusses of camphor, and musk, camphorated oily embrocations over the abdomen; regimen, rest, and a moderate degree of heat and moisture, which may be produced by evaporating water in the patient's apartment, are the means calculated to fulfil the first indication. Thus have I often arrested the disease in its forming state.

In the second stage of the disease, the vomiting continues with its concomitant symptoms.

When a bilious plethora exists, emeticks should be used without fear, and for this purpose a proper combination of ipecacuanha and antimoniated tartarite of potash may be used, and repeated according to circumstances. This preparation possesses a double advantage. It removes the mucous and bilious contents of the primæ viæ, and produces a change in the irritability and sensibility of the stomach and small intestines, and gradually re-establishes their peristaltick motion. When the patient has vomited sufficiently, the alvine discharges are to be encouraged by bitter diaphoretick antimoniated drinks,

and by camphorated enemata, without omitting the use of the opiates and antispasmodicks at night. If notwithstanding the continued use of the above means, the vomiting should continue, the tincture of opium should be added to the camphorated oily embrocations; to which should be gradually substituted camphorated tincture of cantharides, and bolusses of camphor, opium, and musk given at night.

Finally, the alvine evacuations are established, and the third stage of the disease commences. The camphorated injections are still to be continued, as well as the opiate draughts and the same drinks. The patient should be purged with bitter catharticks, united with an infusion of bark.

Sometimes this colick assumes a chronick form. In this case a vesicatory on the abdomen changes the seat of irritation, and removes the disease. When followed by paroxysms of an intermittent kind, the bark is advantageously used in conjunction with bitters. When complicated with other diseases, the remedies should be varied according to circumstances.

Venæsection, mercurial frictions, or mercury in its various formulas; carbonated hydrogen, and the warm bath and narcoticks, which are recommended by the Spanish physicians, and by them used in the commencement of this disease, are by no means proper. Venæsection is highly dangerous in warm climates, in consequence of the debility in which it leaves the sick, and the danger of their falling into an adynamick state after its use. Besides, in such countries there is no inflammation to require it. Mercurial frictions produce insomnia and cephalalgia. Warm bathing increases the bilious diathesis, and weakens the patients: they feel a temporary relief, while they continue in the bath, but when they leave it, the cool air acts more forcibly on the skin which is softened and ex-

ranked, and irritates it to a greater degree. Opium or laudanum, when given too early, renders the organs of the body torpid, and disposes to indirect inflammation. Evacuants, combined with bitters and diaphoreticks, have proved highly advantageous, and we have found them always efficacious, when exhibited in a proper manner and at a proper time. They were successful among our men in every case.

The grand duke of Berg was cured of a most distressing colick by these means. Many general officers and soldiers of every description who laboured under the same disease, recovered from their use.

When the paroxysms of colick have entirely disappeared, and there remains no bilious saburra, the patient should be put on the use of bark, in conjunction with common bitters or good claret. They may be taken in the morning on an empty stomach. They give tone to this viscus, and prevent the intermittent fever that generally follows the colick.

Finally, if the convalescence from this disease be protracted, the only means of re-establishing the health will be to go into another climate, and to use mineral waters, such as those of Bareges or Bagneres. We recommended this plan to many persons who languished in Spain without a prospect of recovery.

In order to guard against this disease, and several others that are common to warm climates, persons should not arrive in these countries at the season when these diseases prevail: they should select those periods of the year when the temperature of the day is nearly equal to that of the night. This equality of temperature is greater in Spain, during the autumn, or from the end of summer to the middle of winter. While at Madrid, great care should be taken to avoid exposure to the cool air of the night.

While transpiration, and the natural discharge from the skin is kept up in this climate, you have nothing to fear from its endemick diseases; the emunctories are competent to furnish these cutaneous excretions with advantage, and thus to prevent disease. Chronick issues and old gleans secured a great many of our soldiers and the inhabitants of Egypt from the plague that prevailed in that country, and also from the small pox and miliary fever. Respectable travellers have also informed me that similar drains have prevented the yellow fever in America and Spain.

The pores of the skin should be kept open by frequently washing with soap and water, and the strictest attention to cleanliness. They who are obliged to be in the night air, should be provided with warm dresses; cloaks or large capes are well suited to this intention: they may be thrown open during the day to admit the air, and protect the wearer from the sun, and at night they will afford an effectual protection against cold. Hence the use of the Greek and Roman cloaks or mantles is rendered proper in Spain, and in other countries where it is still retained.

It is injurious to health to bathe in the rivers of this country near their sources, because the water is too cold, checks transpiration, and produces a particular sensation in the skin, changes its irritability and impairs its functions. Venereal pleasures should be enjoyed with the greatest moderation, both on account of the climate, and the probability that there may be latent or unknown symptoms of syphilis, which in a cold or temperate climate would not remain dormant.

Animal food should be used very sparingly, with but little pure Spanish wine. Pulse, and light articles of diet, should constitute the principal part of the diet; spirituous liquors should be avoided altogether, and coffee taken

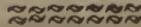
as soon as possible after dinner. A few glasses of ice or iced lemonade may be taken in the evening when digestion is far advanced, or completed. It is not advisable to take them fasting, or too soon after dinner.

The soldiers should make their soup and eat farinaceous vegetables, such as potatoes, carrots, or chick-peas, which are very common in Spain. They should never drink pure wine. Condiments with their food, in moderate quantities, will prove beneficial; such as the canella, pimento, garlick and onions, which are wholesome in warm climates. The fruits of Spain, except the grape, are generally bad, and almost always disturb the organs of digestion.

The most pleasant and wholesome drink that a soldier can take is a mixture of vinegar and water;—this was the *posca* of the Romans: lemonade is equally proper. Finally, he should pay the strictest attention to keeping up the transpiration, by protecting himself with a good cloak during the night, by taking care never to lie on the moist earth, and by taking moderate exercise.

MEMOIR

ON A PARTICULAR MALIGNANT FEVER.



WHILE we remained in Spain, our men suffered much from the use of adulterated wines purchased in the inns of the city. As the publication of this fact might have excited distrust in the army, and interfered with the security of the inhabitants of Madrid, without explaining my motives to the governour-general count Belliard, I requested him to issue an order, forbidding the soldiers, under pain of punishment, from entering the taverns, or the porters of the hospitals from allowing wine to pass through their gates, without an express order from the chief health-officers. As the distribution of good wine, with which our stores were supplied from particular cellars, was regularly continued, and proved sufficient for the soldiers, this order was, in a short time, followed by the best results.

Before I proceed to speak of the extraordinary disease produced by the wine, which I have called the *soporose ataxia*, I may observe that at Madrid, as well as in all large cities, wine is adulterated by different processes; but as I have already said in my memoir on the colick, the wines of Spain contain much of a sweet gummy sub-

stance, and are not easily turned sour; and instead of using litharge, as is done in France, they add the water of different narcotick substances of a stimulating nature, in order that each kind of wine may possess its natural strength and taste. I never could acquire a knowledge of all the substances thus used, but I know that pimento and the lauro-cerasus are among the number, and I have been so informed by Spaniards of credibility.— The inhabitants of Spain are accustomed to these kinds of wine, and are seldom disordered by their use; besides, they drink them mixed with water, and, while smoking their cigars, they swallow the tobacco smoke; it stimulates the stomach and the intestinal tube, and promotes the alvine evacuations, by which the fluids are soon discharged. But our men who drank these wines pure, and without precaution, were much disordered; almost all who used them were ill, and some even died from their use. The first who fell victims to this cause, were four fusileers of the guards, who died so suddenly about the same time in their quarters, that they could not be conveyed to the hospital. Indeed, Dr. Cain, the surgeon of the corps, was called but a short time before they died. According to his report, before death they laboured under all the symptoms which are commonly produced by the narcotick poisons. Similar symptoms were also observed by me in other soldiers who were afterwards sent to the hospitals with the same disease. The first who was admitted was an artillerist, who fell down in a state of insensibility as he entered his quarters, after having drunk about half a litre of wine at an inn; he was instantly conveyed to the hospital, where I saw him immediately. On the 14th of June he still remained in a state of insensibility and lethargy; his eyes were open, immoveable, and dim; his jaws fixed, lips blue, respiration laborious and slightly sonorous, pulse nearly natural,

and extremities cold; the sphincters of the bladder and rectum were relaxed, and his limbs flexible, although in a state of paralysis.

I first directed him to be scarified and cupped over the hypochondriack regions, and ordered the whole surface of his body to be washed with a solution of alkali; cooling antimoniated and ethereated drinks, acidulated with sulphurick acid, to be administered; stimulating enemata were also used.

These means produced no sensible change in his condition: on the contrary, after the expiration of twelve hours deglutition ceased, and his teeth were obstinately closed. I stopped his nostrils to separate his jaws, but he was immediately seized with violent convulsions; his eyes rolled in their orbits, his face was discoloured, respiration irregular and hurried, and the pulse excited and convulsive. It would have been dangerous to try this experiment longer, and I ordered that it should not be repeated. I used a small ebony lever to open his jaws when his drinks were given; I applied two large vesicatories to his arms and legs, and continued the mucilaginous, ethereated, and acidulated drinks, and the stimulating enemata.

He remained in this condition until next day, when the pulse seemed to recover; his eyes were opened and closed occasionally, and sometimes followed the motion of the surrounding objects; his respiration was less laborious, and the involuntary discharges ceased: his limbs performed a degree of motion, and he gradually recovered the use of his external senses and intellectual faculties.

The first words he spoke were indicative of his distress; and he still felt a disagreeable and painful stiffness in every part of his body, with an insupportable weight of the head, and continual vertigo.

The skin of his face was quite discoloured, his pulse accelerated and very small, and his tongue of a blueish colour. The same means had still been continued to this time.

The sudden restoration of the functions of animal life had produced a state of apparent improvement: but it was soon followed by a great prostration of the powers of internal or organic life: the pulse became vermicular, the respiration laborious: convulsive palpitations commenced about the precordia, his tongue appeared of a black colour, his teeth were covered with sordes, and the skin and extremities became cold. The small quantity of urine that was secreted was retained in the bladder, in consequence of a paralysis of this organ.

The fœces were also retained in the intestines: the abdomen was tumefied, and the patient seemed to be in a state of great anxiety and danger. I immediately ordered the best *loxa* bark in generous ethereated wine to be given him, and embrocations of camphorated vinegar to be made over the whole surface of the body, to be followed by a similar application of camphorated tincture of cantharides. Vesicatories were also applied on the hypochondria and thighs, and stimulating and anti-septic enemata administered. Opiate and ethereal draughts were also given internally. On the 16th of June, the prostration was extreme, the pulse almost imperceptible, and the warmth and sensibility of the skin entirely destroyed. The vesicatories had produced no effect: his respiration was hurried and laborious, and the abdomen tense and sonorous, when struck, as in tympanites. Though the functions of animal life were much debilitated, they still continued to be performed until the night of the 17th of June, when he expired.

On the following evening I opened his body. Putrefaction had commenced: the whole body was inflated:

the face tumefied, more especially about the eye-lids, the tongue thick and brown, the membranes and vessels of the brain filled with black coagulated blood, while its medullary substance was of a firm consistence, and gray colour.

The lungs were discoloured, collapsed and free from blood and air. The trachea contained a small quantity of brown frothy humour. There was but little serum in the pericardium. The four cavities of the heart were filled with lymphatick concretions of a citron colour, which were covered on their exterior with a layer of black coagulated blood: the pedicles of these concretions extended into the trunks of the arteries and large veins. I observed no signs of inflammation about the heart and arteries: the abdomen was inflated, and the gas that filled the interstices between the viscera and the abdominal parietes, escaped through the first incision. The epiploon was decayed, and of a yellow colour: the liver filled with black blood, the spleen small, and the stomach and intestines filled with gas. The stomach also contained some fluid. The mucous membrane of the intestines was of a dark gray, or yellow colour: besides this, there was no other sign of inflammation.

The foregoing case, with many others of a similar kind, occurred among our soldiers, and induced me to institute proper inquiries and experiments, to discover their causes. I directed several bottles of wine to be brought from the different inns, and requested Mr. Lambert, our apothecary general, to analyze them. In the extracts of these wines, after they had been evaporated, he found a large quantity of a narcotick substance. On this he made a cat of about four or five months old swallow a scruple, and the same quantity was given to a large dog. The cat died a few hours afterwards in a lethargick

state, and the dog continued in a profound sleep for twenty-four hours. On opening the body of the cat, the same appearances were discovered as above noticed in the body of the soldier.

To complete our experiments, we made a full-grown spaniel swallow half a drachm of monk's-hood, (*aconitum Napellus*) and shut him up in a chamber. He became drowsy in a few minutes after, wakened with surprize, cried, gnashed his teeth, tossed himself about, was attacked with convulsions, and fell into a lethargick sleep frequently interrupted by subsultus of the extremities: next morning we found him dead and rigid, his limbs extended, his jaws firmly closed, and his abdomen inflated.

On opening the body of this animal, we found the vessels of the brain injected with black coagulated blood. The substance of the brain was coloured, and of a firmer consistence than natural. The lungs collapsed, and of a dark gray colour, free from blood or air. The left cavities of the heart were filled with black blood, almost in a concrete state. Of this the right cavities contained but little. The intestines were distended, and of a greenish red colour externally. The mucous membrane of the stomach was friable, of a brown colour, and fell off in lamellæ. The bladder was filled with brown-coloured urine, which emitted a fœtid odour.

A few days after this, a soldier of the guard was brought to the hospital with the same symptoms, namely, a suspension of the functions of animal life, while organick life, although impaired, still performed its functions.

All the means which had been used in the case of the artillerist were now resorted to without success. I imme-

diately opened one of the jugular veins, and procured the discharge of a small quantity of coagulated black blood. The symptoms of soporose ataxia continued to increase, and he died on the second day after entering the hospital, and thirty-six hours after having taken the wine with one of his comrades at an inn.

The advanced state of putrefaction in which we found the body of this man four hours after his death, together with the excessive heat of the weather, deterred us from opening him.

A third was brought from his quarters twelve hours after the appearance of similar symptoms. He lay in a profound stupour, with cold limbs, locked jaws, regular small pulse, and free respiration. He had involuntary alvine, and urinary discharges. After remaining twelve or fifteen hours in this state, convulsions took place, with febrile symptoms. The abdomen enlarged, and black spots soon appeared in the lumbar and dorsal regions. The functions of animal life were suspended, and he died within forty-eight hours. Putrefaction was not so rapid as in the foregoing case, and we opened the body. The same appearances were observed as in the first case.

A grenadier was brought to the hospital with nearly the same symptoms, in a state of stupour and profound sleep; but his abdomen was not inflated. We immediately used acidulated and ethereal drinks, dry alkaline frictions over the whole surface of the body, searified and applied a great number of cups to the abdomen, thorax, and posteriour part of the neck: sinapisms were applied to the feet: and stimulating injections administered: we were in this case so successful as to re-establish the functions of animal life, but in proportion as these were restored, those of organick life sensibly declined. A fever

gradually came on, respiration became laborious, a dysenterick flux ensued, and he felt very unpleasant dull pains in the abdomen and umbilical region. A general distress seemed to take possession of him, he frequently uttered plaintive cries, and shed tears. Yet he answered questions that were put to him: he informed us that he felt himself intoxicated, after drinking but a half bottle of wine at an inn. To the acidulated drinks, I added the use of camphor and etherated *loxa* bark, with directions to increase the dose gradually. Vesicatories were applied to his legs, and his abdomen was embrocated with hot camphorated vinegar.

By these means, and the most sedulous attention, this grenadier was restored to life. But his convalescence was tedious, and his legs and hands remained a long time weak and tremulous.

One of our chasseurs, who had been severely wounded in the shoulder, and a sub-officer, both of whom had an arm amputated and were recovering, died from the above disease, after having drunk some wine that one of the overseers of the hospital bought for them at an inn.

All the means that were used were insufficient. On opening their bodies, we observed nearly the same appearances as in the preceding cases. The abdomen of the chasseur, who had taken most liberally of the wine, became inflated to an uncommon degree, and black spots of various sizes appeared on different parts of his body as soon as he died.

My favourite pupil, Augustus Frizac, died of a similar disease, but in his case it was occasioned by a dose of opium which he took to procure sleep, and to relieve the mental inquietude for the loss of some of his comrades.

The state of torpour in which his stomach was left, the rigours, coldness of the extremities, and anguish that he experienced, induced him to swallow two or three small glasses of brandy, purchased at the nearest inn; with this different narcotick substances had been distilled, as is also the custom in Egypt. Instead of relieving him, this increased the severity of the disease. The functions of animal life were soon destroyed, but those of organick life continued for fifteen hours. The profound lethargy in which I found him, was accompanied with the symptoms that I have just described. When I saw him two hours after he had taken the brandy, I was led to suspect the previous existence of a soporose fever, the consequence of a narcotick poison. We found great difficulty in resuscitating the faculties of animal life in a partial manner, though we lavished every attention upon him that his case required. He was well aware of his danger, and anticipated a fatal result. He expired in the third paroxysm of acute fever, which returned during the day. In his case, the ethereated bark in large doses, with vesicatories to the extremities, and every requisite means were used.

I shall be pardoned for paying a just tribute to the memory of this uncommon young man. Perhaps the memorial of his excellence and virtues may encourage others to imitate him. How few of the age of twenty-three years combined so much talent with every endowment that could render him useful and amiable! Nature had given him a most finished' exteriour. He was conversant in most ancient and modern languages. His extensive knowledge of physick and natural history had already acquired for him the title of adjunct professour in the school of Toulouse, and of corresponding member of the royal academy of Madrid. His attention to the sick was incessant, and to them his purse was always open.

His uncommon modesty and gentleness of character rendered him particularly dear to his acquaintance.

With hesitation do I advance an opinion as to the *modus operandi* of the causes of the disease: but it appears evident that they act directly on the nerves of animal life, and change their galvanick fluid: they absorb the oxygen of the blood, and by setting the carbon of this fluid at liberty, cause it to coagulate. A direct affection of the brain and its dependencies is the result. An immediate suspension of the functions of this organ takes place, and finally, the powers of general life are extinguished.

The absorption of the poisonous principles of narcotick substances, when thrown into the stomach, appears to me to take place in two different modes. First through the arterics of the internal membranes of this viscus, whence it passes rapidly through the sanguiferous system, and, secondly, through the nervous extremities of the *par vagum*, or *pneumo-gastrick* nerves, which convey it directly to the brain. I coincide in opinion with professor Rossi, of the academy of Turin, who has shown in a manuscript memoir, that the nerves are the conductors of all deleterious or poisonous principles, which are highly volatile.* If this explanation be not admitted, we cannot tell why death so suddenly follows the bite of a mad animal, or the deep sting of certain reptiles and vipers of warm climates. We know also that sudden death has often been produced in persons who, while in good health, had absorbed pestilen-

* He produced *rabies canina*, by introducing a portion of the posterioir crural, or popliteal nerve of a mad cat into an incision made in the neck of a healthy dog. This portion of nerve was dissected out, and while warm was introduced into the neck of the dog.—Bulletin of the medical society. No. 35, 1810.

tial miasmata, or mephitis. This opinion I have long entertained, and from my observations while in Egypt, where I saw a great number while sick with the plague, and after death, I am induced to agree with Pinel and various authors, that the glandular system was not affected, but that this disease acted on, and was chiefly seated in the nervous system.*

In whatever manner narcoticks, which generally contain a volatile, acrid styptick principle of a peeculiar smell, do act, they first destroy animal, and subsequently organick life. They first disturb the functions of the former, producing vertigo, tremours, pandieulation, convulsive motions, excess of joy or despair, painful contractions about the epigastriek and hypoehondriack regions, anxiety, and irregular rigours of the extremities in particular, and often of the whole body. To these succeed torpour, loss of perception, paralysis of the limbs and organs of sense and lethargy. If the dose of poison be powerful, the person dies in this condition, and without any remarkable change in the parts of organick life. When the poison is not very active, if by the exhibition of proper antidotes, the dormant powers of animal life be resuscitated and the organs of internal life be stimulated while labouring under the irritation of the poison, a fever is the consequence. The febrile paroxysms thus produced by stimulating and changing the condition of the nerves, vary in degree and violence, and are sometimes followed by adynamia, or internal gangrene.

It is very difficult to counteract the effects of these destructive substances. Acids have been recommended by authors, but were insufficient in the cases already detailed, except in the last. The sulphurick acid was given in an appropriate vehicle, as were also alkaline

* See my memoir on the plague, Vol. I.

drinks and emeticks, while the most powerful topical stimulants were applied externally.

Experiments should be instituted on living animals, to discover the best means of counteracting the effects of narcotick poisons. These fatal cases may teach physicians the necessity of making such inquiries on entering a country previously unknown to them, as are connected with the preservation of health, and of such in particular as are not *seasoned* to the climate.

I regret that I was not sooner advised of the use of the water of supersaturated muriate of soda, recommended by the celebrated Humboldt, to counteract the effects of the *curare*, which the savages of the new continent use to poison their arrows. This means should be tried when persons have swallowed narcotick poisons.

Since my return to Paris, I have observed that several of the guards who were considered as convalescents after mild attacks of the soporose ataxia, still laboured under partial paralysis of the organs of vision, speech, and loco-motion. On examining two of these who were dumb, I found the tongue withered away.

I have always believed that the refined loyalty of the Spaniards could never permit them to poison their wines with the intention of destroying the French. Besides, the natives of Spain drink these same wines. The Spaniards did not encourage syphilitick women to come among our troops, as I had at first supposed. That there is a great number of these women in Spain, is to be attributed to the miserable police of the cities. The generality of those who are affected with this disease are ignorant of its true character, and it is less inveterate in this than in cold countries. I have been consulted by a great number of persons of both sexes relative to this disease, and I am certain they had no correct opinion of it. The best informed persons in this country believe that

this disease is generally hereditary, and had always prevailed among them. It appears that the Spaniards originally derived it from the Arabs. It yields to the plan of treatment common in France, but mercurial frictions should be used with great caution.

With the exception of the unfortunate cases just enumerated, the various diseases that occurred in our hospital during the space of three months, were treated with uncommon success. This success, I think, may in a great measure be referred to the use of excellent bark. The general report sent by me to marshal Bessieres confirms this. I shall insert an extract from my correspondence.

“**SIR**—Since the hospital of the guards has been established in the great city hotel at Madrid, to the first of July inclusive, six hundred sick persons, among whom were also some of the household of the emperor and prince, have been admitted; of these but ten have died, viz. Three of different corps, with acute soporose ataxia. The fourth, a grenadier, was in a dying state as he entered the hospital: his heart was found injured by a sabre-wound. The fifth was stabbed in several places through the abdomen with a knife, and his viscera were wounded. The sixth was wounded by a shot in the abdomen, which injured the spinal marrow. The seventh of a complicated malignant dysentery. The eighth, my pupil Mr. Frizac, with the soporose ataxia; and two others who were wounded. The assistance of art and the greatest care was unavailing in these cases. Two-thirds of these six hundred laboured under acute internal diseases. They have quite recovered, or are convalescent. The healing of some of the wounds is retarded by caries, with loss of substance. Many of them had undergone critical operations. I amputated the arm of young Barre, of Castelnau-dary, Upper Garronne, at the shoulder joint. This

operation was rendered necessary by the traumatièk gangrene which had seized on the whole limb. A second, who was wounded in the abdomen, with lesion of of the stomach and escape of the epiploon, was also cured, with a third, who was wounded in the pelvis, with an injury of the bladder and rectum, &c. &c. &c."

I remarked that the *loxa* bark, mixed in generous wine, with the liquor of Hoffman, produced wonderful effects in simple intermittents, when given in half dram doses. Four or five of these doses were generally sufficient. An emetièk of ipecac. and ant. tart. potash in due proportions was generally premised. This treatment instantly arrested the progress of alarming intermittent fevers, of which we had many cases. We also used this species of bark and opium with remarkable success in the adynamieèk fever. I began with half a dram, and increased the dose according to the acuteness of the disease. This mode of exhibiting it appeared to be preferable to any other.

The *calisaya* bark was preferable to the *loxa* in bilious intermittent, or mucous gastrièk fevers, given in decoction with ether, and other bitters, such as the *serpentaria virginiana*, and chamomile.

The red, or *loxa* bark, was used with great success in gangrenous affections, when given in small doses, with good wine and sulphuric or acetic ether.

These three species of bark which we fortunately found in abundance in the royal stores are the best. It is to be wished that our druggists were well supplied with them, for no article can be substituted for them in these diseases. Mr. Vauquelin has analyzed and given us an account of their constituent parts.

The grand duke of Berg was convalescent from a severe colic, when he was attacked by an alarming inter-

mittent fever. We prevented its consequences by the immediate exhibition of the *loxa bark*, and he was soon able to set out for France, where he intended to use the warm mineral waters of Bareges. He was succeeded by the general duke of Rovigo. Finally, king Joseph, brother of the emperor, made his entrance into Madrid about the end of July, and took the command of the armies in person. A bull-fight was ordered and exhibited to celebrate his accession to the throne of Spain. Fifteen bulls were sacrificed on this occasion.

We were indulging ourselves in the expectation of completing the entire conquest of Spain, when we received information of the surrender of Dupont's division to the enemy, of the insurrection of several provinces, and the sudden march of a great number of the insurgents towards Madrid. In haste we prepared to retreat, and this was effected on the night of the 31st July. Being in want of the means of transporting our sick, and being also uncertain whether we should find the necessary supplies for them on the route between Madrid and Burgos, we were obliged to leave a part of our sick of the line in the hospital of Madrid: but took care to secure to them every assistance that was necessary.

All the wounded of the guards were transported to Burgos, and thence to Vittoria, in the carriages attached to our *ambulances*. We left five who were not able to bear the fatigue of the journey under the care of Dr Honnaud, one of our physicians.

At Burgos we met the victorious army of marshal Bessières, to which the guards were then united, and pursuant to the orders of his excellency, I remained with them. Our passage over the mountains of Summa Sierra was attended with great suffering, from the excessive

heat of the weather, and the various privations that we endured.

The king established his head-quarters at Miranda, and our army encamped on the right bank of the Ebro. The corps of marshal Bessieres, which formed the rear guard, took a position between the fort of Ponte-Corvo and Briesvesca, where we halted some time. During this period of leisure I was occupied in arranging the following observations on the climate, soil, &c. of the two Castilles. (Spain proper.)

Spain, it is well known, forms the extreme southern part of the European continent, and as I before observed, terminates in a peninsula which is intersected by several chains of mountains, of different degrees of elevation, producing remarkable variations in the climate. Along the course of the mountains which extend from Ponte-Corvo, on the right bank of the Ebro, to the shores of the two seas, the temperature during the summer season is very elevated. At Madrid, Reaumer's thermometer rises from 25 to 31 and 32 degrees, though the heat is by no means insupportable. The air is rendered temperate by the north winds which generally prevail in Old and New Castille. These winds, by passing over the snow which remains a long time on the summits of the mountains, are so reduced in temperature, that you cannot stand in the shade while they blow, without feeling chillness. For the same reason, the winds are intensely cold in the winter. The air of these two provinces is dry and piercing, owing to their elevation. There is seldom a fall of rain; when it takes place, it is generally attended with a storm.

The soil of this country rests on a silicious rock, and is principally formed of vegetable exuvia.

The houses of all the towns and villages are built nearly in the same style, and have but one chimney, which belongs to the kitchen. Around the fire of this the women collect during the winter, without distinction of rank or age.

The chambers are warmed in winter by large copper basins (brazeros) filled with coal made of green oak: (*silex quercus*) these are kindled before they are brought into the room.

The influence of climate and unwholesome customs, prevent the Castellians from attaining that physical growth, which we observe among the inhabitants of this country, who live near the borders of Spain. The men of the Castilles are seldom more than five feet one or two inches in height. The women are generally very small; seldom more than four feet two or three inches in height.

The constitution of both sexes is dry and vigorous. The complection of the inhabitants generally, and of those of the country in particular, is brown. The Castellians are generally well-made and muscular. The women are of an agreeable shape, and have fine hands and feet. Their mein is commanding and noble, their eyes black and sparkling, with an appearance of fierceness. Their eye brows are also black and well arched, their noses aquiline, with expanded nostrils, the mouth small, and the lips moderately thick; their teeth are generally inlegant. In both sexes the cranium is very large, of a spherical form, and considerably arched at the vertex.

The physiognomy of the Castellians is forbidding; they are very irascible, and when under the influence of passion their aspect is alarming. They are quick and petulant, and transported to an excess of passion on the slightest occasion: with the most extravagant self love, they cherish the most exalted spirit of independence.

They are fond of quiet and repose, and sacrifice many advantages to obtain them. They bear adversity with resignation.

In our second campaign we saw a great number of these Spaniards who had passed the most rigorous period of the winter in the mountains, and supported themselves on a few cakes of chocolate and pieces of toasted bread. It is true that chocolate prepared with water forms at all times the principal part of the nourishment of these people. They generally eat but little meat, and of bread still less ; but they make much use of the chick-pea (*garvancas.*)

Intoxication is rare among them. During the winter, they always stay near the *brazers*, in which a fire is kept up day and night. The women in particular are very seldom absent from these stoves. Though there is always a current of air in their rooms, owing to the imperfect workmanship of the doors and windows, yet they breathe a portion of the carbonic gas discharged from the stoves while the carbon is in a state of combustion. I consider this as the principal cause of the scorbutick affection of the gums, and habitual tooth ache, of which the Castilians, and particularly the fair sex complain. On the other hand, the purity of the atmosphere, the dryness and warmth of the climate, by stimulating the pulmonary and capillary system, imparts vigour to the animal functions, and increases the calorick of the blood. Hence among the females the catamenia appear at a very early age.

The people of Castille seldom live beyond seventy years. As respects their moral character, they entertain the most elevated sentiments of honour, are generous, intelligent, humane, hospitable, and even polite, if their self-love be flattered.

The Spaniards in general, and the Castilians in particular, are endowed by nature with strong minds, sound judgment and uncommon aptitude in the acquisition of the sciences and mechanick arts. They have a high opinion of their origin, and in this respect consider themselves superiour to the people of other nations; but these sentiments give them a national character, and inspire them with a love of country, and with courage and fortitude undeprivation. I fully believe that when this nation shall be completely freed from the superstitious institutions and customs that have hitherto led them astray and repressed their good qualities, they may be ranked among the most respectable nations in the world.

I still shudder while I think of the atrocious tribunals of the inquisition established in the principal cities of this country. While going to Valladolid, during the second campaign, I visited the subterraneous dungeons of one of the most celebrated inquisitorial tribunals of Spain, and read the black catalogue of its numerous condemnations with horror. I was seized with an involuntary dread on entering the hall where the judges sit, and the room that contains the instruments used when the extraordinary question is proposed. Here are also deposited the apparatus of this tribunal. The grand inquisitor, while he conducted me through the gloomy vaults, gave me every information that I desired.

The army of the insurgents approached our lines, and directed their march on two principal points, viz. Saragossa and Bilbao, with the intention of advancing on one side towards Catalonia, and on the other towards Biscay, to cut off our communication with France. The king marched to meet a corps of the enemy which came from Madrid to reinforce the garrison of Saragossa, and to form a camp under its walls. He sent orders to mar-

shal Bessieres to join him at the royal head-quarters at Haro. We marched along the left bank of the Ebro as far as Logrono, and pushed on a reconnoitring party as far as Calahorra without meeting the enemy, who had retired under the walls of Saragossa.

We made a retrograde movement, and took a position on our former line at Miranda. Our troops being again menaced at Bilbao, we were obliged to march thither in all haste, to drive out the enemy who had already taken possession of the fort; but he made no resistance. We returned to our former position, after leaving a garrison in this place. Head quarters were removed to Vittoria. I attended to the organization of the *flying ambulances*, which were without many articles of the first importance. I ordered a number of mules to be purchased, and furnished with bats to carry dressings, surgical instruments, and drugs, whenever the divisions might require them. The small cars of Biscay, used to cross the mountains and to pass through their defiles, afforded a convenient mode of transportation.

The contending armies remained near each other without evincing a wish on either side to come to an engagement: but we made preparations to commence the siege of Saragossa, and to open a second campaign. The enemy fortified himself in this city, and had taken advantageous positions on the road to Madrid, and had thrown up redoubts and made intrenchments in the defiles of the mountains.

At this time the emperor was announced, and he arrived at Vittoria about the first of October, to which place the guards and several military divisions had preceded him from Paris. To inspector general Percy, who arrived at the same time, I resigned my place of inspector, and resumed my former post in the imperial guard.

I gave a detailed account of my operations &c. during this campaign, to king Joseph, who expressed himself well satisfied with my conduct, and at the same time I reported to the minister the measures I had adopted to improve the staff of the hospitals and *ambulances*.

The marshal, duke of Montebello, while riding carelessly with the emperour, was overturned, together with his horse on Mount Dragon, a rough mountain covered with frozen snow. His horse in attempting to rise, fell on his thorax and abdomen, and injured him considerably. On arriving at Vittoria, he was covered with ecchymoses: his abdomen was inflated and tender, he laboured under acute pain of the bowels, difficulty of respiration, and suspension of voluntary motion. His pulse was small and tense, his face pale and discoloured, his eyes heavy, voice feeble, and extremities cold. The slightest touch of the abdomen produced acute pain and oppression. Every symptom proclaimed an incipient inflammation of the internal organs.

Venæsection and tonick resolvent embrocations would have proved insufficient, and experience had taught me that they are not adequate to arrest the disease that generally follows severe contusions and concussion of these organs. I recollected the surprising cure made by the Esquimaux on the sailors of the *Vigilante*, who were dashed with their boat against the rocks on the coast of Newfoundland; a practice that I have since tried successfully in several similar cases.

I resolved to wrap the body of the marshal in the skin of a large sheep, taken warm from its back, while the animal was still alive.*

* In order to deprive the animal of sensibility, it was stunned by a blow on the neck, and two expert butchers immediately flayed it.

While the butchers were flaying the animal, I prepared and applied a very warm embrocation of camphorated oil of chamomile over all the surface of the duke's body, and immediately afterwards enveloped him in the reeking sheep skin, which was still covered with a copious serous fluid. I adapted it closely to his body, and confined its edges. Warm flannels were then applied on his extremities. I desired him to take freely of light tea, together with lemon juice and sugar.

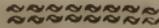
The marshal was immediately relieved, but he complained of a painful pricking, and the attraction that the sheep-skin seemed to exert on his body where they were in contact. But these effects were soon over, and he fell asleep in ten minutes, and remained so for two hours. When he awoke I removed his animal cloak, wiped off the sweat which trickled down his body with a warm cloth, and applied an embrocation of warm camphorated brandy. I applied some compresses dipped in this fluid on the parts most severely injured; prescribed cooling mucilaginous drinks, etherated milk of sweet almonds, and emollient camphorated enemata. At eight o'clock next morning, the swelling of his abdomen had subsided, and was less painful, his pulse was more natural, and his functions restored. His urine which at first had been suppressed, was thick and bloody.

After premising several cups on the parts affected with ecchymosis, I had him put into a warm bath. This was repeated with aromatièk embroecations: the same medicines were continued with suitable variations, and he was able to set out on horseback the fifth day.

The whole army took up their line of march, and advanced towards Burgos, where was the advanced guard of the insurgents.

SECOND CAMPAIGN

IN SPAIN.



THE advanced guard of the French army had an obstinate contest with the Spanish army, encamped near Burgos, which terminated in their discomfiture. The field of battle was covered with the dead and dying Spaniards. We collected all the wounded Spaniards and French together, in number about seventy. Surgeon major Rousel, of the 4th light infantry, with the discernment that extensive experience begets, had operated on all the wounded that required amputation, during the battle. We dressed all those who had not been attended to, and conveyed them to the hospitals of Burgos, taking care at the same time, to separate the Spaniards from the French.

A few days after this, we set out for Madrid by the way of Buytrago. I followed the advanced guard under general Savary, which was composed of the fusileers of the guard, and a part of its flying artillery, and general Lasalles' division of light cavalry.

When we arrived at Boussequillas, a village situated at the entrance of the defiles of Summa-Sierra, we received information that a corps of six thousand troops was intrenched on the heights of Spulveda, and that a

more numerous corps occupied the defiles of the mountains. It was judged advisable, first to attack their camp at Spulveda, but here the wished-for success did not attend us, though the enemy struck his tents and took to flight.

We had but thirty wounded in this affair. I dressed them on the spot and had them conveyed to Boussequillas, and thence to Burgos.

In the mean time, our army entered the defiles of the mountains, and met with no obstacle until it arrived at the intrenchments of the enemy before the village of Summa Sierra; but then the difficulties appeared to be insurmountable. This rugged, narrow road, on the declivity of a mountain, was defended by masked batteries, and the sides of the mountains on either hand of the defiles covered with troops and cannon, and there was no chance of turning on the rear of these formidable positions, without losing much time and undergoing much fatigue. Just at this time a heavy fog arose.

The emperor gave the word, and the light horse of the guard charged impetuously on the intrenchments which commanded the road through a shower of bullets, balls, and fragments of old iron: cleared the ditches, gained the redoubts, cutting in pieces or putting to flight all before them, and made themselves masters of the defile. But this victory was bought by the blood of many in the foremost ranks. This affair may be considered as one of the most brilliant that occurred during the war. The wounded were instantly dressed and operated on near the rough road that winds round the mountain. The carriages of our *ambulance* then conveyed them to Baytrago, and thence to Santo-Martino, near Madrid.

The Spanish forces who escaped our swords dispersed among the mountains, and we arrived at Madrid without further molestation. But the inhabitants of this city

had closed the gates, and determined to dispute our entrance.

They made several discharges of artillery at us, and held out for two days; but at the close of the siege, a brisk cannonade of several hours, and the possession of *Buono Retiro*, which commands the city, induced them to accept the proposed capitulation.

We very soon received information of the arrival of an English army in the province of Zamora, and that they had pushed on their advanced guard to Valladolid. We prepared for a new expedition, and orders were issued be in readiness to march at the word of command. It appeared highly necessary to cut off the retreat of the English on the route to Corunna, the nearest and most convenient sea-port for their embarkation.

With this view, doubtless, we left Madrid on the 22d of December. We marched towards the mountains of Guadarrama, and crossed them on the 23d and 24th of this month. I observed that the mercury in the thermometer fell nine degrees below zero at the foot of these mountains.

The wind blew directly from the north. A considerable quantity of snow had fallen during the preceding days. As we ascended the mountain, the cold, which was already piercing, increased gradually and perceptibly, so that men and horses losing their equilibrium, fell in the road, and many of them were misled on the steep declivities by the thick whirlwinds of hoar-frost and snow. Some of them remained near the road, unable to rise, from the effects of the cold. The flying artillery and cavalry were obliged to stop about the middle of the mountain on a level that presented itself. To have climbed the other half of the Gaudarrama would have been im-

possible.* We were obliged to wait till the next day, when the temperature rose several degrees. In this embarrassing situation, it was difficult to procure wood, and when fires were kindled, they were more injurious than useful to the soldiers. For all who subjected their hands or feet to the warmth of the fire, were suddenly affected with gangrene from congelation, to a greater or less extent. But this gangrene appeared in no case among those who avoided the fire. One of the soldiers of our *ambulance*, having had his right hand affected with the cold as he climbed the mountain, suddenly approached the fire of a *bivouac*, and chafed his hand near it. It instantly swelled in a surprizing manner, like dough when put into a hot oven. When he rejoined his *ambulance* some hours after, his hand was entirely sphacelated, and I was obliged to amputate it at the joint of the wrist. This fact supports the opinion which I advanced relative to gangrene from congelation.

The passage of these mountains was very difficult. I never suffered so much from cold and fatigue. After passing these heights, we entered an immense plain, which appeared to be very fertile.

On the second day of our march, a sleet, attended with rain, succeeded the rigorous cold. With difficulty we marched on to Medina del Campo, whence we passed to Riosecco and Benevento by a cross route. The continued rains, and the boggy soil in which a part of our carriages stuck fast, rendered our march still more difficult, and when we halted we could procure neither straw for the soldiers to lie on, nor wood to dry their clothes.

* See the fine picture of baron Lejeune representing the passage of this mountain.

We arrived at Benevento a day too late: the English army had just passed over the river near this city, and burned the bridge. Our advanced guard crossed it by fording, and soon attacked the rear guard of the English. A sanguinary contest took place, and though our troops were inferior in numbers, they rendered themselves masters of the field of battle, and of a part of the enemy's baggage. The corps of marshal Soult obliged the remainder of the rear guard to retreat in a precipitate manner to Corunna.

They who were wounded in the battle of Benevento, to the number of seventy, were dressed by the surgeons of the corps on the field of battle. Next morning I had them collected in a hospital of the city, devoted exclusively to the guard. Almost all the wounds made by the sabre were extensive and deep. The surgeons had attempted to unite them by the twisted suture, such as is used in hare-lip, with a view of preventing the retraction of the parts. The uniting bandage might have been used advantageously in these cases, as an auxiliary to the suture.

But I did not think proper to remove the dressings here before the third day, because they were applied by skilful surgeons. At the first dressing, after the expiration of three days, we were in hopes of finding all the wounds cicatrized, in consequence of the re-union by suture; but in this we were disappointed. The needles being without the support of the uniting bandage, had produced a local irritation of the thin and delicate skin of the face, and inflammation and rupture of the parts through which the sutures passed were the consequence. A new re-union of the wounds was made by the interrupted suture, with the addition of a bandage applied according to art.

In performing this operation anew I intended to bring the lips of the wound in exact apposition, and to retain them so by means of the uniting bandage, which alone can control the muscular power of the parts and overcome their resistance. The result surpassed my expectations.

With wounds of the face I shall report several cases in which other parts of the body were injured, and some remarkable appearances ensued.

Among the latter was a captain of mamelukes who had several sabre-wounds in his head and left arm.

The skin, the olecranon, a part of the articulating surface of the humerus, the contiguous ligaments, and some branches of the recurrents were divided. Though the wound was severe, I had hopes of preserving the arm. I did not wish to unite the parts by the first intention, for experience had taught me, that an exact union in wounds of the articulations is more injurious than useful, in consequence of the pressure that the uniting bandages produce in the part irregularly divided or torn. Inflammation follows with its train of symptoms, and its consequences are with difficulty prevented. Cataplasms, as I have observed in my campaign in Egypt, increase the obstruction and tumefaction of the parts. Warm camphorated wine is the best topical application that can be used.

The captain was often in a critical state while his wound was under my care: but I succeeded in preserving the arm, which also retained its principal motions.

Ibrahim, one of his mamelukes, was wounded by a pistol bullet, which penetrated the knee-joint, and crushed the rotula. I removed nearly all the loose and detached fragments of this bone, and the wound was simply dressed; he also had some alarming symptoms, but they yielded to the treatment I recommended, and he recovered entirely.

Gabriel Sauvages, a chasseur, was not so fortunate. He received a sabre-wound similar to the captain's, in the left elbow, which divided the articulating portions deeply and extensively. The surgeon had brought the lips of the wound into the most exact apposition; inflammation supervened, and, before the expiration of twenty-four hours, gangrene was the consequence. Without waiting until it should be defined, I resolved to amputate the arm. This operation was attended with the wished-for success, and he left the hospital on the fortieth day perfectly cured.

On dissecting the arm, we found much disorder in the articulations, which must have caused not only the loss of the limb, but endangered the life of the patient.

Whenever a ginglymoid articulation is opened, and extensively injured by a wounding cause, the wound should be examined with the greatest care, in order to decide whether it be not advisable (as I think) to amputate the limb, for by omitting the operation, we expose the patient to certain danger.

The danger of these wounds does not exclusively depend on the admission of the external air. If so, when the wound of the joint is small, the contact of the air would prove as injurious as when the wound is large; but this is not the case. The symptoms that follow should not then be attributed to this cause alone, but to the extensive injury of the ligaments, the synovial membrane, and the aponeuroses that surround the articulations. It is probable that this injury affects the nerves of *nutritive* life that run through these parts; thus the internal organs which receive their vitality from the nerves of the system appropriated to the nourishment of the body, are affected by sympathy, and hence result adynamia, febrile affections, local gangrene with its contagious effects, and

finally, the death of the patient. I have cured a great number of slight wounds of the articulations, but it is difficult to manage such as we have just now described, and a prognosis in such cases is very difficult.

Gardel, a chasseur, had the inferiour half of his nose, and the two eorresponding portions of his checks and upper lip divided by the stroke of a broad-sword. The two maxillary bones were cut through to the palate, so that the inferiour part of his nose, being inverted, hung by a flap of the upper lip over that below. A small portion of the septum narium, and the ala of the left nostril remained undivided.

The re-union of these parts had been attempted by the twisted suture, but the parts had broken loose, and the lips of the wounds separated; a portion of the septum narium alone had formed a slight adhesion to the nose, and this was the only part of the cicatrix that afterwards remained unsightly.

I removed a superficial portion of the edges from this long and irregular wound, approximated and fixed the lips of the wound in the most exact manner, with eleven interrupted sutures, and a retaining bandage. I also returned the maxillary bones to their situations, and kept them together by passing a gold wire around the contiguous teeth of the broken and sound parts. The consolidation of these bones, and the re-union of the soft parts was soon completed, and he left the hospital in perfect health in less than forty-five days. One of the nostrils was obliterated by the tumefaction of the pituitary membrane, and its adhesions to the sides of the nostril. When this young man returned to Paris, I destroyed this adhesion by a perpendicular incision, and kept the nostril open by a tube of lead, to which was afterwards substituted part of a gum-elastick tube.

Philip Thevenir, a chasseur, also had the left eye-brow, the superiour eye-lid of the same eye, the *os malæ*, and a portion of the cheek, including the salivary canal, divided.

The lips of the wound were found retracted and dried: I was obliged to pare them with the crooked seissors, and to introduce seven sutures, to bring their edges into exact apposition and to assist the bandage. The re-union was completed in a few days. The eye retained its natural appearance and there was no salivary fistula formed where the duct of the parotid gland had been divided.

Peter Leclerc, another chasseur, was wounded by a sabre, which divided his nose entirely through, obliquely from right to left, with a great part of the left cheek, as far as the masseter. As the separation of the part in this case was inconsiderable, the re-union was soon completed by the same means as in the foregoing case.

Two other chasseurs, Jerdet and Lejuste, had their noses divided from the root to the base, so that they were attached only by the septum and a small portion of the alæ. Seven interrupted sutures, with a supporting bandage, were sufficient to produce a re-union of the parts and a cicatrix so exact that no deformity remained.

In the case of Riviere Brocard an uncommon cure was effected. He was wounded by a sabre which entered the head at the most prominent part of the parietal bone and divided the skin and the external fibres of the *crotaphite* muscle, as low down as the meatus audicious of the ear: a portion of the parietal bone, with the *dura mater*, as large as a dollar, was cut off, and a thin layer of the brain. The flap with the detached bone had been replaced; but the pain which the patient suffered, the symp-

toms of inflammation which had already appeared, and the spontaneous separation of the flap, induced me to turn it down in, order to extract the fragments of bone and to examine the opening of the eranium and the injury of the brain. I cut out a small piece of the dura mater that turned into the opening of the eranium, made a perpendicular incision in the bottom of the flap formed by the integuments, bathed the wound with warm wine, re-applied the flap, and supported it by a proper bandage. I ordered him to be let blood, prescribed diluting antimonial drinks, antispasmodieks, and low diet.

He afterwards laboured under symptoms which were alarming: the wound suppurated but little, the symptoms gradually subsided, he recovered, and was discharged from the hospital on the 69th day.

The following case is not less important:—Francis Bernard, a dragoon of the guards, was wounded by a sabre in the right inguinal region, at the battle of Benevento. The walls of the abdomen were divided, and a momentary hæmorrhage followed from the epigastriek artery; a large portion of the epiploon was protruded through the wound. The swelling of this adipose membrane having arrested the hæmorrhage, I chiefly directed my attention to the protruded part. As it was now livid, cold, insensible, and removed from its connections, I thought it advisable to cut off all that part projecting beyond the wound, and to return the sound part into the abdominal cavity, after having tied all the small arteries that could be seen. I performed this operation with the success I had anticipated. I placed the patient in a proper position, after applying a suitable bandage, prescribed the remedies and regimen that were indicated, and he recovered in the space of six weeks.

F. Augustus, quarter-master of the horse artillery guards, was wounded by a musket-ball in the same battle, which passed quite through the extensor muscles of the head, from one side to the other, and grazed the inferior occipital prominences, and destroyed their aponeurotick coverings. I dilated both orifices of the wound, drew from it a portion of his shirt, driven in by the ball, and dressed it with emollients.

He soon felt acute pain in the occiput, heaviness and weight in the inferior extremities, and so great a debility in the organs of sight and hearing, that he could scarcely distinguish large objects, or hear acute sounds. His testes diminished in size, and fell into a state of atrophy; the membrum virile also underwent similar changes, and lost its power of action: but his wound improved, the local symptoms disappeared, and he was discharged from the hospital within fifty days.

I shall conclude these cases with that of Rene Bigot, a chasseur of a strong constitution, and passionately devoted to the fair sex. In the battle of Benevento, he was also wounded by a sabre that cut through the skin, and all the convex or salient portion of the occipital bone to the dura mater, of which a small part was also wounded: we could see the right lobe of the cerebellum through the opening in the dura mater. The slightest touch on this organ produced vertigo, syncope, and convulsive motions; when pressure was not applied he felt no pain. I removed the portion of the occipital bone that adhered to the flap, and applied the latter gently over the excavation of the cranium, after having made an incision in the bottom of the flap, to favour the discharge of fluids from the wound. That part of the flap directly over the opening of the dura mater, did not adhere in consequence of the constant serous discharge from the interior of the crani-

am; from this place alone the fluid was discharged, at every dressing, in small bubbles, producing a slight crackling noise. We attributed this to the entrance and exit of the external air through this orifice.

After the first day this man lost the sight of the right eye, and the hearing of the ear on the same side. At the same time he experienced acute pains along the dorsal vertebræ, and a kind of pricking, like the stinging of ants, in the testicles, which gradually diminished in size, and were reduced in less than fifteen days (more particularly the left) to the size of a Windsor-bean. He soon lost all inclination for the pleasures he had so often enjoyed in the company of the fair.

He supported the journey from Benevento to Valladolid, without complaining. His wound was in good condition, and if we except the loss of sight, hearing, and the powers of generation, that appeared to be forever gone, his situation authorized us to expect his recovery, when symptoms of inflammation made their appearance, and continued to increase in opposition to all the means which we adopted to arrest them: the pains of his head and spine were now so violent that he uttered mournful cries. He was always bent in his bed, and lay on his right side; the slightest motion threw him into convulsions, and when he rose to take broths or medicines, he fell into an alarming syncope.

I applied a large vesicatory to his head, prescribed cooling drinks, and such means as were indicated, but the disease still gained upon him, and became complicated with tetanus: he died on the 7th of February, 1809, thirty-nine days after he received the wound.

On opening his body, we observed the following appearances: a great loss of substance in the occipital region, the opening of the dura mater (of which we spoke) opposite the right lobe of the cerebellum, was of a yellow

colour, without suppuration or effusion, the right lobe of the cerebellum had retracted or sunk down, the medulla oblongata and spinal marrow were of a dull white, of a firmer consistence than natural, and reduced to one fourth of their usual size; the nerves which go from them also appeared to be in a similar state of atrophy.

From this pathological fact, we may conclude, that one of the principal consequences of inflammation of the encephalon, is a hardening of the substance of the brain and nerves.

The cranium of the subject of the preceding case, is now among the anatomical preparations in my collection.

Our pursuit of the English was so rapid, that we took a part of them prisoners just as they arrived at Corunna to embark.

The imperial guard halted at Astorga, near the mountains of Asturias; hence we returned to Benevento, and thence to Valladolid, by Rio Secco: near the walls of the latter, I saw the field on which marshal Bessieres met a numerous army of insurgents, and fought the memorable battle that bears its name. On my arrival at Valladolid, I made preparations for receiving our wounded. In addition to the duties of chief surgeon of the guard, by an order of the day, I was invested, *pro tem.* with those of inspector general of the hospitals of the line in this city. The superintendance of the sick and wounded English thus devolved upon me, and proved to be the most arduous part of my duties. The fatigues, the privation, the cold and moisture to which the prisoners had been exposed, while crossing the mountains of Asturias, and the nostalgia that prevailed generally among them, produced a hospital (adynamico-ataxick) fever, which assumed a contagious character. Unless I had immediately ordered the English to be separated from our

troops, the epidemick would have extended to all the hospitals and houses in Valladolid. The sick prisoners were removed into a hospital at a distance from the dwellings of the citizens, and they who were exempt from disease, were sent to spacious well-aired barracks on the outside of the city. I superintended the treatment of the former in person, and proposed such plans as were calculated to preserve the health of the latter, and procured for them, through the kindness of the marshal governour, cloaks, shoes, and shirts, of which they were in great want.

Baron Denzel, commissary general of prisoners, paid them particuar attention, and rendered them every assistance, as they no doubt well remember.

I may also make honourable mention of Mr. Gubert, director general of their hospitals, who attended me in my daily visits to the sick, and acted towards them with the same zeal and disinterestedness as formerly in Egypt.

During the first days after the arrival of the English prisoners, we lost a great number of their sick and of our own, because they were at first received indiscriminately into all the hospitals; but the mortality of the disease soon abated, and disappeared when proper means were adopted. Without doubt the change of winds and temperature contributed to arrest the progress of this epidemick. The excellent bark and wine which the Spanish agents supplied, aided greatly in the cure of the French and English sick. One of the latter, a soldier of the 12th regiment infantry, about 36 years of age, when convalescent from the hospital fever, was suddenly attacked by an anasarea, which was confined exclusively to the right half of his body, while his left side remained nearly in a natural condition. This singular affection re

sisted the means that were used for a long time, but finally yielded to the plan adopted by our physicians.

I will also report an interesting cure in the case of a prisoner, a young English drummer, about twelve or thirteen years of age, son to a corporal of the 12th regiment infantry.

This boy, which the father generally held on his knee, was quite blind, and the pupils of his eyes possessed but little mobility. This loss of sight, his father informed me, came on him suddenly while crossing the mountains of Asturias, during the rigorous cold of the late winter. This cold produced a greater effect on him, as the hair of his head had just been cut close, and he had travelled from Corunna to Valladolid bare-foot, like the generality of the prisoners. I soon discovered that this boy was affected with gutta serena, from the causes just enumerated.

As this was a case of recent blindness, I entertained hopes of curing him. I sent him to one of our hospitals, to remove him from the diseased, and to have him more convenient to me. I ordered at first a saponaceous bath, then put him on the use of diaphoretick bitters, and applied moxa on the course of the facial nerve,* where it comes out of the cranium, behind the angle of the jaw: I directed his head to be rubbed with a camphorated alkaline liniment, covered with a woollen cap, and washed his eyes with warm camphorated wine.

After the second application of the moxa, he saw the light: after the fourth, he distinguished objects and colours, and after the seventh, his vision was quite restored.

* The portio dura, or nervus communicans faciei of the seventh pair.—TR.

I took care to prevent the parts burned by the moxa, from inflaming or suppurating, by the immediate application of ammonia. In order to secure a continuance of this extraordinary improvement, I established a caustick in his arm. I procured a Spanish cloak for the little fellow, had him dressed comfortably, and I finally had the pleasure of seeing him set out for France in perfect health with his father, who was transported with joy at his recovery.

This case, with many others already detailed in this work, proves the efficacy of moxa in paralysis, and I cannot recommend its use in terms sufficiently strong.

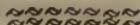
Valladolid being appointed the place of rendezvous for our troops and sick, we were obliged to increase the number of hospitals. But notwithstanding this increase, they were provided with everything necessary, and were well attended. For these advantages, we were particularly indebted to the care of the marshal duke of Istria.

The imperial guard being ordered to return to France, I resigned my place of inspector of the hospitals of the line, to Mr. Percy who was then at Madrid, and with whom I corresponded regularly. To the duke of Istria and the commissary general of the army I made a report on the favourable condition of the hospitals.

I had now fulfilled a painful and difficult task. Overcome by fatigue, and much debilitated by a catarrhal affection which seized me during the campaign at Benevento, to be attributed to fording several rivers, to my exposure to snow, continual cold, and rains, I became obnoxious to the causes of disease, and contracted the hospital fever from the English prisoners. Notwithstanding, on the third day after the symptoms appeared,

I had resolution enough to set out for Burgos, where I was in hopes to rejoin the guard that had marched two days before. But I was seized with delirium on the route, and in all probability I must have perished but for the kind assistance of my pupil and cousin, Alexis Larrey. I was carried to Burgos, and after a dangerous disease was so far convalescent as to be able to set out for Paris, where I arrived with great difficulty.

CAMPAIGN IN AUSTRIA.



I WAS still a convalescent at Paris, when the Austrian campaign was about to open. Without waiting the entire recovery of my constitution from the shocks it had sustained in Spain, I set out on the 22d April, 1809, to join the imperial guard, then in Bavaria.

On our arrival at Strasburg, we learned that the French and allied army had obtained a victory over the Austrians at Ratisbon; a few days afterwards, we met a large body of prisoners, on their way to France. We passed over the fertile plains of the nearest countries of Germany. At Munich, I paid a short visit to Dr. Sœmmering, who gratified me a third time with a view of his rich and valuable collection of pathological anatomy.

A sanguinary conflict took place at Eberberg, between our advanced guards, and that of the enemy.

After a few days' forced march, we overtook the guard, previous to its entering Vienna. The emperor received me kindly, and ordered me to prepare my *ambulances* for another campaign.

The enemy, on leaving the capital, had caused the gates to be shut, in order to oblige the inhabitants to defend themselves. After passing the Danube, they cut away the bridges.

A bombardment for a few hours, and preparations for a siege, induced the inhabitants, and the troops in the

city, to propose a capitulation, which was agreed on, and the next day we took possession of the town.

New preparations were immediately made to carry on the campaign, and bridges were constructed to pass the river and pursue the enemy, who had taken position on its left bank.

The place at which the Danube divides into several branches, and forms a number of islands, was selected for the purpose of crossing. Lobau, one of these islands, is of considerable extent. On the 21st of May, the imperial guard and several divisions from the main body, took possession of this island. Bridges were immediately thrown over the remaining branch of the river, and the attack on the advanced posts of the enemy commenced with spirit; but was not decisive. Our troops remained masters of terra-firma, and next morning covered the landing of such divisions as were enabled to reach Lobau; for one half of our forces was detained on the right bank of the Danube, by the breaking of the first bridges; notwithstanding, a general attack was made, and the terrible battle of Elchingen was fought, in which the infantry of the guard bore the brunt, and displayed such intrepidity and valour. This engagement, like the former, was indecisive. We fell back during the night of the 22d, to the isle of Lobau. This was effected with much difficulty, on account of the small number of bridges, and the slight manner in which they were constructed. My first *ambulance* was posted at the entrance of a small forest, on the left bank of the river, where we performed the requisite operations on all those who had been severely wounded during the conflict. They who were slightly wounded, and could be transported without danger, were carried as fast as possible to the island, where other *ambulances* awaited them.

At a short distance from this dangerous post, the marshal duke of Montebello was mortally wounded: he was on foot, returning from the field of battle to the emperor's head-quarters. A ball of large size, after rebounding, struck his left knee, passed through it, and changing its direction without losing its force, grazed the right thigh, cut the integuments, and a part of the vastus internus just above the knee joint, which fortunately was not injured. He instantly fell, and suffered a violent concussion of the brain, and general prostration of organick power.

Being immediately informed of this accident, I repaired to the spot in all haste, and had him conveyed to my *ambulance*. His face was livid, his lips pale, his eyes dull and watery, his voice feeble, and pulse scarcely perceptible. His intellect was so much disordered, that he was ignorant of his danger.

I was quite overcome at the sight of one thus severely wounded, who had honoured me with his friendship, and to whose wounds I had before attended in Syria and Egypt. But I summoned up all my resolution, and requested the assistance of some of the most experienced surgeon majors. We examined both wounds with great care. That on the right thigh was simply dressed, as not being serious. But the wound of the right knee was alarming, on account of the comminutive fracture of the bones, rupture of the ligaments, tendons, and popliteal artery. My comrades were unanimous in favour of immediate amputation, but no one was willing to undertake it, as so little prospect remained of his recovering, under circumstances so unpropitious. Being encouraged by several successful results in similar cases, and led on by a small glimmering of hope, I determined to perform it myself. The operation was completed in less than two minutes, and he showed little sign of pain.

I applied the usual dressings, and after conducting the duke to the island of Lobau, where the emperor met him, I intrusted him to the care of Mr. Paulet. With regret I left him; but I was the only inspector on the field of battle, and a great number of wounded on the island, whither they had been transported, still required our assistance. We never rested from our labour, until all the wounded were operated on and dressed. To my co-labourers, Messrs. Rayfer, Cothenet, Mouton, Jourda, and Maugras, am I particularly indebted, for their assistance on this occasion.

Notwithstanding the promptness and efficacy of the means used by us, the wounded were still in a perilous condition: they were stretched on the earth, collected in groupes on the bank of the river, or scattered about in the interior of the island. The earth was dry in consequence of the heat of the days, but the nights were moist, and even cold. The frequent squalls of wind often covered the wounded with clouds of dust. They were but imperfectly protected from the rays of the sun, by the branches of trees, or bundles of reeds.

The breaking down of the bridges, and the want of boats to bring provisions, added still to our misfortunes, and we all suffered much; more particularly the wounded, for good food and comfortable drinks. I was obliged to order broth made of horse-flesh, which, for want of salt, was seasoned with gunpowder. Yet, this broth was not black, but quite pleasant: it became clear by boiling.

On the third day, we fortunately received all sorts of provisions, and were able to issue rations regularly. On the fourth day, the bridges were rebuilt, and all the wounded conveyed to the hospitals prepared for them by inspector general Heurteloup, at Ebersdorf and Vienna. I received the wounded of the guards in the superb barracks at Reneveck, formerly appropriated to the

use of the imperial school of artillery, and here they remained until their cures were completed.

The weather was now variable, and very stormy. I went to visit the duke, who had been removed to Ebersdorf. I found him very weak, in a state of great depression and death-like paleness. His ideas were incoherent, and his voice interrupted. He complained of a weight in the head, felt restlessness and oppression, and sighed frequently. He could not bear the weight of the light covering on his bed. He had hitherto used acidulated iced drinks.

The temperature of the air had suddenly been reduced by the changing of the wind from south to north, and by the storm of rain on the preceding evening. I therefore proposed to the physicians, who attended him in my absence, to cover him with flannel, to give him good broth at short intervals, with good wine, and to omit the iced drinks. His strength was in some measure improved, and his sleep more calm. On the next day, his wounds were dressed for the first time. They had discharged a purulent serum, the wounds of the stump had a good appearance, and that on the right thigh led us to anticipate nothing unpleasant: a portion of its edges had already united. We covered the first plasters with a simple digestive, and soaked the compresses in warm sweetened wine. During the first twenty-four hours he was so calm, that I began to indulge a hope of his recovery, contrary to the opinion of my colleagues. But on the night of the sixth day after the accident, a dangerous paroxysm of fever came on. Doctors Lanfranc, Paulet, Yvan, and myself, met in consultation, and agreed to give him bark in large doses, with the addition of sulphuric ether, which was done. A second though less severe paroxysm of fever returned about two hours after the first, and a third ap-

peared in the course of the day, with delirium, and complete prostration of the vital powers. Still his wounds had no appearance of gangrene, but the suppuration was diminished. Dr. Frank, of Vienna, also visited him, and approved of what was done. But he died on the ninth day after the accident.

I was desired to embalm his body, which was conveyed, during the night, to the castle of Schœnbrunn. At break of day, next morning, eighteen hours after death, we commenced the process, though putrefaction was rapidly advancing. I found it difficult to inject the vessels, and to evacuate the cavities. I was obliged to remove all the cellular substance from the surface of the body and interstices of the muscles; the heart contained but little blood, and the brain had left the dura mater, about twelve millimetres. The vessels which pass from the pia mater to the brain were broken, a small quantity of black blood was effused in its circumvolutions, and the ventricles were full of a reddish serum.

Having completed this dangerous and painful task, I returned to the hospital of the guards, where a great number of the wounds were complicated with acute diseases. Tetanus and the hospital fever were productive of the greatest mortality. To the former disease the young soldiers were most obnoxious who had been wounded in the ginglymoid articulations, or deeply in the soft parts, with loss of substance.

The symptoms accompanying the latter disease were nearly similar to those we had seen in Egypt, but there the tetanus was more severe, and bore a nearer resemblance to the hydrophobia. I remarked, both in Germany and Egypt, that when traumatic tetanus followed wounds of the nerves in the anterior regions of the body, it was of that kind called *emprostotonos*, and when the nerves of the posterior regions were injured, *opisthotonos* was

the consequence. Again, if a limb were wounded, so that the injury of the anterior and posterior nerves was equal, complete tetanus was produced. Trismus or trismus alone is seldom caused by wounds, but is generally the consequence of general tetanus.* I have also remarked that this disease is not often caused by wounds, unless the temperature of the atmosphere pass suddenly from one extreme to another. The wounded who were exposed, more especially in the spring, to the cold moist air of the nights when the north north-west winds prevail, were more obnoxious to tetanus: on the contrary, the disease seldom appeared when the temperature of the air was nearly uniform.† Hence we may conclude that this change of temperature is a predisposing cause of tetanus, and that surgeons should guard against it in their treatment of the wounded.‡

On opening several dead bodies, we have also discovered a considerable quantity of lumbrici in the intestines, but we found no evidences of inflammation. They might have acted as an additional cause of tetanus.

* I speak of traumattick tetanus alone, for spontaneous or internal tetanus is not always followed by the same results. See the authors who have written on this species of the disease.

† After the battle of Eylau, not a soldier of the guard was seized with this disease; and I know that but few of the line were attacked by it. The most remarkable case in which tetanus terminated fatally, was that of a young officer, son of general Darmagnac, the consequence of amputating his arm. I saw him in his last moments. On dissecting the stump after death, with Mr. Ribes, we found the median nerve included in the ligature with the artery. The extremity of this nerve was tumefied and red.

‡ These observations and suggestions of our author most strongly inculcate the necessity of attending to the inferrences which naturally grow out of the doctrines on inflammation, noticed in vol. i. p. 179.—T.R.

A remarkable appearance was observed in the case of a soldier belonging to the 75th regiment, who had tetanus in consequence of a wound of the right thigh. The ball having entered on its anterior part, was lost in the thick portion of the thigh. The cold bath, recommended by some physicians, was used. The first two applications of it produced a most distressing sensation, and the patient derived no benefit. When he saw the bath a third time, he felt an invincible dread of water, and refused to go into it; but he was covered with a sheet, and plunged into the water without suspecting it. As soon as he was immersed, the tetanick rigidity increased, and he fell into violent convulsions. It was necessary to remove him instantly from the bath to his bed: at this moment deglutition was obstructed, and the muscular contraction and rigidity had reached their acme; a tumour, as large as a hen's egg, suddenly appeared on the edge of the linea alba, under the umbilicus. He lived several hours, and his intellectual faculties remained unimpaired, as I have always remarked in traumatick tetanus*. At the end of the day all his functions suddenly ceased, and next morning he died.

* I have seen the general cold bath in traumatick tetanus produce increased rigidity, general spasm, and difficulty of respiration, without an amelioration of the symptoms when first used. But when repeated, these unpleasant symptoms did not return, at least to so great a degree; and finally the spasms, rigidity, and profuse perspiration were completely arrested by it. When the sudden immersion of patients labouring under tetanus has produced spasm, &c., I have directed the cold water to be poured gradually over the body; if they could not bear this, a sponge to be dipped in cold water, and applied to every part in succession. By moderately raising the temperature of the water at first, such patients have been enabled to use the bath, and then its temperature was gradually reduced with advantage. In cases of traumatick tetanus that have fallen under my notice, I have ascribed the cure principally to the repeated use of the cold bath. The patients were kept in it but a few minutes, and then removed to their beds.—T.R.

I proceeded to open the body in presence of Messrs. Galette and Trachet, surgeon majors. It was as unyielding as a plank, and perfectly straight: consequences of complete tetanus.

The tumour before noticed near the linea alba, was still apparent; the abdominal walls were retracted to the spine, and his jaws firmly locked. After making a crucial incision in the abdomen, we laid bare the parts which formed this tumour, by a careful dissection. It was composed of a portion of the right rectus abdominis, contracted at this part into the shape of a pin-cushion, in consequence of a rupture extending quite across it. This rupture was seen below filled with black coagulated blood; though extensive, it must have been spontaneously produced when he was plunged into the cold bath. The viscera of the abdomen were reduced to a small mass, and forced into the hypochondriack and pelvick regions; we found several lumbrici in the small intestines, but no traces of inflammation: the cavities of the heart were free from blood, and their walls in contact. The brain presented no remarkable appearance. On opening the wounded thigh, we discovered the ball on the linea aspera of the femur, near the great trochanter. The crural and sciatick nerves had been wounded at the entrance of the ball, and where it passed through the soft parts; by this two-fold injury, was the tetanus doubtless produced.

A few died with tetanus after amputation; we opened the bodies of two who had fallen victims to it: in one, whose arm had been amputated, the median nerve was found included in the ligature with the humeral artery, and tumefied below the ligature, so as to resemble a mushroom*; it was also much swollen above the ligature, and of a red colour.

* This appearance has been observed by other anatomists.

On inspecting the other, whose leg had been amputated nineteen days before, we also found the nerves enlarged at their extremities, and adhering to the surrounding parts. Several years ago I observed that the ends of nerves, which had been divided in amputation of limbs, were considerably enlarged, forming a kind of button, whence very fine diverging nervous filaments seemed to rise, doubtless intended to convey sensibility and vitality throughout the cicatrix of the stump, which is formed of a great number of vessels united with these filaments. The existence of these vessels is proven by the elegant injections of Dr. Sæmmering. This fact serves to explain why tetanus appears at particular periods, and why persons after amputation suffer more or less from variations of temperature. In the former of these cases a nervous twitching commenced, and extended rapidly from the extremity of the divided nerve to its neighbouring branches, and from these branches to the trunks, so as to invade the whole nervous system except the brain: for it is a singular fact that the brain is not disordered when the nerves, and in particular those of animal life, are extensively injured. In the great number of persons that I have seen attacked by traumatiæk tetanus, the mental powers and faculties were not perceptibly altered. This is then the most certain diagnostick by which we distinguish traumatiæk tetanus from the convulsive affections that follow injuries of the brain.

In the last of the preceding cases I took notice also that there had been a suppression and repercussion of the purulent discharge from the wound, and cutaneous transpiration had been checked by a sudden change from a high to a low temperature.

The wounded who were most exposed to the cold moist air of the night during the spring, after being subjected to the excessive heat of the day, were generally

seized with tetanus, which never appeared, except when Reaumer's thermometer rose at noon to 19, 20, 21, and 23 degrees above zero, and fell during the night to 13, 12, 10, 9, 8 degrees. I made the same remark in Egypt.

Having made myself perfectly acquainted with the true causes of this disease, the plan of treatment was less complex. I also used with great success several means which were suggested to me by the knowledge I had acquired of the pathological phenomena of the nerves. These shall be noticed:

1st. When the nerves are included in the ligatures with arteries, after being divided:*

2dly. When they are suddenly and severely acted on by cold moist air, after the sloughs fall off:

3dly. When they contract intimate adhesions with the neighbouring parts of the cicatrix:

4thly. When there is a fracture of the articulating extremities of bones, or when foreign bodies puncture or tear the sensible parts of the wounded limb.

* Though many respectable authors and a great many practitioners are not afraid to apply the ligature on the nerves when they tie the neighbouring arteries after amputation or in the operation for aneurism, yet I am of opinion that it may prove dangerous, in consequence of the manner in which it is performed or from some unforeseen symptoms that may take place. For if the ligature be not applied so tight that the course of the nervous fluid is completely arrested I have always remarked that these symptoms ensued, and even when the nerve is in a state of strangulation if the parts still swell beyond the usual period, these symptoms may be produced from the twitching in the nerve above the ligature. It must then be difficult under any circumstances to apply a ligature on a nerve without inconvenience, admitting that there were no acute pains at the moment of its application which is not the case. It will be at least prudent to avoid the application of a ligature on the nervous cords, and more especially in a temperature favourable to the development of tetanus. If we be obliged by circumstances to include them in the ligature it should produce by its tightness a complete and total constriction of the nerve.

I have often removed the symptoms of incipient tetanus by adopting such means as are suited to remove its causes, viz. by cutting the ligature of an artery in which a nerve is included, and to which the patient refers all his pain, and where the nervous irritation takes its rise. This division of the ligature arrested the disease in its forming state and expedited the cure of the wounds. There is no danger of hæmorrhage, if the vital powers be not debilitated and there be no predisposition to adynamia. A few hours of direct compression, which brings the walls of an artery into contact, are sufficient to induce adhesive inflammation, as I explained in the memoir on hæmorrhage. In order to perform the delicate operation of dividing the ligature of an artery, a grooved probe is to be introduced between it and the artery, and the point of a very sharp straight pair of scissors is to be passed down this groove to cut the ligature. I have succeeded in this operation five times. In one of these cases a soldier was threatened with tetanus, in the others the ligatures were fastened firmly in the cicatrices, and might have remained there during life, as I have frequently seen.

Epispasticks of cantharides applied to the wounds in which suppuration is suspended and the denuded nerves irritated by the contact of cold moist air, will also prevent tetanus. When these applications are made on the appearance of the first symptoms, the natural sensibility of the diseased nerves and the secretion of pus will be re-established. The cutaneous transpiration is to be promoted at the same time, by embrocations of very warm camphorated oil of chamomile, with the addition of tincture of opium, by covering the patient with flannel, and by the exhibition of vermifuge medicines, if there be a suspicion of worms in the intestines. I have used these

remedies with success when cold has been the predisposing cause.

When I suspect the compression of a nerve by the enlargement of the neighbouring vessels or by the adhesion of parts of the cicatrix, I do not hesitate to apply the actual cautery until I reach the points of the disordered nerve, and sometimes I carry the cautery even to a greater depth. This application, justly recommended by the physicians of antiquity, has produced most surprising effects. By destroying the adhesions and preventing the twitchings of the nerves it removes spasm and irritation.

It is also possible, that the calorick may relieve the torpor produced by the action of cold and moist air on the nervous system.

In the fourth case amputation of the limb was indicated and followed by success. I have spoken of it in my first memoir on tetanus. (See campaigns in Egypt.)

Without going more minutely into the theory and symptoms of this disease, I shall report the most remarkable cases of cure from the means that I have just pointed out.

CASE FIRST.

Charles Yorick had his right thigh amputated for an extensive fracture of the knee by a cannon-ball. He was attacked with tetanus on the eighth or ninth day. The irritation or nervous spasm, according to the report of the patient, commenced at the part where the ligature was applied on the vessels. The suppuration of the wound had diminished and become sanious. We used epispastick ointment in the dressings, prescribed warm oleaginous

and camphorated liniment to the surface of the whole body and diaphoretick drinks and strong doses of opiates. These means were continued three days and scarcely retarded the progress of the disease. Suspecting that some of the principal branches of the crural nerve were included in the ligature of the femoral artery which still remained, I cautiously passed the point of one blade of a pair of sharp scissors down along a grooved probe and directing it between the artery and ligature divided it. This simple operation appeared to relieve the tetanick symptoms for some time, but the irritation had already extended too far, and I am of opinion that the action of cold and moisture to which he was exposed during a stormy night succeeding a very warm day, was the principal predisposing cause of tetanus in his case.

As his symptoms continued to advance, and deglutition was very difficult, I resolved to apply the red-hot iron on the whole surface of the stump, which was done next day. By applying an iron brought to a white heat several times, the cautery was made sufficiently deep, and extensive. The operation was very painful, but he bore it with fortitude. To my great surprize, he was decidedly better in the space of a few hours. The jaws before locked, opened at will, and his deglutition was less difficult. The rigidity of the muscles gradually disappeared, suppuration was re-established in the wound, and the eschars sloughed off in due time. This wound healed from the circumference towards the centre, and before the expiration of two months, he was quite well. In the mean time, the use of camphor, opium, and diaphoretick drinks was continued.

CASE SECOND

John Viesse was attacked in the same manner on the fifth day after having undergone the amputation of his left thigh. We adopted the same plan of treatment. The actual cautery was the last resort. Its first application removed all the symptoms of tetanus, but perhaps it might not have proved so successful, if general remedies had not been premised.

He was improving in an uncommon manner, and the cicatrix of the stump was about to form, when he fell into a state of adynamia, from which we could with difficulty retrieve him. But he finally recovered, and was sent to France with others. A rigidity in the stump and inferior jaw remained with a *tic douloureux*, in the muscles of the lips, but these gradually disappeared.

CASE THIRD.

A ball struck Francis Demare, and carried away the skin and a part of the spine of the right scapula, with a portion of the trapezius, and of the infra and the supra spinatus muscles. The division of the strangulated aponeurotic ligaments, and the excision of the disorganized flaps, was made on the field of battle. Some loose pieces of bone were also extracted at the same time, and the wound dressed with a split roller, &c., as usual. Suppuration went on without any unfavourable symptoms, and the wound began to heal around its edges, when he was suddenly seized with tetanus, which, like an elec-

trick shock, extended from the wound over the whole nervous system, and in a few hours he was in a state of complete opisthotonos:

His head was thrown back on the shoulders, the jaws locked, and deglutition very difficult. I immediately prescribed diaphoretick drinks, and large doses of opium. Camphorated oleaginous, and narcotick applications were made to the whole surface of his body. The dressings were mild, and applied over the wound without touching it. In short, every remedy and care was lavished upon him. The secretion of pus was suspended, the edges of the cicatrix enlarged, and in forty-eight hours the wound was half its former size. He then complained of a painful compression in every part which had healed. He told us that the edges of the wound were as painful as if forcibly seized with pincers; and the slightest touch on this very delicate cicatrix, more particularly with metals, made him utter the most acute cries. The symptoms of tetanus were evidently becoming more and more alarming. The superiour extremities were uncommonly rigid, and drawn backwards: the cervical vertebræ were thrown into a curve posteriorly, and deglutition was quite obstructed. In vain we extracted two incisors to introduce the tube of the sucking bottle. Not a drop of fluid could pass into the œsophagus, and when clear water was brought near him, he fell into convulsions: he had the greatest dread of it, as I have often seen in cases of tetanus. The salivary foam was augmented at this critical time, and all the symptoms increased to an alarming degree, and he still had no symptoms of delirium. It now appeared impossible that he could survive twenty-four hours, if some efficient remedy was not adopted. I now ordered four large irons to be brought to a white heat, and applied them in immediate succession over the whole wound, and particularly on the

parts of the cicatrix where I suspected that some branches of the accessory of Willis (the spinal nerve) were compressed and enlarged. This application was very painful, but I persisted in it until every part of the wound was deeply and completely cauterized. This was scarcely done, when a copious perspiration took place, and the symptoms were arrested. He sat up without assistance, and called for drink. His jaws relaxed spontaneously. I gave him a glass of nitrated milk of sweet almonds, in which were mixed sixty drops of laudanum, and a few drops of Hoffmann's anodyne liquor. I ordered the camphorated narcotick liniments to be repeated, and his body to be wrapped in very warm flannels. An abundant critical sweat followed: he became quite calm, and enjoyed several hours of easy and refreshing sleep. On the following morning, I found him free from all symptoms of tetanus, with the exception of a slight stiffness about the jaws and spine. The dressings of the wound were mild and simple, and applied with the greatest delicacy. The eschars sloughed off between the ninth and tenth days, and the cicatrix then commenced without pain. He improved daily, and his cure was complete within sixty days, when he set out in good health for France. A degree of stiffness in the motions of the shoulder and arm of the wounded side still remained.— This cure is among the most remarkable in military surgery.

CASE FOURTH.

Jacques Lucas, a grenadier, had the calf of his leg carried away by a ball. He was dressed on the field of battle with the same precautions as in the foregoing case,

and then carried to Reneveek, where he was well attended. The eschars of the wound separated, and the cicatrix was forming, when he was attacked by tetanus, but not in a manner so sudden and violent as in the last case, — we also used the same means, and in particular large doses of opium. Notwithstanding, opisthotonos was completely, though gradually, formed, and attained its third stage. In a few days the jaws were locked, and deglutition became more and more difficult. Being already convinced of the inefficacy of the usual remedies, I did not hesitate to apply the actual cautery; the irons were brought to a white heat, and applied in immediate succession; the improvement was nearly as rapid as in Demare's case. The symptoms sensibly abated, but he continued to feel a stiffness in the jaw, in the spine, and in the leg and foot of the injured extremity. When the eschars fell off, after the first cautery, I again applied the hot iron, which entirely banished all tetanick symptoms. The wound now remained to be healed; it appeared to be in the best condition; but by the most disorderly intemperance, he brought on an ataxick fever, with gangrene of the leg, and fell a victim to his own imprudence, after his tetanus had been evidently and completely cured.

CASE FIFTH.

A chasseur had the index of the right hand extirpated at its articulation with the metacarpal bone, in consequence of a wound of this finger by a ball, in the battle of Esslingen. A troublesome hæmorrhage from one of its arteries induced us to apply a ligature on the vessel, and the concurrent nervous branches were also included in it. Several days elapsed without accident, and the ci-

catrrix was nearly complete when tetanus came on. I lost no time in dividing the ligature, which still remained on the artery. The operation made no change in the condition of the patient; the progress of tetanus was gradual, and the patient's life endangered: I applied the actual cautery on the little stump as deep as possible. The symptoms all disappeared as by enchantment, and this soldier was in a short time entirely relieved from the disease, and his wound healed kindly.

CASE SIXTH.

To these cases I shall add another of a soldier, who was also attacked with tetanus after a wound. A part of the tarsal bones of the right foot had been carried away by a large ball. Suppuration took place, and traumatick tetanus came on. I proposed amputation of the leg, which was indicated by the nature of the wound, but he refused to submit. I confined him to the use of anodynes, diaphoreticks, narcotick, and camphorated lineaments. The disease was arrested in some measure, and assumed a chronick form, that is to say, the general rigidity remained nearly the same; and although epispasticks were applied on the wound, the secretion of pus could not be re-established. His disease now seemed slowly to gain ground, and emprostotonos followed: at the same time he felt an acute pain in the right elbow, which was succeeded by redness, tumefaction, and all the symptoms of local inflammation. Emollient anodyne cataplasms were applied, and the doses of narcoticks were increased; for the tetanus now threatened to destroy the patient. To the symptoms of inflammation succeeded those of suppuration; an abscess formed above the joint; I opened it

with a bistoury, and it discharged a large quantity of grayish pus: he was immediately relieved. The rigidity of the body and extremities immediately left him, his jaws, before locked, now opened at command, and he swallowed medicines and food with the greatest ease, although previously he could with difficulty take the narcotick draughts. All the symptoms of tetanus finally disappeared; the wound healed, the abscess became clean, and soon filled up. But just as I expected to see him perfectly restored, all his left side became paralytick, and the arm, fore-arm, and hand in particular, were quite deprived of sensibility and motion. He remained in this state a considerable time, and appeared to have no disease but the hemiplegia: but when the warm weather set in, he was attacked with the dysentery, which soon carried him off.

It was evident in this case, that the abscess was the consequence of the wound in the foot of the same side; that the paralysis was produced by a metastasis of purulent matter, and that the purulent discharge from the abscess had proved critical. The paralysis alone remained, and would doubtless have disappeared eventually if he had lived.

Tetanus also seized on many others of our wounded, but as it yielded to the usual mode of treatment, I shall not notice them. I shall merely add the case of an officer of light dragoons, who was attacked with tetanus in consequence of a wound of the head.

CASE SEVENTH.

In a charge of cavalry, Mr. Markeski was wounded by a lance on the right side of the forehead, the point of which glanced obliquely upwards and inwards, making a deep fissure in the os frontis. One of the branches of the frontal nerve was divided by the cutting edge of the lance. Nine days passed without the appearance of any unpleasant symptom, and the wound was treated as usual; but on the night of the ninth day tetanus came on, with convulsive motions of the lids of the eye on the injured side and total loss of sight in this organ. He had slight delirium, acute local pain, locking of the jaws, and emprosthotonos was evidently about to take place. I first applied emollients on the wounded part, and prescribed opiates and diaphoretick drinks; they procured no relief, and the disease advanced with such an alarming aspect, that I doubt not he must have died in twenty-four hours.

I probed the wound and soon ascertained its direction. The probe produced great pain, and I was induced to lay open the wound from one end to the other with a bistoury and grooved director; with a single cut I divided the frontal muscle, nerves and vessels.

He was instantly relieved, and in less than twenty-four hours all the tetanick symptoms had disappeared. I now thought he might recover; but on the twenty-fifth day symptoms of inflammation of the brain, and its meninges, with the characteristics of effusion, appeared: I had been prepared to expect these consequences from the delirium before noticed, which is *never* a symptom of tetanus. But at that time I had discovered only a small fur-

row in the external table of the os frontis, made by the point of the lance. I now applied a large vesicatory over the scalp, and prescribed cooling drinks and antispasmodicks. The disease still advanced, the fever increased, delirium followed, and he died on the 27th day.

On inspecting the cranium, we found the internal table of the frontal bone detached at the end of the fissure, and a considerable effusion of bloody purulent matter under the right anterior lobe of the brain, which was here also in a state of suppuration. When the first symptoms of compression appeared, after those of tetanus had subsided, I proposed the application of the trepan on this fissure, but was induced to omit it from the decision of several of my colleagues, who were of opinion that no effusion would follow so small a fissure. I regret that I did not pursue my first intention: "*ocasio præceps, judicium difficile.*"

Many of the wounds among our men were complicated with fracture of the cranium, and required the trepan.

In two cases on whom we operated, the fractures extended to the base of this bony cavity; these men sunk under the symptoms that ensued, but in two chasseurs the operation was successful.

A grenadier was wounded by a ball in the left temple, on a level with the meatus auditorius. The ball buried itself deeply behind the parts and the erotaphite muscle, and stopped at the base of the mastoid process of the same side. The ball was not discovered at the first examination, and this apparently trifling wound was simply dressed: indeed it soon cicatrized, and on the fifteenth day he thought himself well, and requested to be discharged. But being about to leave the hospital, he was

seized with vertigo, weight, and lancinating pains of the head, which obliged him to be carried to his bed again.

Next morning I examined his wound with great attention, and discovered a small red fluctuating tumour, near the base of the mastoid process behind the ear. A free incision with a bistoury discovered the ball under the base of this process. I extracted it, and the wound was simply dressed. He felt immediate relief, but still the symptoms of disordered brain returned, and continued to increase: a lethargick fever ensued, with hemiplegia of the right side, and he died in a stupor.

We opened the cranium next morning, and discovered a fracture at the part before-mentioned, which extended to the base of the os petrosum, and towards the sphenoid. The cells of the mastoid process were carious, and a collection of matter had formed in the lobe of the brain, contiguous to this part, and a purulent effusion in the middle fossa of the base of the cranium.

On the opposite side of the cranium we found a bony pyramid, which projected about four centimetres from the concavity of the internal table of the parietal bone, into the brain, carrying the membranes before it. His companions assured us that he had never been indisposed before the late wound. They knew that he had been wounded on the head, while in Italy, several years before. Indeed I took notice of a depression, like a cicatrix, opposite the exostosis, in appearance such as follows a sabre wound. It does appear probable that this internal exostosis was so gradually formed that nature could accommodate herself to it.

His comrades had remarked, that he persisted in what ever he undertook with the most determined obstinacy.

I showed the cranium and brain of this subject to Dr Sæmmering at Munich.

Peter Auger, a grenadier, was also wounded by a ball in the right temple; after penetrating the skin and erotophte muscle, it fractured the squamous portion of the temporal bone, and then divided into two pieces, one of which penetrated into the cranium, and the other buried itself under the temporal muscle.

Symptoms of concussion and compression of the brain came on at the same time, and rendered his situation critical; I lost no time in dilating the wound, which could not be done without dividing some branches of the temporal artery. Having secured them with a ligature, I proceeded with the operation, and laid bare all the injured portion of the cranium. I soon discovered one piece of the ball in the muscle, and easily removed it. By means of an elevator I raised up a large scale of the cranium, and was so fortunate as to seize the other piece of the ball with a pair of dressing-foreeps, and extracted it from its nidus, between the dura mater and the cranium: Through this accidental opening a considerable quantity of black fluid blood was discharged, and the wound was dressed according to art. From this time the symptoms gradually abated, and finally disappeared; the wound continued to suppurate several days: an extensive exfoliation of the circumference of the wound took place.— But the space thus left, gradually diminished, and the cicatrix of the soft parts was soon completed; he was discharged cured before the forty-fifth day. But the pulsations of the dura mater could still be felt under the cicatrix.

The following cases of wounds of the head will serve to make us acquainted with some of the uncommon resources by which nature is able to rise superiour to the most unfavourable obstacles, and to keep up the vital functions.

CASE FIRST.

A soldier of the 61st regiment of infantry, returning from exercise on the 23d of March, 1810, levelled his gun in sport at Christopher Cros, of the same regiment, and under the impression that it was not charged, he fired the piece:—Cros fell, and to the great surprize of his comrade, his head was found to be transfixcd by the longest part of the ramrod, which had been accidentally left in the musket. Cros was immediately carried to the hospital of Grosgerau, where Mr. Caizergues* attended to him. The wounded man had travelled from the spot where he received the injury to the hospital, distant about a league and a quarter, partly on foot, and partly in a carriage. He neither bled from the nose nor ears, and his functions were unimpaired when he arrived.

The ramrod had entered his head in the middle of the os frontis, and made its exit on the left side of the neck: its ends were of equal thickness, and formed an angle with the exterior of the cranium of about two inches.

The singularity of the case, and the difficulty that Mr. Caizergues found in extracting it, induced him to call all his colleagues together at the hospital.

The result of the consultation was, that the ramrod should be extracted by its anterior part. After some attempts, a *portion* of this iron rod was broken off by the pincers which were used and it was easily perceived that this fracture was the consequence of a flaw in the rod. According to Mr. Caizergues, this fragment was

* This surgeon gave me the detail of this case, and at the same time sent me the cranium of the subject of it.

about fifteen centimetres in length; neither stained with blood, nor the substance of the brain.

Attempts were made in vain to extract the portion of the rod which remained, by the extremity that projected from the neck. They used the strongest pincers and the greatest exertions to effect it, for this end was marked and crooked by the instruments applied on it.

It was decided that the crown of a trepan should be applied on the cranium, as near as possible to the ramrod. Contrary to all the precepts of art, and in opposition to the danger of such an operation, it was applied on the posterioir edge of the occipital foramen. For this purpose, it was necessary to cut up the thick layers of the trapezius spleneus, and great complexi muscles, and to divide the vessels and nerves to come at the bone. Mr. Caizergues did not mention the difficulties which he must of necessity have encountered, nor the phenomena that occurred during and after the operation. He merely stated that the trepan was useless, and that they were obliged to resign all expectation of extracting it, and leave the patient to the resources of nature alone. He observed that the man bore the operation with great courage, and retained his intellectual faculties. But he died on the 25th inst. He did not state the symptoms that followed the operation, or preceded death.

On inspecting the cranium after death, the course of the ramrod was ascertained, and the injury of the parts was apparent.

The os frontis was found to be pierced between the sinuses. The aperture was round, and without fracture, and near the size of the ramrod, which then passed in a horizontal direction, between the two hemispheres of the brain, without wounding them, but tore the falx. It then penetrated the body of the sphenoid bone, under the foramen opticum, passed on through this bone, from

the point of the os petrosum, and the cuneiform portion of the occipital, inclining towards the left condyloid apophysis of this bone, came out near the occipital foramen, and its point penetrated the adjoining soft parts.

Through its whole course, the ramrod had not injured one important organ. Having first passed between the two hemispheres of the brain without injuring them, it then glanced under the sinus of the carotid artery without piercing it. It was even separated from this sinus by a bony scale, which was almost detached from the sphenoid. In short, it was at a distance from the third pair of nerves, and the internal jugular.

The resistance opposed to the rod by the bones, and by their elasticity arrested its progress, and it remained firmly fixed in the bones through which it had passed.*

On examining the cranium of this soldier, two questions naturally arose :

1st. What would have been the result, if he had been abandoned to nature ; while, at the same time, every necessary attention had been paid to his situation and symptoms ? Death appeared to have been inevitable ; but at what period would it have taken place ? To these queries we can give no answer, as we did not see him, and were therefore unable to decide on the degree to which his animal or organick functions were impaired. This inquiry appears to have been entirely neglected.

2dly. What advantage could be derived from applying the trepan, admitting that it could have been effected without danger ? When the pincers and other means used to extract the ramrod had proved ineffectual, the

* See plate XI. where a drawing is given of this head as it was pierced with the ramrod. It is now deposited in the museum of the faculty of medicine at Paris.

trepan could have been of no service. It was therefore unnecessary. But setting aside the difficulty of applying it on this part of the occiput, did it prove injurious and fatal to the patient? The cerebellum may have been injured by the teeth of this instrument, or at least the dura mater may have been wounded; for the edges of the aperture were of very different degrees of thickness in different parts, and we know that the slightest punctures, or lesion of the cerebellum, are sufficient to produce death. The caution laid down by authors is then well founded, namely, never to apply the trepan on the cranium, below the line of demarkation, between the cerebrum and cerebellum.

Without attributing the death of Cros to the operation, I think it would have been more reasonable, after the attempts which were made to extract the foreign body, to have left it undisturbed, and awaited the event. Besides, it could scarcely prove more dangerous by its presence, than by the injury which it had probably produced in the interior of the cranium.

On opening the cranium after death, I was convinced that it might have remained some time without destroying the patient, as no organ was injured by it.

CASE SECOND.

Among the wounded of the line who were not able to bear the transportation from Reneveek to Vienna, and were therefore united to the wounded of the guard under my care, was a remarkable case. I could not learn the name of the young man, (about twenty-one years of age) as he had lost all his senses, and almost all his animal faculties. The organick functions were still nearly in

their natural state. He had been wounded in the battle of Eslingen by a ball, and a fistulous wound remained in his left temple, near the orbit of the eye. The eye of the same side projected outwardly, and had entirely lost its powers. But he could still discern light and large objects with the right eye. The left half of the cranium was evidently more arched and voluminous than the right. When the temporal region was examined by the eye or touch, a space as large as the finger was perceived to extend upwards and backwards, in a semicircular manner, along the course of the coronal, as far as its junction with the sagittal suture. It was evident that this space, in which the finger could be placed, was produced by a separation of the frontal and parietal bones.

Authors give us many cases of the separation of the bones or sutures of the cranium, followed generally by death before the ninth day after the accident.* But I never saw a case like this, in which the patient survived beyond the ninth day. We shall be better prepared to appreciate the resources of nature in such cases, when the appearances are given which we discovered on opening his cranium after he died of the hospital fever, then very general in our wards. At that time, his wound was nearly healed.

This man always continued lying in bed, and seldom moved, in consequence of the paralysis of his muscles. His appetite and digestion were good. Respiration, circulation, and secretions, continued to be regularly performed.

After examining the head carefully, and probing the wound, I discovered a hard body deeply seated near the orbital sinus. I dilated the superiour part of the sinus, and with a strong pair of pincers extracted the ball. It

* See memoirs of the academy of surgery, Vol. I.

was then moveable, though at first it was firmly fixed in the bone.

After extracting this ball, which was irregularly flattened, I discovered a deep cavity, and felt the pulsation of the brain. The wound was dressed superficially with dry lint, and he took bark, wine, and antispasmodicks.

After this operation, which was in August, he appeared to improve, and the enlargement of the suture seemed to diminish gradually. When I set out for France, about the first of November, we were in expectation of his recovery: five months had now elapsed since he was wounded. After the ball was extracted, he talked like a child which is just beginning to stammer: for example, he expressed an affirmative by the word *baba*, and a negative by *lala*, and when he asked for any thing, he forcibly pronounced the words *dada* or *tata*. About the beginning of December, of the same year, he fell a victim to the hospital fever:

The surgeon of the hospital at Reneveck was so obliging as to send the head of this man to Paris, in a cask filled with a solution of hyper-oxygenated muriate of mercury.

Mr. Aumont, an expert hospital-surgeon of the guards, proceeded to dissect it in my presence. The integuments and soft parts about the cranium being carefully removed, he divided this bony case vertically, from side to side, that we might be able to see the disorder occasioned by the ball in its anterior part. We found the dura mater strongly adhering to the sutures: it had acquired great thickness and strength along the parieto-frontal suture, which was dilated. The circumvolutions of the brain contiguous to the fracture were effaced, and the membranes covering this portion of the cerebrum were also very thick and adhered to each other. After detaching these membranes and raising up the brain, we discovered an aperture in

the frontal, below the angle of the temporal bone, and behind the external angular apophysis. The edge of this aperture, of about three millimetres in diameter, was round and polished, in consequence of a cicatrix which had formed in this opening similar to the same process in soft parts. Externally, and anteriorly and superiorly might be seen a cicatrized groove, which extended to the distance of three centimetres towards the most prominent part of the frontal bone on the same side. This was once a fracture; a little further behind we found the parieto-frontal suture, thin and transparent with large indentations which scarcely touched each other, and two curved transparent lines which ran parallel with the suture, at an unequal distance from each other, and disappeared when they came near the sagittal suture.

The tenuity and imperfect ossification of the coronal suture, and the transparent lines marked out the separation which I had discovered while this soldier was alive. Near the orbit, I saw a depression which admitted the end of the thumb. It was evidently formed by the external portion of the orbital plate of the frontal bone, which, after being fractured by the ball, had pushed down the side of the orbit, compressed the globe of the eye, and thus destroyed its vision.

This piece of the frontal bone had been detached by the ball, and was now re-united by a membranous substance, which was ossified in particular parts, when he died; finally all the soft or hard parts injured by the ball, after undergoing a new organization, were cicatrized, and nature had made every arrangement for completing the cure of this man, when he was carried off by the contagious disease.

But he must have laboured under serious infirmities a long time after his wound had healed. For besides the appearances noticed in the fractured part, the left lateral

part of the cranium was much enlarged, while there was a perceptible diminution of the transverse diameter of the orbit on the wounded side. This curious case points out the resources of nature, even in the most desperate circumstances.

I shall indulge in a few reflections on the manner in which this extraordinary separation was produced in the above case; a separation so uncommon as to raise doubts of its existence, were it not attested by a great number of my colleagues, who saw it with me before his death. The ball having arrived at the end of its rectilinear course, entered at the part where the indented edge of the frontal, the anterior and inferior point of the parietal, and the extremity of the ala of the sphenoid bones meet, and leave a space imperfectly ossified. The ball separated these bones, and the weakest and most fragile was broken, and pushed into the orbit, while the edges of the frontal and parietal bones were separated at the same time. In this space the ball continued to act like a wedge, and the separation gradually increased until it was displaced and extracted. The ossification which commenced while the ball still remained, now closed up this vacancy, and united the bones by a new suture, the limits of which were easily seen: that is to say, osseous vessels of the indented edges, which were separated, expanded themselves so as to fill up the interval, and to form other tenons and mortises to unite, grow together, and form a suture.

If well-directed and cautious attempts had been made at first, and the ball extracted, the tedious operations of nature might have been much abridged; but was there not ground to fear that it might be driven with fragments of bone into the cranium and wound the brain, or produce alarming hæmorrhage from the deep temporal and meningeal arteries? I am of opinion that the wisest plan was adopted. Besides, it is difficult, nay impossible to

establish certain and invariable rules relative to the extraction of foreign bodies; the knowledge and sagacity of the surgeon must supply these, and hence this is the most difficult part of military surgery. The following fact supports this opinion.

At the battle of Eslingen, Bazamon, a chasseur, was wounded by a ball, which passed obliquely through the right side of the face, and buried itself deeply in the right lateral part of the neck. It entered at the right angle of the mouth, laid open this part, uncovered the teeth, and mutilated his face. Several of the molar teeth of the inferior jaw were broken off; the ball appeared to have turned obliquely to the right of the base of the tongue outwards and backwards towards the pharynx, then behind the sterno-mastoid muscle into the space betwixt the transverse apophyses of the fifth and sixth cervical vertebræ, where it was wedged in.

Though well aware of the course it had taken, I thought it most prudent to make no attempt to extract it. I first attended to the complicated wound of the face, pared off its edges, brought them into exact apposition, and retained them so by five sutures, and a proper bandage. They soon united, and the wound healed in a few days without deformity. But he always complained of very acute pain in that part where the foreign body was suspected to be lodged. He uniformly inclined his head to the opposite side and when the integuments of the neck in the vicinity of the wound were touched, he uttered the most piercing cries. Tetanus had supervened; he could not move his jaw, deglutition was difficult, and he continually discharged a bloody froth from the mouth; emollients and anodynes were applied externally, for with difficulty could he swallow a portion of broth, and a

few spoonfuls of the milk of sweet almonds, with the addition of nitre and opium.

Besides the symptoms just noticed, those which attend effusion into the cavity of the thorax succeeded, namely, pain in the side, affected stertorous cough, with bloody expectoration, difficulty of respiration, and an inability to lie on the unaffected side; small accelerated pulse, burning heat, and frequent sensations of suffocation. All the muscles of the arm and neck nearest the wound were in a state of tetanick rigidity, with an obstinate contraction of the head to the left. He laboured under anxiety and insomnia, and when obliged to be moved, he experienced great pain.

Without being able to decide exactly on the seat of the ball, I was persuaded, in opposition to the opinion of several surgeon majors, who attended my lectures on clinical surgery, that no effusion existed in the thorax, and that the alarming symptoms which had taken place depended on the irritation of the cervical nerves, which were either ruptured or strongly compressed by the ball.

We persisted in the use of emollient applications externally. About the fifteenth day an erysipelatous redness appeared on the right inferior part of the neck, and extended to the thorax; an obscure and deep-seated fluctuation was perceived under it. The expectoration was now purulent, and the symptoms which had induced the belief of effusion now disappeared. The local pain was more lancinating, and the tetanick affection continued to increase.

The imminent danger of the patient, and the existence of several symptoms indicating that the ball was wedged between the transverse apophyses of some of the last cervical vertebræ, induced me to plunge a bistoury in the lowest angle of the triangular space left between the posterior edges of the sterno-mastoideus, and the anterior

edge of the trapezius. The edge of the instrument was directed gently outwards to avoid the jugular vessels, and to arrive with greater certainty at the ball. This operation was difficult and painful, but I was so fortunate as to seize the ball, and to extract it without much trouble. It was flattened, and wedged under the transverse process of the sixth cervical vertebra.

As soon as the operation was completed, he felt relieved, and slept soundly for three hours: the first time he had slept since he was wounded. The tetanic symptoms disappeared: in short, we had every promise of a speedy cure, when a purulent discharge took place from the new wound, mixed with bubbles of air at every inspiration. We could no longer doubt the communication of the wound with the substance of the lungs, and it is probable that a purulent fistula had formed between the seat of the ball, and the nearest lobe of the lungs.

The wound remained a long time fistulous, but he recovered finally.

It is evident that if I had not dared to plunge the bistoury deeply into the neck to extract this ball, the disorder occasioned by it among the cervical nerves must have increased until death would have been the consequence.*

A grenadier was admitted into the hospital at Reneveek, on the seventh day after the battle, for a tumour on the abdomen, about two inches from the umbilicus on the right side. It was as large as the first; covered with a considerable ecchymosis, and fluctuated. One of my

* This man appeared a second time in my hospital at Paris with a disease unconnected with the injury of the neck. The cicatrices of the wounds were then sound and firm.

colleagues was of opinion that it was a sanguineous effusion. As he wished to see me before the operation was performed, he was brought to my hospital.— He had no symptoms of strangulated hernia. This tumour disappeared when in a horizontal position, and returned when he rose. The nature of this tumour could not be mistaken, and we decided that it was formed by the epiploon, and the intestine. He had been grazed by a ball when near the end of its course. His jacket, and the skin of his abdomen being pressed on by this ball, had yielded to its action, but the rectus and the aponeurosis of the abdomen being less elastic, were ruptured; and a ventral hernia was instantly produced. The digestive functions were at first disturbed, but no strangulation of the part followed, as the rupture was extensive. Rest, scarification of the tumour, camphorated wine, gentle compression, emollient enemata, acidulated diluting drinks and regimen, prevented inflammation of the intestines, and removed the symptoms which appeared at the commencement.

The hernia remained, and he was put on the pension list.

It is more than probable that in this case a button or a piece of money intervened between the ball and the seat of the hernia, and thus increased the injury.

In the three following cases, the ball meeting with no hard or prominent part, while passing over the exterior of the abdomen, after depressing its walls in an uniform manner, produced a more deep-seated injury of the organs, as will be evident.

An artillerist came to the hospital of Reneveck several days after the battle of the 22d: his abdomen was much tumefied and distended, without perceptible fluctuation,

his respiration difficult, his face livid and slightly swollen, his inferiour extremities painful, heavy, and stiff, and his pulse small and accelerated.

I immediately prescribed moderate venæsection in the arm, and extensive cupping over the thorax and abdomen. He was put on the use of diluting laxatives and diureticks. These means had produced a moderate improvement of the symptoms, and he felt himself better. But his abdomen still remained distended, and an obscure fluctuation was perceived in it. I directed two large vesicatories to be applied on the hypochondria and sides of the abdomen, and they proved highly beneficial. Shortly after, a fatal remittent fever came on, and he died on the fifteenth day after entering the hospital. During the three last days of his illness, the abdomen increased greatly in size.

Twenty-four hours after his death, we opened the body. The first incision into the abdomen allowed a large quantity of black, bloody serum to escape; this was a portion of a considerable effusion of fluid, with which the abdominal viscera were covered. The intestines were slightly tumefied, and injected with blood of a brown colour. The epiploon livid, the liver and spleen enlarged, and gorged with blood. The effused fluids of the pelvis contained clots of blood, the lungs were also much obstructed, and we found in the cavities of the chest a large quantity of a similar fluid.

I was surprized that this man had survived so long. He informed us that being exhausted with fatigue after the battle, he laid himself down in a low place, where he supposed the balls could not touch him, and that he should not have perceived the passage of the ball over his abdomen, but from the noise it produced in rebounding a few steps before him, carrying away some buttons of

his jacket, and giving a violent shock to the abdomen. He was then unable to rise and walk, and was carried to his quarters, where he remained a month, supposing that his injury was not so severe as to require admission into the hospital.

The abdomen was painful, and slightly inflamed. An ecchymosis appeared about the umbilicus, which he bathed in brandy. His disease grew worse, and he was conveyed to the hospital, where our assistance proved unavailing.

Rene Taillandier, a grenadier, entered the same hospital with symptoms exactly similar to those in the preceding case. The evidences of sanguineous plethora were less conspicuous, and he seemed to labour under ascites, and the undulation of a fluid in the abdominal cavity was not doubtful, as in the preceding case. We first used cups, rubefacients, light drastick purges, and diureticks. These proving of no advantage, and the size of the abdomen increasing, I resolved to puncture it. I used the trochar of Monro, with a small canula, and made the puncture much below the part pointed out as most proper by authors. Six or seven litres of a fluid precisely similar to that in the above case was discharged, which, when permitted to remain at rest for a few minutes, deposited a large quantity of fibrina.

The viscera of the abdomen appeared to be in a good state, and I was willing to attempt a radical cure, or rather to meet the existing indications. It appeared to be necessary to evacuate all the fluid and clots of blood which remained in the circumvolutions of the intestines. For this purpose, I introduced a blunt-pointed bistoury down along the groove of the canula, and made an incision of about two centimetres downwards, following the fibres of the external oblique. A large quantity of blood,

partially coagulated, was discharged. Camphorated embrocations were made over the abdomen, and a suitable bandage, &c. applied. He was put on the use of stomachicks and laxatives at intervals, and as no inflammatory symptoms supervened, I applied a large vesicatory on the abdomen. During the first fifteen days, there was no appearance of a new collection, and I began to expect his recovery, but he was seized with rigours and a fever, and finally, a legitimate ascites was formed. I drew off ten litres of the common yellowish serous fluid of ascites. The operation had been repeated several times before I left him at Vienna.

This man informed us that his abdomen was injured by a rebounding ball, as he was putting on his knapsack. The internal disorder was not so great as in the foregoing case, though the vessels of the peritoneum and viscera were diseased in the same manner, and to the sero-sanguineous effusion which followed, was added the accumulation of the peritoneal serum which could not be taken up, in consequence of the debility of the absorbent system.

A third soldier was injured in the same battle. As he lay on his back, he informed us that he saw a ball rebounding for the last time, and threatening to fall on his abdomen. He suddenly raised the breech of his musket to ward it off; but a moment too late. The ball had rolled over his abdomen like the wheel of a carriage, with a rapid motion. The walls of this cavity were immediately inflamed, and he afterwards had some transitory symptoms. But he always remained an invalid from that time.

A chasseur was wounded in the same battle, by a ball in the middle of its course. It carried away the skin, a por

tion of the left os ilium, the insertions of the large abdominal muscles of the abdomen, and laid bare a portion of the sigmoid curve of the colon. The subsequent symptoms were at first very alarming, and we despaired of his recovery. But on the 21st day, the eschars came away, granulations were thrown out, and covered this enormous wound in a short time. Some portions of bone exfoliated, and the cicatrix was then speedily completed. He completely recovered his health, and set out with us for France.*

Two soldiers were wounded in the urinary organs in the same battle. In one, a grenadier, the ball entered the right buttock, thence passed through the pelvis, and came out in the left groin, after penetrating the bladder obliquely from below upwards, and from right to left.— During the first twenty-four hours, the urine was discharged through both wounds, but afterwards passed through the natural passages. This may appear extraordinary, but if we attend to the phenomena which take place in gun-shot wounds during their different stages, we may easily conceive that when a wound of this kind is first made and dilated, it permits the fluids of any viscus, with which it communicates, to have free egress; because the edges of the wound are still separated, and this separation is increased by the evacuation of the vessels.

In the second stage, which always begins at the end of the second day, the edges of the wound are obstructed and swollen. They come in contact and close the apertures of the wound; thus preventing the discharge of urine, or other fluids through them.

* During the campaign on the Rhine, I saw several cases of similar wounds, that were afterwards perfectly cured.

In the third stage, which begins between the seventh and ninth day, the sloughs fall off, the wound is opened, and the urine again escapes through it.

During the first stage of a gun-shot wound, the urine with difficulty insinuates itself into the cellular membrane through which the ball has passed, because its cells are obstructed by the friction and subsequent contraction of the injured parts. During the third stage, the parts which have been disorganized slough off, and the wound being thus opened, the urine insinuates itself into the cellular membrane, and produces most alarming symptoms, viz. inflammation and gangrene. After having dilated a wound communicating with the bladder, and dressed it according to art, a gum-elastic catheter should be passed into this viscus, where it must be left. The urine is thus drawn off from the internal orifices of the wound, and it heals in a short time.

Thus we treated this man, and others with similar wounds, many cases of which I have seen during the different campaigns. The wound of the buttoek remained open until the injured bone exfoliated, and came away.

The other soldier who was wounded, had just extended his legs to fire his piece at a body of the enemy which approached on the flank, when he was struck behind by a ball of moderate size, from the batteries of Eslingen, which passed through the upper part of the space between his thighs, carrying away a portion of each, with the margin and cutaneous sphincter of the anus, the skin of the perineum, the bulb of the urethra, the skin of the serotum, and the right testis. The right spermatick cord was ruptured near the abdominal ring, while the left testis was denuded, and the skin of the penis and prepuce torn.

He was left as dead on the field of battle, but after several hours, he was brought to the *ambulance*, and thence sent to the hospital at Reneveck. Though the injury appeared to be incurable, and he was so much debilitated, I dressed it with the greatest care.

It was first necessary to cut away several flaps of the disorganized parts, to take up the spermatiek arteries, and several branches of the gluteal, which bled when I cut off the ragged parts. I inclosed the left testis in the portion of the dartos, which remained sound, and brought the irregular edges of this extensive wound as near together as possible, by a split roller of fine linen, and dressed it with lint, &c, as usual.

The laceration of the organs of generation, the injury of the internal organs, and the effusion of urine into the wound, produced the most acute symptoms, namely, intense pain, painful anxiety, ardent thirst, insomnia, nausea, occasional vomiting and fever, with convulsive motions from the least accidental irritation. I supported his fainting spirits by promises of a final cure, and he bore the frequent and painful dressings most heroically.

To prevent the effusion of urine into the wound, I passed a gum catheter into the bladder, though a great part of the urethra was destroyed. But owing to the inflammation which had extended to the bladder, he could not retain it there, and I was in this respect obliged to trust to nature. I had him dressed with great care under my inspection. A copious suppuration came on and removed the inflammation of the neck of the bladder and the retention, to which succeeded an almost habitual incontinence of urine, while on the other hand a retention of the fecal mater took place from the contraction of the sphincter of the anus, in consequence of the destruction of cellular substance by suppuration. For twenty-one days after the wound he had no alvine evacuations; fre-

quent enemata and suppositories were insufficient to remove it. On examination I discovered a mass of hardened fœcal matter extending up beyond the rectum, and as the symptoms were aggravated by it, a necessity existed for its removal by art; for this purpose a dilator and scoop were successfully used. He was much relieved by this operation and the symptoms heretofore increasing now declined, and the fever left him. He slept calmly several hours, for the first time since the accident. The incontinence of urine gradually passed off, the edges of the wound approximated, the cicatrix soon formed and he was cured before the fourth month. But he continued to discharge his urine through an orifice which remained open in the perineum near the beginning of the urethra, the inferior wall of which had been carried away by the ball. Constipation was prevented by the frequent use of suppositories, enemata, and suitable diet: this was a remarkable cure.

In reverting to the consequences of the battle of Wagram I shall speak of some uncommon amputations at the shoulder-joint and of the leg and foot.

We now made preparations for crossing the Danube and attacking the enemy in his lines on the left bank of this river.

All our wounded and such as were invalid were sent to France. On the first of July the army and the guards marched to cross the river at the same place where bridges had been thrown over before the battle of Eslingen. At four P. M. the troops were united on the island of Lobau. A flotilla with 3000 land troops under the command of count Barte (now rear admiral) was prepared to cover our passage over the further arm of the river and to attack the advanced posts of the enemy who were entrenched on the left bank of the Danube. It was intended to carry every operation into effect at the

same instant, and the order of attack was given just as a most violent storm burst upon us. The report of the artillery of both armies, was heightened by reiterated and loud claps of thunder accompanied with hail and torrents of rain. So complete was the darkness that we could distinguish nothing except by the flashes of lightning or of the artillery. Notwithstanding these formidable obstacles our troops made good their landing on the opposite bank, possessed themselves of the enemy's batteries and immediately formed on the plains. Several bridges were now thrown over at once and the whole army effected a passage in few hours.

The enemy being surprised by the celerity of these operations moved precipitately to take a new position on the lines of Wagram, before which a general though indecisive battle was fought in the evening. Both armies remained in sight of each other during the night and at day break we attacked them again. The contest grew hot, but their left wing was soon broken and gave way; and the enemy's right was closely pressed on the Danube and the centre kept in check by the corps of reserve composed of the imperial and royal guards, while his ranks were thinned by the fire of the artillery, which seemed to thunder on every side. At length the Austrian lines were carried, their divisions dispersed or destroyed by the terrible execution of our cannon, and the victory was complete.

With my flying *ambulance* I followed the movements of the guards till the decisive moment, and we dressed the wounded on the ground as fast as they were brought up: but the number afterwards became so great, that I found it necessary to establish a hospital in the nearest village whither the wounded of the guard and a great many officers of the line were conveyed. Before night 500 wounded were collected at my ambulance. The ma-

majority of whom being severely wounded by cannon or other shot required important operations. Here the necessity of immediate amputation was most evidently confirmed. And I do not hesitate to say, that without it a large portion of our wounded must have perished within twenty four-hours. Two of our guards who required amputation at the hip-joint fell victims to delay. I must confess that the members of the faculty and the academies afforded me but little encouragement to undertake these operations, and though the success obtained by me in others of a character nearly similar had been decisive, I was induced to omit extirpation in these cases. And as I had not the most distant hope of saving them, I was satisfied with the application of a common dressing to wounds which were attended with fractures of the great trochanter. But these men insisted on the operation with incessant cries; their pain was intolerable. Their request and the reiterated solicitations of my colleagues led me though unwilling, to undertake the extirpation of the thigh. Seven hours had elapsed since they were wounded. I did not entertain the least expectation of their recovery, and in undertaking the operation thought only of removing the cause of their pain, and a distressing spectacle from the sight of the wounded.

According to my plan I first applied a ligature on the femoral artery; after this the vessels were tied, and the operation completed in fifteen seconds without loss of blood, and both these men immediately became calm and one of them fell asleep. The former had a pulse scarcely perceptible, his strength was nearly exhausted; he fell into a state of *Lipothymia* and died three hours after. The second passed the remainder of the night with composure though in a state of extreme prostration. I saw him at four in the morning and retired to take a few moments repose; when I returned at six o'clock he had expired.

I have long since observed, that when large wounds have been received near the trunk, a species of disorder, or violent spasm, seizes on the nerves of organick life, and destroys the patient, unless, when indicated, the mutilated limb be instantly removed, or the proper incisions be made to remove the cause of the irritation.

When the spasm has invaded the whole nervous system, it is very difficult, if not impossible, to arrest its consequences, as was the case in the foregoing. Internal life had been directly impaired, and had suffered most; its functions had ceased, while those of animal life were still going on. In both cases the pulse disappeared entirely, and there was scarcely any respiration, when one of them moved his limbs, and cried out, and still appeared to see and understand.

I am of the opinion, that if this operation were instantly performed by an expert surgeon, when the wound required it, as in these two cases, it would succeed as well as amputation at the shoulder-joint, but few successful cases of which were formerly recorded.

The surgeons of the army being encouraged by the surprising success which attended the extirpation of the humerus, in my first campaigns, and being convinced of the correctness of my principles, have since performed the same operation with courage; and, to the immediate practice of it, a great number of our brave fellows owe their lives. I shall report the cases in which I performed it at the battles of Eslingen and Wagram. These cases support my principles and practice relative to the performance of amputation on the field of battle, and teach us to disregard the opinion of Faure and his partisans, who advise us to postpone it until the wounded have been brought to the hospitals, and the primitive symptoms have ceased. He pretends that the sight of operations produces fear in the soldiers, and hastens the death of

the wounded. My former answer to the latter objection may suffice. The encouragement which the wounded mutually afford each other under operations, and the confidence which the soldiers feel when they see the wounded attended to under the fire of an enemy, completely refute the former. Inexperience, or pusillanimity alone could admit such difficulties. "The surgical amputation of a limb is the most philosophical operation within the circle of human knowledge," says the celebrated Dufouard. And yet celebrated surgeons, who are our contemporaries, call this operation *cruel* and *barbarous*. The truly intelligent, bold, and experienced man can alone know and appreciate the wonderful effects of amputation. I can now call on a crowd to witness its efficacy, who, without it, must have passed the gates of death.

I shall now notice a few cases that occurred at Eslingen and Wagram.

At the latter engagement, the first who was brought to my *ambulance* was general Daboville, then colonel of light artillery. A large ball had carried away a part of his right shoulder, and fractured the scapulo-humeral articulation. A large portion of the pectoralis-major, the deltoid and latissimus dorsi muscles were torn away, and the acromion and humeral extremity of the clavicle were fractured. The head of the humerus was broken into three pieces, and driven into the axilla. One of them was wedged into the brachial plexus, and several of its nerves broken. The axillary artery was much distended, and ready to break. An aneurismal dilatation had already taken place in it. His pulse was scarcely perceptible, and he appeared to be in articulo mortis. Indeed, death seemed to approach so rapidly, that I hesitated under the supposition that he could not live under the operation. But

I resolved to go through with it, more with an expectation of relieving his pain, than of seeing him survive.

The operation was performed in a few minutes, and, to my great surprise, succeeded completely. Had it been delayed in this case a few minutes longer, he never would have gathered the laurels which he deserved.

A portion of the pectoralis-major was cut up in order to tie the artery above its dilated part. He was placed on a miserable bed of straw, where he lay very quietly until he was sent to Vienna. During this period, he several times fell into syncope, and I was apprehensive that he could not support the fatigue of this short journey, and he was therefore removed among the last. I conveyed him on a sedan prepared for the purpose. The dressings were renewed, but the pieces in the deepest part of the wound were only changed every fifth day.

His wound was very large, but he continued calm, and spoke with a more audible voice. He also slept several hours of the first and second night. The dressings were simple, and performed under my own inspection, by Mr. Therrin, surgeon major of artillery. The colonel's strength gradually returned, and in a short time he could use light food, and was cured perfectly in three months.

CASE SECOND.

Mr. Rodelsturdz, a major of the 92d regiment of infantry, was brought to the same *ambulance* with a similar injury of the shoulder-joint. But he retained a greater degree of strength, because he had lost less blood. The operation was immediately performed. In both these cases, it was impossible to preserve the flaps, and the

wounds were therefore very large, with great loss of substance, and they healed very slowly. The major did well during the first nine days, but tetanus appeared on the night of the ninth, and gave us serious alarm. Its progress was rapid, and must have proved fatal, unless the most energetick means had been used.

The tetanus had attained its acme and most perfect character on the third day. The jaws were locked and deglutition was difficult. Epispasticks to the wound and the internal exhibition of opium were of no avail.

All the ligatures had come away, and I was sure that none of the nervous branches had been included in them. I resolved to apply the actual cautery, particularly on the most painful parts of the wound. An iron of a white heat was applied once on that part whence the pain seemed to rise. It was attended with acute pain, but immediately produced a copious sweat, and a perfect calm. The muscular rigidity was immediately removed, the functions were re-established, and he was relieved of every tetanic symptom in a few days. The superficial eschars, produced by the cautery, sloughed off, the wound healed over without further delay, and he was quite cured in ninety days.

CASE THIRD.

Louis Picard, captain in the ninth regiment of the line, had the superiour extremity of the humerus fractured by a ball, which passed through the arm near its superiour articulation. The injury of the soft parts was less extensive than in the preceding cases, and I was enabled to form an anterior and posterior flap: I followed the plan

laid down in my campaign in Egypt. These two flaps soon united, and the captain was perfectly cured in six weeks.

CASE FOURTH.

Charles Jouffroy, an artillerist of the guard, received a wound nearly similar to the preceding. But in the latter, the ball had injured the parts so that the two flaps could not be formed, and I was obliged to follow the plan of Ledran: he also recovered.

CASE FIFTH.

Claude Levert, a grenadier, had his left humerus fractured, near the superiour articulation, by a cannon-ball. The deltoid, pectoralis major, and latissimus dorsi, were chiefly destroyed, the capsular ligaments lacerated, the acromion fractured, and the head of the humerus divided into two pieces, and luxated towards the sub scapular fossa. I extirpated the humerus according to the indications presented by the wound, but could reserve no flaps: yet this extensive wound gradually filled up.—The diarthrodial cartilage of the scapula exfoliated by degrees, a vascular granulation was thrown out from the glenoid cavity, and united with the vessels and surrounding soft parts to complete the cicatrix.

CASE SIXTH.

Peter Girardel, of the artillery, received a severe wound of the shoulder, in the same battle, on the 6th of July. The humeral extremity of the clavicle was fractured, and three ribs laid bare by the destruction of the pectoralis major. The axillary artery was broken in the brachial plexus, and produced an aneurismal tumour of the size and shape of a pigeon's egg; hence it was difficult to tie the vessel, and I was obliged to dissect up to the clavicle, to apply the ligature above the dilated part. He bore it heroically, and the operation was completed without accident. His symptoms were alarming for several days, abscesses formed above the clavicle towards the latissimus dorsi, and under the scapula I made incisions into them, and dressed them according to art. The edges of the wound were approximated by degrees, the vessels of the periosteum of the ribs threw out granulations, and united in the formation of a cicatrix; he was quite cured in four months and a half, and, with the subject of the preceding case, received the decoration of the legion of honour from the hand of his majesty.

I also extirpated the arm at the joint in the cases of five soldiers, whose wounds were not very remarkable, though requiring the operation.

I had previously performed the same operation on three others at Eslingen, being fourteen in all, twelve of whom afterwards enjoyed perfect health: the thirteenth, in a fit of melancholy, threw himself from a window, and was taken up dead; and the fourteenth died within the first twenty-four hours.

Experience has since taught me, that amputation at the joints in recent injuries is more successful, *ceteris paribus*, than amputation when performed in the middle or continuity of a limb. The cases of extirpation of the arm, just reported, must tend to confirm this opinion.

This difference in the results after amputation in the continuity of a limb, appears to depend—

1st. On the division of the bone, which must exfoliate either in a *sensible* or *insensible* manner, where it has been mutilated by the saw. It is necessary that a change be produced in its texture and shape, to enable the osseous vessels to shoot out, and to form the cicatrix. This process is of various duration, according to the age, &c. of the patient, and retards the success of the operation, or renders it uncertain.

2dly. From the division of the muscles they are often irritated, or contract, unpleasant symptoms often follow, and nature is required to form the cicatrix of several parts separately.

3dly. From the disorder of the parts in the wounded limb; for if this disorder extend to the articulation, the common amputation would then be in vain.

But when amputation is performed at the joint, success is more certain, for the following reasons:—

1st. Because the section is made beyond the limits of the disease.

2dly. Because the bones of the contiguous parts are not injured, and do not become diseased, in consequence of the operation.

3dly. Because there are no muscles to be divided, except in certain cases some portions of muscle, the fibres of which are divided longitudinally, rather than transversely. The division of the tendons is productive of no inconvenience, because they are insensible, and unless when long exposed to the air, never exfoliate, but are

easily consolidated with the cicatrix of the flaps. A single difficulty exists in this operation, and may render it unsuccessful; namely, including the nerves in the ligatures of the arteries: but this may be easily avoided by attention to the rules of operating.

Finally, I do not hesitate to assert, that nine of ten cases will succeed, where amputation of the extremities has been performed at the joint; while two thirds of the same number will scarcely survive, when the operation is performed in the continuity of the limb. This difference in the result will still be greater in chronick diseases of the bones, namely, in deep-seated caries, and serofula, spina ventosa, or necrosis; for though these diseases may appear to be limited to the centre, or seat of disease, they generally extend to the articulation above them, or to its vicinity. A great number of such cases have confirmed this fact.

I shall report four cases that occurred among our guards, and on whom amputation was performed for chronick diseases of the extremities.

CASE FIRST.

Peter Leray, aged thirty, a chasseur, entered the hospital with a wound which he received by a sabre two days before. The olecranon, the head of the radius, and the capsular ligaments, were completely divided. The lips of the wound had been approximated, and at my first visit, we had no reason for apprehending the alarming symptoms which ensued the same day. The lips of the wound were separated by inflammation, and discharged a reddish yellow albuminous fluid. The arm and fore

arm were much swollen, and the fever came on with paroxysms, insomnia, and delirium.

The symptoms rapidly assumed a more alarming character, in opposition to the means which were indicated; and in a short time the articulating bones became carious, and gangrene took place in the wound, and in the fore-arm. The fever also became more ardent, and he was in imminent danger. Though the traumattick gangrene was advancing, I resolved to amputate. But I called a consultation of the different surgeons, who all agreed in the necessity of the operation, but also thought it should be performed in the continuous part of the limb. But I was in favour of taking it off at the shoulder-joint, under the belief that the bone and soft parts were thus far diseased. The operation was performed in a minute, according to my plan. Every precaution was taken to exclude the nerves of the brachial plexus from the ligatures of the vessels.

His situation was critical for several of the succeeding days, but he daily improved on the internal use of tonicks and proper dressings: the fever of absorption disappeared, the suppuration was gradually re-established, and on the first of March, he left the hospital perfectly cured. A dissection of the amputated limb discovered the disorder of the joint, and a caries which extended from the external condyle of the humerus, into the medullary cavity. A purulent fistula was formed along the course of the vessels, from the original seat of disease to the neck of the humerus, where caries had also commenced. The body of the bone was even enlarged, and the peritoneum inflamed, where it was contiguous to the disease of the articulation.

CASE SECOND.

John Cotentain, a dragoon, aged forty, entered the hospital about the first of March, 1811. He had a wound of his left leg, complicated with fracture, from the kick of a horse. I first saw him on the third day after the accident, and could not then proceed to amputate, because the primitive symptoms had appeared, and advanced with such rapidity, that the wound fell into gangrene on the fifth day. Fever and delirium succeeded, and he was very ill on the eighth or ninth day. Symptoms of legitimate ataxia continued for some time, and produced the gangrene. The means adopted could not arrest the fever, and deep-seated caries extended from the fracture to the knee-joint, seized on the condyles of the femur, and the knee tumified and became very painful. In this state several weeks elapsed, and there was no interval in which amputation could be performed with any prospect of success. After two or three violent paroxysms of fever, the local symptoms abated: several eschars sloughed off, and every thing promised fairly, when a profuse hæmorrhage took place from the antierior tibial artery. I then resolved to amputate, as the only means of saving the life of this man, now reduced to the last extremity. During the first twenty days after the operation, nothing remarkable occurred. Suppuration was perfectly re-established, the ligatures came away, and the wound seemed to be slowly but surely healing, when he was attacked with symptoms of adynamia, and the hospital sore. An emetick was prescribed in divided portions, and then cortex and camphor. Suppuration went on, several sloughs came away, and he appeared to be again

improving, but he seemed to labour under melancholy from some unknown cause; he soon relapsed, and finally died with coma, &c., on the forty-first day after the operation.

The dissection of the limb discovered two interesting phenomena :

1st. The os femoris was in a state of necrosis, from the place where it was divided to the trochanter minor : the bony fibres destined to form a new bone arose from the sound parts of the os femoris, and had already covered a large part of the deficiency. These fibres were arranged in strata, and were prepared to form a new bony cylinder.

2dly. The femoral artery was retracted several millimetres above the stump, its internal surface was formed into spiral rugæ or folds. The part under the ligature had contracted adhesions, and above it I found a small detached yellow clot of blood. The divided ends of the muscles were of a circular form, and had united to each other, but not to the general cicatrix of the stump, except by vessels and cellular membranes. Had he been more youthful, nature would have surmounted every obstacle.

CASE THIRD.

Philip Patlour, a grenadier, aged forty-five, had a fistulous ulcer for several years in the right elbow joint, with caries of the articulating bones, the consequence of chronic syphilis, for which he had submitted to various plans of treatment. It was absolutely necessary to amputate the limb. I was convinced beforehand, from the extent and continuance of the caries, that the whole hu-

merus was concerned in the disease. Under this belief, I proposed to extirpate the arm, instead of amputating it in the middle, but several distinguished physicians who were then present, opposed my opinion, and insisted on the adoption of the latter plan. But the pain which the patient felt along the humerus when it was slightly pressed with the fingers, and also the uneasiness of the joint, from the least motion, added to the chronick character of the disease, convinced me that the caries had taken entire possession of this bone. Still it was decided that the operation should be performed in the continuity of the limb.

During the first twenty-four hours after the operation, the patient appeared to be easy and free from pain. I prescribed such medicines and regimen as were suited to his condition. On the third day, the dressings being completely filled with a fetid yellow serum, they were renewed, with the exception of the lowest pledgets of lint that had not yet been separated by the secretion of pus. The stump became painful as far up as the shoulder, and the flesh livid and torpid. I had previously prognosticated the unfortunate result of this operation: at the second dressing gangrene was found to have taken place in the wound, and a considerable tumefaction took place along the humerus, and at the shoulder-joint, with acute and continued pain: the skin and muscles appeared to be in the same state of laxity, as on the former day, and without any signs of inflammation. A sympathick fever from absorption followed, and he died in defiance of all our antisepticks on the ninth day. It was true that this man was affected with a syphilitick cachexy, the effects of which were apparent in the viscera after death. On dissecting the arm, we discovered an extensive caries of the head of the humerus, and along the whole course of the medullary cavity. The capsular ligaments

were diseased, and the soft part in a state of putrid decomposition. This case supports the principle which I have previously advanced.

CASE FOURTH.

Henry Schupp, a lancer, aged twenty-one, was sent to the fever-wards of the hospital, June 7th, 1811, for chronic serofulous pains of the right arm, and the last stage of a phthisis pulmonalis. The medicines that he had taken from well-informed physicians, had not been sufficient to arrest the progress of the disease: the cough and purulent expectoration were habitual: the paroxysms of slow fever, with viscid sweats, returned every evening. He slept none, and could scarcely digest broth or rice-milk. A large abscess suddenly formed above the right elbow-joint. This being viewed by the physician as a critical abscess, he was sent to the wards among the wounded to be operated on. At my first visit, finding the fluctuation evident, and the abscess very extensive, I opened it without hesitation. About a litre of dark gray fetid pus was discharged, mixed with clots of blood. I made several counter openings, through which skeins of thread were passed, and after applying some pledgets of lint on the wounds, I surrounded the arm with compresses dipped in warm camphorated wine. He was reduced to a state of extreme emaciation and debility, and fell into a syncope, which threatened to prove fatal. When he revived, I immediately gave him warm claret with ether, and prescribed an antiseptick and cordial mixture to be taken day and night, with good broth and wine. He passed fifteen days after the operation under favourable appearances. The purulent expec-

teration and the paroxysms of fever had diminished, but the cough continued as before. New fistulas formed above the original abscess: emollient topical applications were made for some time, and I made openings into these abscesses, which discharged a large quantity of blackish ichorous matter. He felt much relieved, but next morning before my visit, a hæmorrhage took place, and would have proved fatal, if the surgeon had not been on the spot. I arrived about fifteen minutes after, and on examining the wound to discover the artery, was surprised to find the lower third of the humerus deprived of its periosteum and muscles, and in a state of necrosis, even quite into the articulation, which was open in several places.

I was thus induced to take off the arm at the shoulder-joint. The patient was transferred to the operating room: he was so weak that with difficulty he sat in the chair, and in short his condition was so alarming, that none of my colleagues, whose advice I requested on this occasion, spoke in favour of amputation, lest he should die under my hands. His hæmorrhage could not be arrested, and being convinced that he must die, and calling to mind the case of young Barre, I immediately amputated. An external and internal flap were instantly made, the axillary artery was taken care of by an expert assistant, and the ligature quickly applied; he lost no blood: every small artery was tied, a suitable dressing adapted to the part, and he was put to bed in the same room, where he remained several days. The operation had the effect of a powerful cordial: he took several draughts of good broth and claret. He was covered with warm flannels, and his thorax and abdomen embrocated with hot oil of chamomile, strongly camphorated, &c.

Dissection discovered that all the ligaments of the elbow-joint were destroyed, and that the articulating sur-

faces were deeply affected with caries, the lower half of the humerus deprived of periosteum, and in a state of necrosis: the head of the humerus was also affected with caries. The soft parts were in a state of putrefaction, and one of the collateral arteries opened.

Though he appeared to be tranquil after the operation, I did not dare to expect a recovery until after the fifth day. During this time he remained in a feeble and almost dying state. The discharge from the wound was black and sanious, the pulse small, and the excretions almost suspended. I increased the dose of the tonicks, and applied a stimulating digestive on the wound of the stump, first sprinkling it with camphor and a few drops of sulphurick acid, and our attentions were redoubled. On the night of the fifth day a paroxysm of fever came on, and was followed by a copious fetid sweat, which produced a favourable revolution in his case.

From this time the suppuration was established, and became abundant; the organs gradually resumed their functions; tranquil sleep removed the pain, and refreshed him, and to our great and agreeable surprize, he continued to improve daily, and was discharged, cured, on the 10th of October, the seventy-fifth day after the operation. The principal disease, viz. that of the arm being removed, all the symptoms of phthisis pulmonalis, and scrofulous cachexy disappeared; he even became corpulent.

This cure is worthy of attention, both on account of the success of an operation, performed under the most unfavourable circumstances, and the disappearance of the phthisis pulmonalis.

Baron Desgenettes inspector general of the medical staff has communicated to me a fact no less curious* which

* In West's picture of the death of general Wolf the officer, who is seen supported in the arms of another, was

also proves that causes producing great disturbance in the human body may operate a salutary change in inveterate diseases, and in some measure affords us an explanation of phenomena which excite the astonishment of the most intimate observers of nature.* I flatter myself that these cases with the preceding view of the advantageous consequences of amputating at the shoulder-joint, may encourage practitioners and assist them in deciding on the proper place for performing amputation in recent or chronick cases.

If it be important that amputation of a limb be performed in the preceding cases it is not less necessary when two limbs have been mutilated by a ball. In such cases a delay of a few hours almost uniformly proves fatal to the patient.

wounded by a ball which penetrated his thorax and cured him of confirmed phthisis pulmonalis.

* Another fact nearly similar came under our notice. Lt. Col. Hævemeur aged 35, of the 2d. regt. Holland lancers, had been for two years afflicted with a fistulous wound and caries of the right elbow-joint. He suffered acute and incessant pain through the whole extent of the arm to the shoulder, and the fore-arm and hand were in a state of atrophy. He was pale, emaciated, had an incipient phthisis and scrofulous cachexy: the symptoms of the latter he had at a tender age. The wound of the arm and caries had been produced by a ball in Spain. He had come to our hospital to submit to amputation, of the necessity of which he was fully aware. A full consultation of physicians and surgeons decided that amputation should be performed in the continuity of the arm, the superiour third of which appeared to be sound. But taking experience for my guide I did not deviate from my plan, but extirpated the arm at the shoulder-joint. He immediately found himself relieved: the ligature came away in due time, and he was soon cured.

All the symptoms of phthisis and scrofulous cachexy disappeared, and he regained his strength and usual good appearance. On dissecting the arm we found a caries extending to the head of the humerus and a disease of the medullary membrane; this confirmed my prognosis.

Before the erection of the *flying ambulance* with which we dressed the wounded on the field of battle, we seldom saw men who had lost both legs or both arms: because the operation was delayed too long. The twofold nervous irritation arising in consequence of the destruction of two limbs, produced such disorder in organick life that the wounded expired in a short time under most acute pain. Let this state of disorder be once established, and amputation cannot arrest its progress. I have seen a great many soldiers who were lost because amputation had not been performed with sufficient expedition in the first twenty-four hours. Of three who had both legs amputated during the battle of Wagram the first only survived, because in his case it was done within a few minutes after the injury. The other two died in 'defiance of all my attention. The stumps of the first of these were of an exact length and enabled him to walk conveniently with wooden legs; an attention to this uniformity of the stumps is my rule of practice in such cases. Many soldiers operated on in this manner in Egypt and Poland congratulate themselves on the ease with which they walk without crutches. Indeed they do not always require a cane.

Thirty of our guards had their thighs amputated for extensive fractures of the knee or lower part of the thigh. In these cases we followed the plan of Petit,* namely, after dividing the skin and separating it from the muscles; as high up as is deemed necessary, we cut through the superficial layer of loose muscles, including the vessels, and finish the second by a deeper cut above the first, and

* Colonels Corbineau and Dosmenil were amputated by me on the field of battle, after this plan. The former had his left thigh removed for a large fracture of the knee, and the latter the right leg, from the destruction of the whole foot and a part of the leg. They recovered under the subsequent care of Mr. Lachome.

In this manner the conical shape of the stump is prevented. I do not heal the stump by the first intention (the reasons for which I have given in several parts of my work), but approximate the edges with a split roller, which covers the whole wound, and a compress round the whole stump. In defiance of these precautions, abscesses in the thick part of the thigh frequently follow, when the shock of the ball has been very great. I have observed that the most common cause of these abscesses is a rupture of one or more of the aponeurotick expansions by the ball. When these ruptures are deep, and at a distance from the divided parts, we cannot discover them, or prevent their consequences; but if they be near the face of the stump, their effects may be obviated by making perpendicular incisions, as we often did, with great success, in many cases. The apertures thus left facilitate the discharge of the fluids, prevent inflammatory strangulation, and purulent fistulas of the parts. Hence the mode of amputating with flaps is evidently the best when this complication is connected with an extensive local disorder of the superior part of the thigh, so that it is necessary to saw off the bone near the great trochanter. This plan is then preferable to the circular operation which lays bare a great extent of sensible parts. A greater number of vessels is also opened, which are not always discovered at the time of the operation, and distressing hæmorrhages are the consequence: besides, the cicatrix of the stump is more slowly formed than in the flap-operation, and the latter is the only plan which should be pursued when operating on the thigh. But these flaps should not be made very large or placed in exact apposition. It will be quite sufficient, after applying the split roller upon them, to keep them together by two strips of adhesive plaster and long compresses properly applied. This plan has often completely succeeded among our guards. It would

be useless to report the cases here, and I shall therefore notice such only as were attended with some remarkable appearances.

John Aubin, an artillerist, was struck by a ball while charging his piece. The ball, though flying with great velocity, rebounded before it met him, and while ascending struck the external and inferiour side of his thigh, buried itself deeply behind this bone, turned upwards and outwards between it and the adductor muscles, and lodged in the neighbourhood of the groin. He asserted, that after leaving him it had killed another artillerist not far distant, and complained only of an inconvenient weight in the limb. None of the surgeons suspected that the ball remained in the thigh. On seizing the limb to amputate it, I found it unusually heavy, and I decided that there was a ball in it, as I had often seen while making the incisions, during operations.

Under this impression and supposing that the thigh was injured high up, I wished to amputate with the flaps. I then made an incision parallel with the axis of the thigh and discovered a 5lb. ball, which was extracted through the incision when enlarged, with considerable difficulty. I formed a short flap externally, and completed the operation by the internal flap, in the thickest part of which were found the femoral vessels; we secured them easily; I isolated the fragment of the femur as high up as possible, to apply the saw above the injured periosteum. Notwithstanding this precaution an exfoliation of one-half the bony cylinder took place. This exfoliated part was about five centimetres in length. I approximated the flaps and fixed them in contact by means of adhesive straps and applied the usual dressings. The bullet being weighed before me and my pupils was deposited,

together with the exfoliated bone, in the anatomical museum of Dr. Sæmmering at Munich.

The shock of all the internal organs and the protracted pressure of the ball on the nerves of the thigh, produced acute symptoms; viz. deep-seated abscesses, fever, dysenterick flux, and local gangrene. But, by the greatest care, the danger was obviated, and he finally recovered and now enjoys his health in the bosom of his family, at Draguignan.

Two grenadiers were wounded at Eslingen, in a manner nearly similar, but the consequences were different.

The first lost his leg, below the knee joint, by a ball which fractured the lower part of the femur and broke up the aponeurosis and skin. For the reasons already given, I was induced to amputate with flaps in preference to the circular mode. He never had the least fever, and was nearly well in two months, when I left him.

The second had the knee struck and the articulating bones crushed by a ball which had nearly finished its parabola.

The femur was extensively fractured and the soft parts broken up. He suffered much pain, his pulse was small and countenance death-like and delirium had come on. In his case, as in many others, the concussion was more extensive in consequence of the resistance of the parts to the ball, which had ceased to move in a right line, and the internal organs were subsequently affected*

The limb of the first grenadier was quite carried away by the ball, which flying with its greatest velocity acted like a cutting instrument and he suffered no consecutive

* This commotion or shock from the ball is greater when the person is standing erect: and the inferiour extremities which support the whole weight of the body are more injured *ceteris paribus* than the superiour limbs.

acute symptoms, but soon recovered. The effects of the percussion were limited to the injured part.

But in the latter case, the ball had nearly completed its parabola and could not divide the parts so completely as in the first. Those which were elastick yielded to its action, but the firmer parts were broken or torn, and the effects of the percussion were thus extended far and wide and affected all the internal organs. This accident is fatal in proportion to the delay of the operation.

This man was operated on immediately after the wound and in the same manner as the first. The local pain was removed and the general anxiety ceased, but his pulse remained weak and contracted, and he was tormented with unpleasant dreams. The suppuration was not copious, but we were encouraged by the appearance of the stump, when suddenly he felt great pain, a fatal fever followed and destroyed him on the tenth day after the accident.

On opening the body we found the viscera collapsed and injected with black fluid blood: the cellular substance surrounding the semilunar ganglions was filled with a reddish serum, and the ganglions were also tumefied. The brain was not in contact with the cranium by the space of several millimetres, and its vessels were injected. These appearances were the consequences of the shock he had sustained. The prognosis in gun-shot wounds must be according to the character of the injury and the manner in which the ball has acted.

Before I make some remarks on amputation of the leg I will notice a remarkable case of contusion of the thigh from a ball complicated with the introduction of a foreign body into the part.

A grenadier was the last of three who were laid prostrate by one ball. It passed through the abdomen of the first, carried away the hip of the second, and grazed

the thigh of the third. The two first who died on the spot, destroyed the rectilinear motion of the ball, and when it reached the third it rotated on its axis and its effects were less to be dreaded. But he was knocked down by it, and when brought to the ambulance we discovered all the signs of an extensive contusion on the anterior part of the thigh. There was a small longitudinal wound surrounded by a large ecchymosis. He assured us that nothing had touched him, save the ball which fell not far off. As I could not introduce a probe through the cellular membrane; I merely dressed the wound as usual.

He was conveyed to the hospital, where he passed fifteen days without any uncommon symptoms. But now an acute and deep-seated pain in the thigh took place: the discharge from the wound was brown, ichorous, and of a particular odour; signs which indicated the presence of a foreign body, and an injury of the bone. After this, I discovered with a probe, a hard sonorous body under the vastus externus, close to the bone. Though the fistulous wound was extensive, I laid it open by a free incision, and introduced a pair of polypus forceps (instead of bullet forceps), and extracted a piece of crooked copper, about nine centimetres long, and half a centimetre wide, which proved to be the ferule of a rammer. How could the ball carry this ferule before it, which was doubtless left upon it while ramming down the charge; and how could this piece of copper, after having been fastened to the ball, and passing through the bodies of two men, separate, just as it struck the thigh of the third, and penetrate to the bone, at the same time making a wound disproportioned to its diameter? I cannot offer an explanation of the fact. I saw something of a similar kind during the campaign in Poland.

After extracting this copper, the wound soon healed, and he returned to duty.

During our campaign in Egypt I amputated the leg, in two cases, very near the knee-joint, through the condyles of the tibia, and nearly on a level with the head of the fibula, which I then removed. My success removed the doubts which I had before entertained of this operation. In this operation should we not be apprehensive of caries which easily takes place in the spongy substance of a bone, and advances rapidly; and is there no danger from a disorder of the joint, and an anchilosis of the stump? Neither of these accidents occurred in these cases, and the cicatrix of the stump was completed nearly as soon as when amputation of the leg had been performed at the usual place; namely, about four inches below the tuberosity of the tibia.

Since the expedition into Egypt, I have frequently amputated on this new plan, when wounds prevented me from amputating at the place commonly chosen, and I have met with equal success.

Surgeon Garrigues performed this operation considerably above the part recommended by authors, and he explains its advantages in his inaugural thesis, printed in 1806. While paying a just tribute of applause to the work of this respectable surgeon, whose opinion we adopt in part, we must confess, by a kind of enthusiasm he has passed the bounds prescribed by experience and anatomy.

Without entering on an analysis of this dissertation, I shall describe the plan of operating which I have substituted to that hitherto selected, and shall point out the limits, above which we cannot go, without exposing the patient to the most acute symptom. The reader may then perceive the difference between my rules and those of Mr Garrigues.

Though I had performed amputation through the condyles in many cases, after the battles of Austerlitz and

Eylau, yet I had never seen it attended with a success so uniform as after the battles of Eslingen and Wagram, and during our last campaign in Austria, where the cases of amputation were numerous and of various descriptions.

At Wagram and at Eslingen, I amputated the legs of many of the guards at this part. The severe wounds received from the fire of the artillery, often extended to the upper part of the leg, and very near the knee, to such a degree, that all my colleagues who saw them, were of opinion the operation should be performed on the thigh.

I endeavoured to remove their fears relative to the operation through the condyles of the tibia, and assured them with the confidence which experience gives, that it was not more dangerous than amputation at the usual place: but care should be taken never to carry the knife much higher than the tuberosity of the tibia, but to make the section below the insertion of the tendon of the patella. If a line be drawn from this point around the limb, it will generally pass below the head of the fibula, and across the inverted points of the condyles of the tibia: but the relation of the tuberosity of the tibia to the head of the fibula, is not always the same, and the former should therefore be always taken as the limit, above which the knife should not pass. For if it be applied too far up, the ligament of the patella is detached, the synovial bursa behind it is often injured, and the insertions of the capsular ligaments on the sides are divided; a retraction of the patella, effusion of synovia, deep-seated disease of the articulation, and other acute symptoms will ensue, and endanger the life of the patient, or require subsequent amputation of the thigh.

By making the section on a level with the tuberosity of the tibia, the patella retains its attachments, with the tendons of the flexors of the leg, which move the stump,

and the condyles are cut so low that we have nothing to fear from caries.

When a parallel is drawn between this *new* operation on the leg, and amputation of the thigh, as recommended by authors in such cases as in my opinion require the adoption of the *new* plan, we are convinced that the superiority of the former, as respects the wounded, is incalculable.

In the first place, the life of the wounded man is less exposed, because its dependencies are not so extensively invaded. The operation is performed with equal facility in either case, and the cicatrix will form as soon on the stump of the leg, as on that of the thigh. I have never seen a caries of the spongy portion of the tibia, in consequence: on the contrary, this spongy substance is soon removed by the vascular action which takes place in it, and the cicatrix soon covers it, and no apparent exfoliation takes place. When the portion of the fibula which remains is short, as generally happens, extirpate it as I have often done. The head of that bone is now a useless body, and impedes the use of the wooden leg. As much of the skin should be saved as possible, to cover the face of the stump: it should be cut vertically to the axis of the leg, where it lays near the tibia.

Such is the operation which I have adopted, when necessity demanded it. On the stump formed of the knee, and about two inches of the leg, the invalid may find a firm point on which to rest. The support of his body is sure, and he performs loco-motion with great ease, and without a cane.

An artificial leg of a natural shape may easily be worn under the knee while bent, provided the length of the stump do not extend beyond the calf of the artificial limb. This will be more convenient than if the stump were introduced into its cylinder, as is done when ampu-

tation is performed above the ankle: an operation which is not recommended by intelligent surgeons, because many cannot procure these artificial legs, and because acute symptoms generally follow from the scantiness of the cellular substance and flesh at this part of the leg, and from the thickness of the bone. The stump heals with difficulty, and there is more nervous irritation produced than from the usual operation: besides suppuration takes place with difficulty, and becomes sanious. I have frequently amputated above the ankle, and almost all the patients have died of nervous fever, or tetanus.

General ****, amputated at Wagram, was a striking example of this. Finally, it is better in all possible cases, to take off the leg too high than too low; and never to operate on the thigh, unless the articulation of the knee be really injured.

I shall here add the cases of several who were amputated on the new plan, since my return to Paris.*

CASE FIRST.

Louis, brigadier of dragoons, was brought to the hospital for the kick of a horse on the left leg. The anterior and superiour part of the limb was extensively contused, and the tibia and fibula fractured. The whole shoe of the horse had acted on him. At first sight, this wound appeared by no means alarming, and in opposition to my opinion, the majority of my colleagues were of opinion it

* I report these cases in preference to others, because I was here more at leisure to attend to the effects of the operation.

might be saved. With reluctance I submitted to this opinion, and dilated the wound to extract the loose splinters and to dress the limb, after wetting the bandages in camphorated vegeto-mineral water. During the first stage of the wound, the symptoms were mild: on the 12th day, acute piercing pains came on, with gangrenous inflammation of the wound, fever, insomnia, &c. We met them by the proper remedies, but they continued to increase until the limb was threatened with sphacelus, and his life in imminent danger.

Abscesses formed, and a hæmorrhage followed from the antierior tibial artery, which produced great prostration, and obliged us to amputate. A phenomenon occurred in this case, namely, a convulsive hiccough, which was produced by the slightest pressure on the leg or the dressings.

The surgeons who were at first opposed to amputation, now advised it on the thigh, but as the knee was still sound, I operated on the leg, and even risked a second operation above, should the condyles of the tibia be fractured or carious. When acting thus in doubt, I think it better to expose the wounded to the risk of a two-fold operation, rather than deprive him of the knee, which is invaluable. The section was therefore made through the condyles, a short distance above the tuberosity of the tibia: we arrested the adynamia produced by the first symptoms with great difficulty, but his strength was gradually restored, and with great care we brought him through, and retained his knee. The stump was completely healed in four months. He walks with a wooden leg without crutch or cane.

We dissected the leg, and found both bones broken and stripped of their periosteum: the muscles lacerated and injected with blueish blood, and the cellular substance filled with black purulent matter.

CASE SECOND.

Bernard, a fusilier, came to the hospital in December, 1810, with a fistulous wound of several years' standing in the superiour part of the right leg. A deep-seated caries of the tibia, enlargement of three-fourths of this bone, atrophy of the limb, and incessant pain attended. These symptoms were the effects of a gun-shot wound at the battle of Wagram. The ball which entered at the now fistulous opening, had fractured the tibia, and buried itself in the thickest part of the limb. His sufferings had since been extreme; he had fallen into a slow nervous fever, with insomniæ, frequent diarrhœa, and extreme emaciation. The leg was bent upon the thigh, and diseased high up, but the knee was still sound, and I thought proper to operate on the leg, and then if the caries had extended to the condyles, (which I did not expect) I intended to make the incision through the thigh. In this case we should have performed two operations instead of one; but the importance of the knee sanctions such a measure, as I have before explained.

Finally, I operated through the condyles, just above the tuberosity of the tibia, in opposition to the opinion of many consulting surgeons. It succeeded, and the cicatrix was complete within 125 days, when he left the hospital in a state of approaching corpulency.

We dissected the limb, and found two-thirds of the bone carious, and at the part where the caries com-

menced, the ball was seen flattened and wedged between the tibia and fibula. The muscles were discoloured, and in a state of extreme atrophy.

I shall add another important case. Mr. Poltz, a dragoon, received a most severe kick from a horse while manœuvring, which fractured his left leg, though he wore a strong boot. He was immediately brought to the hospital, where I received him. The wound occupied the superiour and anterior part of the leg, both the bones were comminutively fractured up to the condyles of the tibia, and there was considerable hæmorrhage. I did not hesitate, in this state of things, to remove the leg, and, contrary to the opinion of my colleagues, who decided on the thigh as the most proper part, I amputated through the condyles of the tibia. Here it was uncertain whether the fractures extended into the condyles, but in that case it is better to subject the patient to a few moments of additional pain, than to deprive him of his knee; but his knee was sound, and he recovered sooner than either of the preceding. The limb was shattered as if struck by a ball.

The same practice is not to be adopted in amputating the superiour extremities at their superiour part, for instead of leaving a short stump, it is better to extirpate the arm when the humerus cannot be taken off below, or on a level with the insertion of the deltoid muscle; the stump is drawn towards the axilla by the great pectoral and dorsal muscles. The application of ligatures on the deep-seated vessels in the axilla, irritates the brachial plexus, and increases this retraction, which proves painful and very inconvenient to the patient, and often causes tetanus: the stump always remains inflamed, and the humerus is finally united to the scapula by ankylosis, so that this portion of the arm is quite useless, and exposed to accidents. I have heard many soldiers and officers of

every description, regret that their amputations had not been made at the shoulder-joint.

Besides, this operation is rendered so simple, that a young practitioner can succeed as in common amputation of the arm, and it is always to be preferred when there is a necessity for going above the insertion of the deltoid.

We often amputated the foot with complete success between the two rows of tarsal bones, or between the tarsus and metatarsus. It is certainly important to reserve every part of the limb which supports the body, and facilitates loco-motion. An artificial end may be applied to the foot, and the patient walks securely as on a natural foot.

Some unusual appearances were observed after the battle of Wagram.

George, a grenadier of a strong constitution, was wounded by a ball, which had nearly terminated its parabola. He was knocked down, but there was no external mark or trace of injury. He lay speechless, and his companions thought he had been killed by the wind of the ball, which fell a short distance from him, but he afterwards recovered, and was brought to my hospital at Paris.

Another grenadier was grazed by a ball which fell near him. Without losing his equilibrium, he was deprived of his voice and became dumb.

This second case would *seem* to confirm the erroneous opinion of some celebrated surgeons of the present day. How many similar phenomena, which form the basis of false hypotheses, still remain unknown, because they have not been examined into? The ball in the first case having nearly completed its parabola, passed obliquely over the thorax and superiour part of the abdomen, so that while turning on its axis, it rolled over the abdomen; the muscles and skin being acted on perpendicularly to

the axis of the body, yielded to its force, and neither solution of continuity nor ecchymosis were at first produced, while the other subjacent parts, being more tender, were much injured, distended, and deprived of their electricity. Here the branches of the eighth pair of nerves seemed to have received the shock of the ball. After a general syncope, or sudden death of several minutes' duration, he was unable to utter a single word, or to articulate.

When he recovered from the syncope, he informed us by writing, that he felt a fulness extending from the ensiform cartilage along the thorax and neck, to the tongue and jaw, which he could not move. Tetanic contraction ensued; the integuments of the thorax and abdomen inflamed, and a large ecchymosis appeared about the epigastrick region two or three days after the accident, and proved the contact of the ball with his body. These symptoms were removed by anodyne camphorated liniments, and cooling drinks; but he remained dumb. The muscles of the jaw gradually regained a part of their power, while the muscles of the tongue itself, and those concerned in its motions, remained rigid and paralytick; this organ fell into a state of atrophy, and was much reduced in size. The sense of taste was quite destroyed, but after a long time he could taste sapid fluids or liquid aliment in the nostrils, and probably this extraordinary faculty would have improved in time. His stomach also appeared to have lost its sensibility, and its contractile power appeared to be much diminished, for his digestion was slow and painful, and for this reason he was obliged to eat frequently, and to take but a small quantity of food at once. He was even deprived of the sensation of appetite, and emetick medicines produced no vomiting nor any kind of sensation. This man was seen by professour Dumeril, and by several other celebrated physicians at the hospital of the guards, where he submitted to a va-

riety of treatment, and was then placed on the pension-list.

Was it the shock of the ball alone which produced these symptoms? Or did the ball destroy the electricity or galvanism of the principal nerves of animal life, viz. the eighth pair? I believe both causes co-operated.

In the second case, the ball, under similar circumstances, grazed the neck. The parts were whole, and a slight ecchymosis could scarcely be discovered under the skin of the neck, and superiour part of the chest. The same nerves were injured, and to this injury may the loss of the voice be attributed. All the assistance of art was insufficient in these two cases.

The application of cups to the part, immediately after the accident, general bleeding, covering the thorax and abdomen with the reeking skin of an animal (a sheep for example) which has been stunned and quickly flayed, and diaphoretick drinks are the means by which the consequences of such an injury may be arrested, These contusions, whether more or less apparent, cannot receive too much attention.

After the battle of Wagram, the enemy retreated precipitately to Snaim, and we pursued and cut him off from Moravia, and confined him in this city and its environs by the wings of our army, which had been engaged; but a parley was held during the following night, and a suspension of hostilities agreed on.

Both armies encamped, and the negociations were continued: head-quarters were established at Schenbrun and Vienna, where they continued till peace was concluded and proclaimed a few weeks after.

In this interval I attended to the wounded and sick guards and gave a course of theoretick and clinical surgery, in order to profit by the remarkable cases which occur-

red. For this purpose I had an amphitheatre prepared, and rooms for dissections, where the surgeons of the army and of Vienna who attended this course were admitted.

The military hospital of *Josephine* academy is well built and arranged, and its medical institutions in full vigour: in this school and under the direction of the academy, military surgeons are educated. I visited the museum of anatomical preparations in the great hospital of this academy, and of the imperial university, and the pathological preparations in the museum of the clinical school of the same hospital, collected by the celebrated Franck and Quarin.

The report, containing the result of my operations during this campaign, with the list of the guards who were rendered invalid by wounds, &c., was presented to the emperor, who conferred upon me the title of baron, with the annual sum of 5000 francs.*

When our troops evacuated Vienna to return to France, I transported all our sick and wounded to Paris, where I arrived in December, 1809. On the first of January, 1810, I resumed my duties at the hospital of the guards.

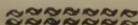
I shall give an account of the most interesting diseases that have come under my notice from that to the present period. Many of these required operations of more or less importance, and were attended by some uncommon phenomena, affording subjects for the clinical lectures which were given once a week, at this hospital.

* My colleagues, Messrs. Desgenettes, Percy, and Heurteloup, by the same decree, also received the same title and pension.

MEMOIR

ON HYDROCELE,

*Followed by some Reflections on the Operation for Fis-
tula in Ano.*



HYDROCELE is a common disease among soldiers, and one which has occupied the attention of practitioners, both on account of the ill success and the consequences of the various operations performed to effect a radical cure. The cure by injection, introduced by **Monro**, the regimental surgeon, who lived about the time of the celebrated **Edinburg** physician of that name, is doubtless the least dangerous, and possesses more advantages than any other; but is not entirely free from danger. I have seen it prove fatal, though performed by expert surgeons with mild fluids, such as pure wine.

These unfortunate occurrences have induced most men who labour under hydrocele, more especially such as are of advanced age and irritable habits, to submit to the inconveniencies of the disease all their lives, rather than undergo an uncertain operation.

The numerous cases of hydrocele which have fallen under my care in the hospital of the guards since my re-

turn from Egypt, have afforded me an opportunity of becoming acquainted with the advantages of the different plans proposed for a radical cure. Without regret I have given up the operations by excision, incision, cautery, and seton, which are always uncertain, and very often followed by most alarming symptoms. I have most generally succeeded by injecting alcoholick fluids, but I must confess that many of my patients have suffered much and encountered great danger from it. One of them died under my eyes with peritoneal inflammation, the consequence of the operation, in defiance of all the means which were used to arrest it. Gangrene soon followed.

During the campaign in Austria, I thought of substituting to the operation by injection another plan; namely, the introduction of a gum-elastick tube into the tunica vaginalis testis, through the canula of the trochar, to favour the discharge of the serum, and to irritate the sac ad libitum.

I never reduced this intention to practice until I returned to Paris. The first attempt was made in February, 1810, on a dragoon who could not bear a light vinous injection: for, when a few drops of this fluid were introduced into the tunica vaginalis, he cried out with vehemence, and in a few seconds fell into convulsions. I immediately withdrew the syringe, and pressed out the injected wine through the canula of the trocar. But then in order that the operation might not be in vain, I introduced part of an elastick tube through the canula, secured it in the tunica vaginalis, and kept it there till next morning, when finding that the serous discharge had ceased, and that slight symptoms of inflammation had come on, I removed the tube, supported the scrotum by a suspensory bandage, and awaited the result.

A slight swelling of the testis, with pain and redness of the skin were perceived, which indicated the adhesion of the tunica vaginalis, to the tunica albuginea.

These mild symptoms continued to increase for two or three days; after this, resolution commenced, and went on gradually. On the fifteenth day, he was quite well, and the testis of its natural size.

During his treatment, I may observe that he took light food, and that no other remedies were adopted, than cooling acidulated drinks and enemata.

The numerous cases of this kind among the dragoons which have been admitted into our hospital, have occupied my attention. Since the first case to the first of October, 1811, thirty-three guards of different ages and constitutions with hydroceles of various size and duration, have been radically cured by my plan in a very short space of time. These facts enable me to assert without fear of contradiction, that it is preferable to every other, proposed for the radical cure of this disease. I shall hereafter attempt to show why these advantages are to be expected.

In thus claiming it as my invention, I admit that several celebrated surgeons of the eighteenth century, among them *Monro* of *Edinburg*, had spoken of a practice nearly similar. They used the canula of the trocar which had been introduced, and left it in the tunica vaginalis, a longer or shorter time. *Monro*, the father, who was the author of this plan, without having ever carried it into effect, recommended it with some hesitation. *Monro*, the son, expresses great fears from its adoption, because he says the testis would be scratched, and other unpleasant results follow. My illustrious preceptor, *Sabatier*, in his surgical works, (*Article Hydrocele*) admits the objections of these surgeons, and disapproves of the operation. So that no practitioner since *Monro* the son, has attempt-

ed it, or endeavoured to correct its imperfections. Still it was entitled to their attention, since Mr. Sabatier admits that Fabricius ab Aquapendente has formally recommended this mode of operating as the best.

It is matter of surprise, that during an age in which surgery has been carried to such a degree of perfection, no one has thought of rendering the operation for hydrocele more simple, and adopting this plan by which (as Monro sen. has observed) we can increase the inflammation, or arrest its progress with an instrument completely under our controul.

After receiving the first light of experience on this subject, I endeavoured to come at the rationale of this fact. Now what are the intentions of a surgeon who wishes to cure a hydrocele without disordering the general functions of the patient, or injuring the testis, surrounded as it is by the fluid of disease? It is to evacuate this fluid by the most simple means, and to prevent its subsequent formation and collection. To effect these intentions, the contents of the sac must have a free exit, and the membranous organ which secretes the fluid must be irritated in a gradual manner, and for a proper time. The exhaling vessels must inflame and be obliterated: the source of the watery effusion must be dried up, and finally, the two serous membranes must come in contact, and unite internally to each other, by a species of adhesive inflammation, and the disease will be radically cured. My plan appears to embrace these intentions.

My new plan has often been noticed in my lectures on clinical surgery, at the hospital of the guard, and several of my colleagues have reduced it to practice.

My pupils have attended to its effects in thirty successful cases.

To perform this operation, I use a small trocar of the kind preferred in paracentesis, so that the canula will

admit an elastick catheter of sufficient size. This trocar is to be plunged into the most depending part of the sac. When the fluid is evacuated, a gum elastick catheter of convenient length should be introduced through the canula of the trocar, which still remains in its place. The canula may then be removed, and the catheter secured by a bandage moderately tight. The patient is to observe strict repose and suitable regimen.

The presence of the catheter in the tunica vaginalis causes but little pain or uneasiness. During the first twelve hours, the serum is discharged through the catheter: then the secretion is suppressed, and entirely disappears. Inflammation now commences, and a complete adhesion takes place between the tunica vaginalis and albuginea, except at that part occupied by the point of the catheter, which should be removed as soon as the serous discharge ceases; for this is the certain sign of incipient inflammation.

This mild inflammation is generally established before the second day, according to the age and irritability of the patient, and proves sufficient to produce adhesion. When the patient is very young and irritable, a few hours are sufficient for this purpose. The catheter should then be withdrawn; for if it be left until the serous secretion has ceased, the local inflammation may become too violent and suppuration and abscess may follow, as I have seen in two or three cases, when the catheter had not been removed at the proper time. But if the hydrocele be chronic, or the patient have submitted to previous operations, it may be permitted to remain a longer time.

By strictly attending to the effects of this mechanical irritation, the surgeon may arrest it by withdrawing the catheter. The testis is then slightly swollen and painful, but resolution soon takes place, and without the necessity of any topical application. If there be induration of the

testis, mercurial frictions on the part will remove it. All on whom I have operated in this manner for hydrocele, recovered without a relapse before the twentieth day. No serious symptoms ever occurred, and small abscesses seldom formed; a proof that this mode of operation is as mild as it is infallible.

The operation for fistula in ano, which was also common among our soldiers, and very familiar to us, was so far improved, that we considered it as respects its facility and safety, on a par with venæsection. Formerly, this operation was both severe and unsuccessful, and though much improved about the end of the last century, required further perfection. I have seen many persons labouring under this disease, who were operated on by expert surgeons, and were attacked by new fistulas, which took their rise in the seat of the former disease. This is to be attributed to a want of attention to the immediate causes of fistula. I now speak of those with an internal or intestinal orifice. It appears clear to me that when this orifice is not included in the section of the bistoury, the fistula continues or returns. And that on account of this perforation, it always forms from within outwardly, and never from without inwardly, unless a wound penetrate the rectum in this direction. So we may conclude that deep abscesses of the margin of the anus will always be attended with fistula, which will be complete as soon as the abscess is opened. This prognosis should always be made, and the patient be informed of the two-fold indication to be fulfilled. The first relating to the abscess, and the second to the fistula, on which no operation should be performed, until the abscess is well cleaned.

The whole success of the operation then depends on finding the internal orifice, which, to the inexperienced, is no easy matter, and this difficulty is increased when its seat is not known. To ascertain this, has been the principal object of my researches. If the probe be carried on through the fistula when introduced into the external opening, it generally passes into the bottom of a blind sac, formed internally by the fistula. Its thin wall is easily broken through, and this accidental opening leads into the intestine, so that the former orifice is almost always left below, or on one side, and thus the fistula is not cured by the incision, or returns soon after. This inconvenience more particularly attended the operation of my preceptor, Desault. I speak of his perforating trocar, by which he passed a leaden wire to include the diseased portion of the intestine.

If we attend closely to the structure of the rectum, and the manner in which the causes of fistula act, we may easily be convinced that the internal walls of this membranous tube are injured only in those parts most obnoxious to the causes of fistula, namely, in the sinus, between the two sphincters of the anus, immediately above the internal sphincter, where the frequent contraction of the anus produces a circular furrow, in which feces and foreign bodies such as portions of bone, or the seed of grapes, &c., are easily arrested, and after corroding or wearing away, or perforating the mucous membrane, produce irritation, abscess, and fistula in the surrounding cellular substance. In this part of the intestine, therefore, are we to seek for the internal opening. It is never found above the furrow, of which I have just spoken, but generally below it. It may be easily discovered with the naked eye, by carefully separating the edges of the anus. A probe is to be then conducted through this opening. A

curved tube with an open end is then to be introduced along the probe, and its open end fixed on the beak of a gorget, so that we may cut with firmness, and divide the part between the tube and gorget, with a single stroke of the bistoury. By this plan and careful dressing, the patient may be assured of a cure between the fifteenth and twentieth days. The cicatrix of this recent wound is produced after the divided vessels are thrown into disorder, and separated like the lips of a wound which never unites. A piece of lint, if placed between the lips of this incision, will generally suffice for the first few days. The cicatrix is then formed without assistance, and leaves a depression of greater or less depth.

This operation may be simplified, and rendered easier to the surgeon, and less painful to the patient. This could be done by using a flexible stylet, with a small button at one of its extremities, and a groove at the other. The grooved end should terminate in a rounded plate, so that it may be held with the fingers. After passing this stylet through the internal aperture of the fistula, fix it in a gorget having bars across its gutter, and then draw it out as far as the groove, or seize it with the fingers for this purpose; thus the operation will generally succeed: with a thin sharp straight bistoury, the small portion of the margin of the anus, turned aside by the stylet, may be divided.

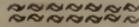
After this plan I have often performed the operation among our soldiers, who assured me that they felt but little pain. They were perfectly cured in a very short time.

I may observe that the most certain mode of operating for fistula in ano, is to lay open its internal aperture with the bistoury, and in order to effect this, the greatest care and attention should be paid in passing the tube

through it. This plan has never disappointed my expectations.

I shall not introduce the particular cases of persons who underwent operations, for the two diseases just spoken of; I shall only notice, in a few words, some facts relative to a case of hydrocele, produced by hydatids.

CASE

Of a watery Tumour of the Scrotum

MR. HARDOUIN, a dragoon, entered the hospital on the first of April, 1811, with an uncommon tumour on the left side of the scrotum, which incommoded him greatly.

The situation of this tumour on the course of the spermatick cord, in front of the testis, (which was sound) its irregular shape, and the changes produced in its dimensions by particular circumstances, had induced several intelligent surgeons, to whom I showed it, to form an erroneous opinion as to its character. Some of them thought it an enterocele, but the greater number viewed it as an epiplocele. When this man stood erect for some time, the tumour increased till it attained its greatest size, and was then of the dimensions and shape of a large hen's egg, containing two yolks, and having a transverse depression between them. While in this state the patient felt acute pain and tension of the abdomen, with nausea, and disorder of the stomach: when laid horizontally on his back, with the thighs bent, the tumour was reduced to

half its size, and appeared to return into the abdomen, or to pass partially into the abdominal ring, which we found much dilated. The tumour was soft, irregular, and indolent, and fluctuated but little; when pressed on, the patient felt no pain, and the tumour did not retreat into the abdomen: still we had reason to believe it an epiplocele. An internal motion which I discovered in this tumour, at my first visit, induced me to view it as being formed by hydatids. I made several experiments upon it: rest, and the extension of the left thigh, allowed the tumour to enlarge, and except when the patient moved, or suddenly touched it, the tumour remained *in statu quo*: but if a cold, volatile, or stimulating application were made, it retracted, diminished in size, and partly concealed itself in the abdominal ring.

If this experiment was not repeated, it resumed its former position and size. The scrotum was not concerned in these motions. I explained these phenomena in a clinical lecture, under a persuasion that hydatids were possessed of life, and of the power of contracting, and thus effecting the various changes, that we had seen in this tumour.*

* During my campaign in Poland I observed that sheep, when left in marshy pasturage-ground in the spring, became lean, had prominent bellies, and finally died. Being desirous of knowing the cause of their death, I had a number of them opened in my presence, and I also frequently visited the butcheries of the army to inspect others that had no external appearance of disease. In all the sheep from these pastures, hydatids of different sizes were found, adhering to the mesentery and intestines. At different periods, I separated many of them from the abdomen under the hands of the butcher. I carefully removed the external covering of the hydatids which is very difficult, on account of its attachment to the proper coat of the animalcula. I then had the hydatid without any foreign connexion; its proper coat was filled with a transparent albuminous fluid through which very fine and delicate blood vessels were

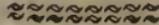
This dragoon having consented to the operation proposed by me, I proceeded to extirpate the tumour. In order to keep the hydatids alive, I divided the skin of the tumour transversely, with a crooked bistoury, and dissected it up with great care. The hydatid was formed by the union of two parts, of the size of a horse-chesnut. The contractions were now more evident. I expected to detach these tumours entire, but the patient moved and broke them. I then cut up their pedicles, and the extirpation was complete. Small blood-vessels were distributed over these living vesicles. A considerable portion of the tunica vaginalis was removed from the testicle, by the invasion of the hydatids, which were produced in its substance, or on its surface. After inclosing the testis in the dartos, I brought the lips of the incision together, and completed the dressing by a proper bandage. An irregular exertion of the patient, during the night, disordered the dressing, and the testes was thrown from its place. Inflammation followed with its attendants. In such a case, the suture would have been proper, and I should have used it, had I not calculated on the composure of the patient. The testis was however gradually restored, and he was discharged perfectly cured on the 1st of June.

This is the only case within my knowledge, in which hydatids have been discovered in a man.

distributed. The head of the hydatid was supported by a small pliant neck and resembled a round tubercle. These animalculæ when put into tepid water lived several hours. I made them contract at pleasure by touching them with a probe or by pushing them from place to place. In this state we kept many of them for a considerable time.

ESSAY

On the Extirpation of Scirrhus or Cancerous Testes.



THE extirpation of scirrhus or cancerous testes, according to the general opinion, is an operation of very uncertain success. Practitioners even avow, that this success is very limited, more especially in hospitals. I believe, reasoning from my experience in these cases, that its failure is to be referred more to the treatment during and after the operation, than to the nature of the disease.

When this disease arises from an internal cause, it may generally be attributed to the presence of some particular morbid taint, or virus in the system, the consequence of the repercussion of gonorrhœa, herpetick affections, &c.

Guided by this opinion, before the operation is proposed, the patient should be subjected to such a regular treatment, as may be indicated by the particular cause.

When this plan has been continued for a sufficient length of time, the disease becomes local, and the operation will succeed.

This preparation is of the utmost importance. For my experience has also taught me, that mechanical causes alone seldom produce scirrhus and cancer in the testes of men, or in the mammæ of women.

I have had a great number of women under my care for wounds and severe contusions of the mammæ. But the symptoms which followed were easily removed by the common means, and I never knew a scirrhus or cancer to follow these injuries, unless there existed some internal cause.

Among horsemen it often happens that the membrum virile is bruised against the pommel of the saddle, and that violent contusions are received on the testis. The symptoms which follow generally yield to local venæsection, to topical applications, and low diet. But if the contusion have been very great, the inflammation cannot be arrested; the testis swells beyond measure, suppuration follows, the tunica albuginea cracks or ulcerates, like the proper coat of an artery in aneurism, and the organ is melted down. The most acute pain now attends, with symptomatic fever. But scirrhus and cancer appear in a different manner, and with other symptoms.

I am fully convinced that every person on whom I have operated for either of these diseases, had laboured under serofulous or herpetick affections. But the most common cause of scirrhus or cancer in men or women, is the repercussion of gonorrhœa, or leucorrhœa, and the best means of averting these unpleasant effects, is to re-establish the local discharges as soon as possible, and to exhibit proper remedies for the scirrhus or cancerous disease. The uniform success which has followed every extirpation of scirrhous or cancerous testis, after this pre-

paratory treatment had been adopted, confirms my opinion.*

Of more than thirty such cases on which I operated at the hospital of the guard during the years 1810, 1811, but one died, who was extremely timid and exhausted: he had a cancer in a state of suppuration. The others recovered sooner or later, according to the character of their disease. In some cases, the skin and organs were both removed at the same time: in others, extirpation of the testes alone was sufficient; but in every case, the cancerous disease was more or less evident in the interior of the organ.

When the tumour is large, and the patient robust and irritable, a difficulty occurs which we should be prepared to meet, namely, the immediate retraction of the cord into the abdomen. This may prove fatal in consequence of the effusion of blood in this cavity, from the spermatick arteries which have not been tied. To prevent this accident, the ligature should be previously applied, and the cord strongly compressed during the operation, where it passes through the abdominal ring. The skin of the scrotum should be divided to the bottom of the sac, left by the extirpation of the testes: and every artery be carefully tied, so as to prevent the blood from passing into the cellular membrane, and causing inflammation, deep-seated suppuration, and gangrene. The lips of the wound should not be united, as advised by many practitioners, because it must suppurate; this process is necessary. The strength of the patient must be supported, and the general treatment for the *cause* of the disease conti-

* I often extirpated scirrhus and cancerous mammae in my private practice, and in no case have I known the disease to return after the operation.

nued. The dressings should be mild at first, of balsamick articles, then with fine lint and plasters of cerate.

The cancerous tumours in all these cases varied in size, in the cancerous disorder, state of the skin, and idiosyncrasy.

I shall notice none of them, as they have been collected by the young gentlemen who attended my clinical course, except one, in which a sarcomatous tumour had formed on the the spermatick cord and testes.

CASE.

John Constantin, a dragoon, aged 32, entered the hospital with a hard, renitent, and unequal tumour, of the size of a large hen's egg, on the right testis and spermatick cord. At the bottom of this tumour, a fluctuation was perceived, depending evidently on the presence of a fluid in the tunica vaginalis testis. I conceived that the best plan would be to lay bare this membranous sac, and the tumour, to puncture the former more conveniently, and to remove the latter, after ascertaining its character. With this view, I made a longitudinal incision through the integuments of the tumour; the tunica vaginalis testis was laid bare, and then punctured at its most dependent part. The tumour was now exposed to view, and after dissecting round it, I extirpated it with such precautions as were necessary to secure the cord and testis from injury. After the operation, the tunica vaginalis was found to be entirely destroyed, a proof that it assisted in forming the tumour. It was a legitimate sarcocele, which must have increased to a large size in process of time, or in a warm climate. A split roller, wet with mallows-wa-

ter was immediately applied on the wound to bring its lips together, and protect the denuded testis: the wound soon healed, the dartos united to the surface of the testis, and he was discharged cured in less than a month, with the seminal organs uninjured.

This delicate operation is a proof of the success that may be expected when operating for very large sarcoceles.

To this case I will add two others of hernia, with some uncommon appearances.

Michael Gillaume, a grenadier of the guards, came to the hospital on the 4th of September, 1810, with an inguinal hernia of the right side: he had laboured under all the symptoms of strangulated hernia for thirty-six hours. The application of cold water, pounded ice, cataplasms and baths, were in vain made to the part, and venæsection was used without success. This was the second time the hernia had been strangulated. The operation was required without delay and performed the same day, September 5th, in presence of the hospital-surgeons and my pupils.

The skin having been divided with care, I laid bare all the external surface of the hernial sack, which was apparently formed of two distinct and separate layers, having a small quantity of reddish serum between them. Was it not probable that the peritoneum had been pushed down at each descent of the hernia, thus forming two separate sacs? When I reached the second sac, the assistants took it for the intestine; but a moment's reflection convinced me of the contrary. The intestine could not adhere, like the sac, by its pedicle to the surface of the surrounding parts: this adhesion could only take place in the abdominal ring, and to some parts of the sac.—Again, its surface was not uniform like an intestine, and

its vessels were not so well defined and thinly distributed as in the peritoneum. Without apprehension, I pinched up the most dependent part of this membranous sac, and opened it with a single cut of the bistoury. A considerable quantity of reddish serum was discharged; I then cut up all its anterior wall with a grooved director and crooked seissors, and laid bare the parts contained within it. The tumour, of the size of a horse-chesnut, was formed by a small portion of intestine, surrounded by a part of the epiploon. According to the practice of John Louis Petit, and the opinion of the consulting surgeon Dr. Ribes, after enlarging the ring, they were returned into the abdomen, without taking into view the particular state of the intestine. Yet I took care to separate the epiploon from the intestine to prevent the latter from being confined or strangulated by it. I completely succeeded in this obscure and difficult operation. The patient was dressed with a fine split roller, applied immediately over the wound with lint, and compresses above this, and an inguinal bandage. I had taken care to dilate the ring at its external angle, where the two tendinous pillars separate to form this opening. The epigastrick artery, which runs obliquely behind the internal pillar, and is pressed towards it by the spermatick eord, is thus avoided: the eord is generally found between this artery and the hernia. Besides, with a very small incision at this tendinous commissure, just mentioned, a greater dilatation is produced than when the internal pillar is entirely divided. The edges of the ring are more easily approximated, the cicatrix of the parts is more solid, and the patient is less obnoxious to future hernia. In short, I have always had reason to adopt this plan.

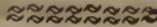
After the operation the symptoms abated, and gradually disappeared; nature was assisted by enemata, antispasmodicks, cooling remedies, camphorated oily embro-

tations of the abdomen and regimen. The wound healed, and he was discharged on the first of the ensuing October.

I would advise that the strangulated intestine should never be returned with the epiploon surrounding it, nor until its whole surface has been laid bare and examined. The omentum should be opened with great caution, and separated from the intestine, and each returned separately. If any vessels of the epiploon be divided, they should be tied, and the ligatures kept out of the wound. This advice given by Ritch appears to be very correct.

Mr. Muriau, a chasseur, had had an inguinal hernia of the right side, for the space of two years, and supported it by a truss, but by a sudden effort the truss was broken, the hernia driven down and strangulated below the inguinal ring; he tried in vain to reduce it, fainted away, and was carried into my hospital. The attending surgeon applied emollients, opened a vein in the arm, and used the taxis, after having placed him in a proper position. Local pain, vomiting, anxiety, and constipation now appeared. When I visited him in the morning, twenty-four hours after the accident, I found a tumour as large as an egg, in the right inguinal region, attended with pain, tension, and slight redness of the skin. The vomiting and hiccough were frequent, the features of the face haggard, and the pulse small and weak. Some other means to reduce it were now used, besides the foregoing, and we thus lost several hours. Finally, the reduction of the hernia was thought impossible: I called together the surgeons of the hospital, and it was resolved that the operation should be performed without delay. After dividing the skin and cellular membrane, I discovered the hernial sac formed of several folds, which I divided in succession; for this reason the operation was tedious.—

When I opened the sac, a large quantity of reddish serum escaped; the openings were extended upwards and downwards by a grooved director, and crooked seissors. I dilated the ring, according to my plan, at its external commissure, and was then surprised to find that the intestine could not be returned: through the coats of the intestines, I discovered a knot of lumbrici which prevented its reduction. I disengaged the ends of the strangulated intestine, and with my fingers pressed the worms one after the other, into the intestinal tube, and the hernia then suddenly and spontaneously returned into the abdomen. He felt immediate relief, and the symptoms abated; I dressed the wound as usual, and ordered emollient enemata to be administered. Embrocations of warm camphorated oil of chamomile were made on the abdomen, a composing antispasmodick draught was given, with a tea of orange-flowers for common drink. He passed a comfortable day; he felt a few colick pains; the enemata had yet produced no evacuations, but the hiccough and vomiting had entirely ceased. I ordered the injections and embrocations to be repeated; he had two copious alvine evacuations during the night, and slept with composure three hours; a perspiration ensued, and he was much improved: I then ordered for him an anthelmintick dose of ol. ricini, and syrup of chicory, which removed five large lumbrici. He continued to improve daily, and was discharged on the thirty-second day in perfect health.

Of Complicated Wounds of the Abdomen.

ONE of our grenadiers was wounded with a sabre, in a duel, on the right side of the umbilical region. A considerable portion of the small intestine had immediately protruded through it, which appeared of a reddish brown colour, inflated, without heat and arterial pulsation: within this portion of intestine was a collection of worms. He suffered much pain and distressing anxiety; the pulse was small and vermicular; his countenance ghastly, and his extremities cold. In this state had he been seven hours when he came to the hospital. The house-surgeon being alarmed at his condition, sent for me, and I found the symptoms as just described.— My first care was to dilate the opening of the abdominal muscles which produced the strangulation, and I then examined the other portions of intestines to know if they were wounded; I found the small curve of the colon wounded in two places, and the mesentery extensively divided by the sword. The first indication was to extract the worms which filled the strangulated intestine, which I effected with a pair of dressing-forceps: they were still alive. I then introduced a suture through the lips of the wounded intestine, and after bathing it with warm wine, reduced it, taking care to retain the ends of the thread used in the suture. When the wounded intestine was returned, a considerable quantity of black clotted blood

escaped, showing that effusion of this fluid had taken place in the abdomen. I brought the lips of the external wound together with a roller, and applied compresses, dipped in warm camphorated wine, and a suitable bandage. He was conveyed to a clean bed, and took two grains of opium in sweet wine. The symptoms abated, he became composed, the animal heat returned, and with it the internal functions were restored. He slept a short time; next day the abdomen was much more painful and sensible to the touch, the urine entirely suppressed, temperature elevated, and thirst ardent; the lips of the wound had separated, but presented nothing remarkable. He died on the seventh day from inflammation and subsequent gangrene of the peritoneum and intestines.

On opening the body, we found the portion of intestine formerly protruded, nearly of a natural appearance. The lips of the wound, united by suture, were agglutinated to each other; the edges of the divided mesentery were found lying on each other in folds, and adhering together, so that the contents of the wounded intestines could not escape into the abdomen. This is a very remarkable circumstance, and pleads loudly in favour of using the suture in wounds of these viscera. But we found a quantity of black decomposed blood filling up the pelvis and the interstices of the viscera in the iliac regions. Inflammation had made them adhere to each other, and to the peritoneum. Several portions of the end of the ilium were in a state of gangrene; extending our researches further, we discovered the source of this copious effusion: the superiour mesenterick artery had been divided near its origin, and at a distance from the first wound of the mesentery.

But for the latter injury, this man might have survived the wounds of the intestines, and finally recovered. This

case may encourage surgeons to use the suture to unite wounds of the intestines.

When a surgeon is called to perform this operation as soon as a wound is inflicted, very small, round crooked needles should be used. These do not divide the small arteries of the intestines, but only separate the fibres of their coats without leaving an open wound, and the fluids cannot escape through these small openings, as happens after using the triangular needle.

Etienne Belloe, aged seventeen, a fusileer of the guards, was wounded by a sword in the abdomen, about two inches above the umbilicus, and on the right side of the linea alba. He was brought to the hospital on the first of April, 1811, and the attending surgeon applied a simple dressing and bandage. Next day I examined the wound, which permitted the omentum to escape through it. The right rectus muscle and its tendinous sheath were cut quite through, and the instrument appeared to have passed in a transverse direction deeply, from before, backwards, between the great curve of the stomach, and the arch of the colon.

The paleness of death was on his countenance, and he was tormented with intolerable anguish, nausea, and efforts to vomit; with hiccough, ardent thirst, acute pain at the bottom of the wound, and great anxiety: his pulse was small and feeble, his extremities cold, and voice no longer audible: we had reason to believe he could survive but a few moments. Still, I reduced the omentum, and with my finger ascertained that the sword had glanced between the stomach and colon, but I could not decide on the place where it had stopped: the wound was dressed, externally, with linen, &c., dipped in warm wine. The abdomen was embrocated with warm cam-

phorated oil, and covered with hot flannel. I prescribed cooling mucilaginous drinks, emollient enemata, low diet, a particular position of the body, and perfect rest. He felt but little relief from this treatment; the prostration continued as before, the pulse was small and tense, and anxiety and nausea attended: he was never at rest. On the night of the second day, vomiting came on with considerable efforts, cold sweats, and alarming syncope; he first discharged the contents of his stomach by vomiting, and then bilious matter with clots of black blood. On the fourth day, to these bilious evacuations succeeded a vomiting of thick black blood, in such quantity, that the chamber-utensil was filled with it in a few minutes. On the fifth day an alvine evacuation, equally copious, took place, preceded by violent colick, and acute pains in the wound; the abdomen always remained flaccid, and without any signs of effusion in its cavity. An alarming syncope succeeded these evacuations on the night of the sixth, and his companions believed him dead. When I visited the hospital very early next morning, I found his face covered with the sheet, and he opened his eyelids with difficulty; the pulse was imperceptible, and his body cold. I immediately gave him warm wine, had his body rubbed with warm camphorated oil of chamomile, and wrapped in hot flannels. He soon revived, and recovered his senses. The colick never returned, and from this time he gradually recovered. I prescribed a mucilaginous drink, with syrup of althea, and orange-flower-water, to which was added a small quantity of nitrated alcohol; emollient enemata were given, and the oily embrocations on the abdomen continued. The vomiting had entirely ceased, but on the 9th, the bloody stools again appeared, and continued until the 12th of April, when they left him: a pain remained for a long time in the bottom of the abdomen below the wound. On the

sixteenth day he appeared to be out of danger, and took light food. The wound was simply dressed, and healed before the thirty-fifth day; his convalescence was tedious.

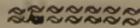
A remarkable circumstance occurred while the wound was healing. The omentum, which at first formed a tumour about the size of a queen-apple, on the outside of the wound, became gradually and spontaneously reduced, and returned into the abdominal cavity, without forming any adhesions with the wound, the lips of which united as fast as the epiploon withdrew from between them. I had made a similar observation under other circumstances, but I had never studied nature in her spontaneous operations as in this case. This phenomenon, and the character of the wound, confirms the precept of Mr. Sabatier, who directs us to leave the epiploon on the outside of abdominal wounds, above the umbilicus. Here we see that nature was advantageously substituted for art. How shall we explain this fact? Doubtless the vessels of the different parts did not come properly in conjunction with each other, in order to form adhesion, and anastomoses, though a great similarity of organization and internal distribution, existed between these parts. Thus in a stump, the cicatrix of which has been long completed, the vessels of the divided muscle do not expand on the cicatrix, and unite with the vessels of the skin and cellular substance, but combine with each other to form a separate cicatrix on the end of the muscle; this forms a union with the end of the stump, by the vessels of the cellular membrane, which pass into it: so it happens when the epiploon is left in a wound of the abdomen. After passing through the different stages of inflammation and resolution, the vital power of the omentum effects the retraction of the displaced part by a repulsive systaltick motion: the vessels do not sympathize with those of the skin or abdomi-

nal muscles, form no connection with the neighbouring parts, and return to their former situation.

What part of the intestinal canal was wounded in this case? It was not the stomach, because he vomited no blood until he had thrown up the bile, and the fluids before taken into this viscus. The sword also passed below the great curve of the stomach. None of the small intestines could be wounded in this case; otherwise the blood could not have filled the intestinal canal, but would have been poured into the cavity of the abdomen, and the symptoms of effusion would have followed, which was not the case. Had the large intestines been wounded, the blood should have appeared in his first stools, but this was not the fact. Every circumstance induces me to believe that the second curve of the duodenum was wounded where it is covered by the mesocolon. It appears as if the point of the instrument had pierced this membrane with the intestine, while Belloc was in full action, and guarding himself. His immediate fall changed the relative situation of the parts. The wound of the mesocolon no longer corresponded with that of the intestine. We may suppose that the lips of the wound in the former soon adhered together, and that the blood was poured out by the small arteries of the intestine into its cavity, and remained there several days, producing local irritation, fixed pain, and sympathetick vomiting of the contents of the stomach. One portion of the effused blood was discharged in the same manner, and the other downwards. By attending to the direction and depth of the wound, and to all the concomitant symptoms, I think this intestine alone could have been wounded.

MEMOIR

On the Consequences of the Operation for Empyema.



I HAVE never been able to ascertain why the operation for empyema, when performed to evacuate sanguineous or purulent collections in the thorax has been so unsuccessful: The cases which occurred in the hospital of the guard during the years 1810, 1811, led me to inquire into the causes of this failure, and to make myself acquainted with the resources which nature adopts in cases where a recovery has followed the operation.

I have inspected the bodies of a great number who died in consequence of sanguineous, purulent, or aqueous effusions into the thorax, and these dissections unequivocally prove, that the lobe of the lungs in the cavity where effusion has taken place, collapses and retracts towards its root, gradually yielding to the effused fluid that space which it formerly occupied. The vessels of the lungs can no longer admit the fluids which filled them in a natural state. They become obliterated, adhere together, and the surface of the lungs adheres to the pleura costalis. This

organ continues to diminish in size, and its internal adhesions multiply in proportion to the increase of effused fluid. Finally, the substance of the lungs disappears entirely: their bronchial pedicle becomes contracted, and the air-cells totally obliterated. The lobe of the lungs is now incapable of being dilated, and though the effused fluid be evacuated, the space which it occupied remains vacant. Nature not being able to fill up this vacuum by the dilatation of the lungs, adopts other means which I shall attempt to explain. We may now draw the following inferences, namely, that the operation will be more or less uncertain, according to the duration of the effusion. When the operation is therefore performed at an early stage of empyema, before the foregoing state of the lungs shall have taken place, it may be successful. Under such circumstances, I have seen many cases of cure after the operation.

Whatever precautions may be taken to prevent the admission of air into the vacuum, left by the abstraction of the fluid, still the result will be the same. That is to say, if the lungs cannot dilate, for reasons before given, the empty space must remain the same. The membranes which line the walls of the thoracick cavity, become irritated and inflamed by the presence of a new fluid, namely, the external air.* When this inflammation runs very high, it impairs the functions of the heart and lungs, and the patient sinks. If he survive these first effects, a copious suppuration takes place over the whole surface of the pleura, lining the diseased cavity, and goes through its different stages in a longer or shorter time, according to the age of the patient, the duration of the disease, and the

* The observations contained in the note, p. 179, Vol. I. relating to the inflammation of wounded cavities, will apply here.—TR.

character of the effused fluid. In adults, the suppuration is more abundant, the pleura is destroyed with more difficulty, the capillary vessels are not so soon thrown out from the walls of the cavity, and it is almost impossible that the large space left by the evacuation of the fluid, can be filled up. Therefore, examples of cure at this age, and *a fortiori*, at a more advanced period of life, are very rare, if they exist at all. For the small number of such operations detailed by authors, were performed on persons who were very young, or whose ages were not recorded.

I shall attempt to point out the means by which nature, with the assistance of art, may fill up the space just spoken of, and remove a vacuum which the animal economy cannot tolerate without great injury.

The accumulation of a fluid in one or both cavities of the thorax has two effects. The first is, the separation and distension of its pliant walls, namely, the diaphragm, mediastinum, pericardium and heart, and the false ribs and their cartilages. The second is the disorder of the membranes, which, coming in contact with this fluid, have their functions disordered or impaired. The capacity of the cavity increases in proportion to the augmentation of the fluid, so that I have found five, six, ten, and fifteen litres of fluid in a single cavity of the thorax. The first operation of nature after the liquid has been evacuated, is to draw the separated and distended walls nearer together; which is effected by the laws of elasticity, and the power of the parts. This diminution of the cavity is relative, and is gradually effected. The production of capillary vessels by the pleura, mediastinum, diaphragm and probably the lungs, assists in effecting it. The intercostal muscles become useless, and lose the power of contracting. The ribs approximate, the cartilages lose their

curves, and encroach on the thoracick cavity. The process of ossification in the sternum and ribs undergoes such a change, that the curves of the bones diminish, while they increase in thickness and become cylindrical, thus contributing to invade the cavity. Finally, all the powers of organization concur in producing this convergence, and gradual diminution of that space in the thorax, whence the effused pus, blood, or serum was drawn. The walls come together, and contract mutual adhesions, or form an internal cicatrix, and the patient regains his ordinary health. Such a termination may easily take place, in persons whose bones are not completely ossified, and whose capillary organs are susceptible of unusual extension. But if the patient be more than thirty years of age, nature does not possess the same resources, and a recovery is rare. I know of no well-attested cures after this age.

The same phenomena will be noticed in the following cases, and may be explained by the pathological preparations in my possession.

From these facts, the following inferences may be drawn.

1st. When we have ascertained that a fluid has been effused into a cavity of the thorax, we should lose no time in evacuating it. This operation may be performed with greater confidence, as it is neither dangerous nor difficult, more especially to such as are accustomed to operating. The external air should be prevented from coming into contact with membranes habituated to the presence of a liquid, particularly if the atmosphere be cold and moist. Injections are rarely useful; they debilitate the capillary organs by their mechanical action, and their difference of temperature may produce a metastasis, or increase local irritation.

2dly. The evacuation of the fluid may be sufficiently encouraged by close and simple dressing. A small tent covered with cerate, should be carefully introduced into the orifice, to prevent, as far as possible, the admission of air into the cavity of the thorax. The patient should be kept under strict regimen, while his strength is supported by good stomachicks, and mild stimulating articles. Convalescence after this operation is tedious, as will appear by the following cases.

I shall first report an uncommon case of hydrothorax, the diagnosis of which will serve as a guide to distinguish the varieties of thorachick effusion.

This case appears interesting, from the curious and remarkable appearances which occurred during its continuance, and after the operation.

Avoine Chatelain, aged twenty-six, a drummer of the guard, after serving during the campaign in Egypt, and returning to France in good health, was attacked in April 1802, by a pleurisy, which passed gradually through its different stages. He so far recovered under the care of my colleague at the hospital, that he was able to repair to Chamberry, his native country, to spend three months of convalescence. He then returned to his corps, but he always complained of a part of his side which gave him pain, when he took severe exercise, or bent the trunk. He then felt difficulty of respiration, and slight palpitations, followed by paleness of the countenance; emaciation, anxiety, and disorder of the organick functions appeared to have increased gradually and insensibly, since his disease, until he was threatened with suffocation, and symptoms which he considered dangerous, and he returned to the hospital on the 14th of May, 1804.

He was placed under the care of the physician, doctor Sue, who remarked, while examining his thorax at his first visit, that he pointed out this part as the seat of the disease, and that the pulsations of the heart were felt on the right side of the thoracic cavity, whence he inferred that the heart had been removed from its original situation, by a mechanical cause. The patient said that a stone had struck him on the right side of the thorax at the siege of Acre. It was supposed that if this deviation of the heart existed, the circulation would be impeded, and rendered languid. The pulsations at the wrist were indeed very feeble, while those of the heart appeared stronger, in consequence of the approximation of this organ to the walls of the thorax.

This aberration of the heart having excited the curiosity of the pupils, and several physicians of the city, Dr. Sue requested me to visit the sick man.

At first sight, I was convinced that he laboured under a hydropick disease of the thorax, and I immediately opposed the opinion relative to the manner and cause by which the heart was moved from its natural position. It was impossible that such a transposition of that organ could take place without proving fatal in a short time, or inducing symptoms which he could not survive.

I attentively examined his thorax and every part of his body before interrogating him. This examination, and a few interrogatories, confirmed me in the opinion that a fluid was accumulated in one of the cavities of the thorax; but I knew that hydro-thorax uniformly occupies the left side of the chest: indeed the ribs were evidently more horizontal on this than on the opposite side; the intervals between them were larger, and between the the third and fourth rib, counting from below upwards, a fluctuation was perceptible, or at least, the part was uncommonly elastick. The least pressure on this part pro-

duced acute pain. On the posteriour part of the same side of the thorax, I found an œdematous swelling, which may be considered as a characteristick of this disease, and in cases of sanguineous effusion, an ecchymosis forms on the same part, as Valentin has observed. The patient always reclined on the same side, because he could not remain on the other without experiencing great difficulty of respiration, and being threatened with suffocation: it was equally painful to him to stand erect, or to lie in a horizontal position. His abdomen was swollen, the spleen protruded the integuments over the iliack region, the pulsations of the heart were felt under and behind the right breast, opposite the middle of the arch of the fifth and sixth ribs. There were no arterial pulsations at the right wrist, and they were merely perceptible in the left. They could be perceived in the axillary, crural, and carotid arteries. The motions of respiration were languid, short, and laborious; the hypochondrium of the diseased side without motion, the face pallid, and slightly bloated, and the tongue white, and partly covered with saburra. The alvine evacuations, though by no means frequent, were natural, the urine small in quantity and seldom evacuated, the body emaciated, the skin rugose, and perspiration obstructed. He had a slight evening exacerbation, and laboured under continual insomnia and anxiety, in consequence of the difficulty of changing his position. In short, he was extremely feeble, and from all appearances could expect to survive but a few days.

There was an immediate necessity for evacuating the fluid from the thorax, and I proposed the operation for empyema. A consultation was called next morning of the physician of the hospital, and the principal surgeons of the guard, who decided in favour of an immediate operation.

On the 17th of May the patient was removed to the operating room, where his debility was so great, that he could scarcely sit up. I had only divided the intercostal muscles, when the fluid rushed out to the distance of more than four feet, and the orifice grew larger spontaneously. I directed the assistant to reserve the fluid, which was discharged, but he neglected so to do; but according to the estimate of the assistants, the whole quantity was fifteen or sixteen litres. Notwithstanding the prostration of strength, the patient bore the operation very well, and felt relieved as soon as the thorax was opened. The fluid discharged was almost inodorous, of a gray colour, and milk-like consistence. The symptoms which succeeded induced me to believe, that this fluid had been contained in a particular cyst, formed on some portion of the pleura, at a distance from the part originally diseased, and that it had since gradually increased.

The liquid was completely evacuated, and he had no syncope during the operation: a sound was introduced into the thoracic cavity, and passed on to a considerable distance, without meeting any resistance. I introduced into the wound a tent, covered with cerate, and compresses and proper bandages were then applied.

By the production and growth of this cyst, may we explain the changes of situation which the organs of the thorax and abdomen had undergone. Thus the lungs of the same side had been compressed and pushed back by degrees towards their bronchial roots, and were almost destroyed: the mediastinum being pressed towards the right cavity of the chest, had drawn with it the pericardium and heart to the same side, and the pulsations of this organ could thus be perceived between the fifth and sixth ribs.

The operation was followed by a general calm, respiration became less laborious, and the heart appeared to

contract with greater facility. We neglected to put a bandage round the abdomen, and the intestines being suddenly set at liberty, became inflated; a flatulent colick was the consequence. It yielded to embrocations of warm camphorated oil of chamomile, and graduated and uniform compression on the abdomen. He slept two hours, was calm during the night, and I found him much improved next day.

For several days after the operation, the dressings were filled with a copious, serous, purulent discharge, of a gray appearance; his strength gradually returned. During the first days I permitted him to take some light potage, which he digested with difficulty, in consequence of the weakness and sudden expansion of the abdominal viscera. We were obliged to direct aromack and camphorated embrocations, tonick and moderately stimulating enemata to be administered, and cordials and stomachicks to be given in moderate quantities.

The principal arteries of the body pulsated with sufficient force on the third day, but the pulse did not return to the radial arteries, until the fifteenth and sixteenth day, and then continued very weak and vermicular even after the brachial arteries had enlarged, and assumed an aneurismatick character. This fact shows that when the contractions of the heart are much impeded, this organ cannot overcome the resistance produced by the various ramifications of the principal arterial branches. It even appeared that these arterial divisions were on the point of being totally obliterated, for the circulation through the capillary system was almost entirely arrested. This fact enables us to explain the constant coldness of the body and extremities under which he laboured, and the discoloration of the skin of the latter.

On the fifteenth day the pulsations of the heart were still perceived near the same region, namely, on the right

lateral part of the thorax; but his respiration was less laborious, and more full and complete: the alvine evacuations were more regular, his sleep was no longer disturbed by distressing dreams or pain, his countenance resumed its natural colour, and the swelling perceived before the operation now subsided. The fluid discharged from the thorax continued to be nearly of the same appearance; it became more fluid and fetid: I ordered the dressings to be renewed three times a day. Such medicines and aliments as were calculated to support the strength of the patient were still continued, with a view to assist nature in the accomplishment of her intention, which was the destruction of the cyst, and the approximation of the walls of this great cavity. His strength continued to improve, his functions were evidently returning to their natural state, the heart gradually returned to its original position, and its pulsations were felt every day nearer the sternum.

The state of the patient was now a matter of surprise; he rose without assistance, and was able to take a few steps with the help of his nurse, his appetite was good, and he slept in any posture. The opening between the ribs was much reduced in size, and discharged a small quantity of laudable pus.

Professour Desgenettes, and several other physicians saw him at various periods since the operation.

He remained some time in this promising condition, and we entertained some expectation of his recovery, with which he also flattered himself; but in the midst of these expectations, he was suddenly attacked with rigours, extreme anxiety, torpor, oppression, difficulty of respiration, and colick. These symptoms appeared to be the consequence of the repercussion of suppuration, and cutaneous perspiration, caused by the cold moist air while sleeping accidentally without covering, during a stormy

night: stomachick cordials, dry frictions, warm flannels to the whole surface of his body, and vesicatories, could not prevent him from falling into a hectic fever, with colliquative diarrhœa, which reduced him, in a short time, to the last degree of emaciation: he died without pain on the 31st of July, of the same year.

I proceeded to open his body in the presenee of the physician of the hospital, and my pupils; we found the stomach and small intestines much smaller than natural, and the spleen large and hard, extending below the false ribs into the iliaek region. The liver was reduced nearly to one half its natural size, and appeared to be pressed into the lowest part of the hypochondrium. A portion of the small intestines were lodged in the cavity of the pelvis; these changes were consequences of the great depression of the diaphragm by the weight of fluid contained in the left cavity of the thorax, where we now found a large empty space. After examining more closely, we discovered an oblong prominence on its lateral and superiour part, hard to the touch, and covered by the ulcerated membrane, which lined the whole of this cavity. This tumour was attached to the root of the right lobe of the lungs. At the most dependent part appeared the opening made by the operation; this was so situated that the fluid could flow out without obstruction: more in front, a deep caries had destroyed the sterno-costal junction of the cartilage with the seventh and eighth ribs, the consequence, without doubt, of a former injury at this part. It appeared that the disease took its rise here, and extended from below upwards, and to every part of its surface. All this large cavity was lined with a pellicle covered with a purulent mucous matter of greater thickness towards the bottom of the cavity, and thinner above, where several portions of it had even fallen off.

The diaphragm was pressed downwards, and the mediastinum to the right, so that it had abandoned the sternum, and its right edge had contracted adhesions with the cartilages of the ribs. The pericardium, which also contained a considerable quantity of serum, was, like the heart, still inclined to the right; but much less since the operation than before: the position of this organ was such, that instead of having its point turned towards the *left*, forward and downwards, it was turned in the opposite direction, to the right, while its base was thrown upwards to the left. By this disposition the circulation was carried on with difficulty through those parts which received their blood from the first branches of the aorta; even the heart itself was diminished in size, and its right auricle considerably dilated, as well as the mouth of the inferior vena cava. The cavity of the ventricle, of the same side, did not appear to be proportionate to the capacity of the auricle; the artery, which was given off from it, was small, and seemed to incline by a single trunk towards the right lobe of the lungs: that of the right lobe was almost obliterated. The left auricle was almost effaced, in consequence of the *retroversion* which the heart had undergone, and a part of it was solid, and without a cavity. The pulmonary veins of the right side entered near the base of the heart, and opened almost immediately into the left ventricle; the septum between the auricles was still open, about the space of four millimetres, so as to permit a part of the blood of the inferior vena cava to pass into the left auricle. The origin of the aorta, like the heart, had been subjected to a degree of *retroversion*, which doubtless impeded the circulation of blood in this artery, and the branches which it gave off. The vessels which arose from the curve were very small, especially the arteria innominata, the walls of which were almost in contact; this explains the deficiency of

pulsation in the humeral branches, both before and after the operation; the pulsations of the left side were also impaired. The arterial tube was still partially open, and appeared as if it had permitted a part of the blood to pass from the pulmonary artery into the pectoral aorta. The substance of the heart was whitish, and of a soft consistence, as if macerated.

The examination of this body enables us to explain the phenomena which appeared during the disease, and how far the resources of nature may be called on for the preservation of the individual.

The following cases more clearly point out the possibility of curing this disease.

Bernard St. Ogné, aged thirty, a chasseur of the imperial guard, was brought to the hospital on the 18th of March, 1810, at two o'clock, P. M. with a punctured wound of the left side of the thorax, about two centimetres long. The skin, and a part of the pectoralis major were divided with the cartilage of the fifth rib near its union with the sternal extremity of this bone. Frothy and vermilion-coloured blood was discharged by jets synchronous with the pulsations of the heart, which were perceived by sight and touch. He was pallid and cold, his lips blue, pulse small and frequent, and voice feeble and interrupted. His respiration was laborious, and often impeded by sighs and sobs, and his eyes watery and dull. He refused surgical assistance, and seemed to wish for death.

His injured feelings had brought on a paroxysm of desperation. Being accused of a misdemeanour of which he was innocent, with his left hand he plunged a knife into the thorax, after having carefully ascertained where the pulsations of the heart were most perceptible. The

edge of the knife was directed perpendicularly to the axis of the fifth rib; at first it met with great resistance, but this he soon overcame by applying a greater force: and the instrument having a very sharp edge and point, entered the thorax obliquely from before, backwards, downwards and inwards. The cartilage had been divided quite through, the superiour and anterior part of the left pulmonary lobe was wounded, the pericardium was injured, and the point of the knife buried in the anterior mediastinum, where it probably met the diaphragmatic nerve: the symptoms which followed seemed to prove this.

The hæmorrhage and injury of these organs were first seen by the surgeon of the hospital, and Mr. Dieche, junior surgeon of his regiment. The latter being called to give him the earliest assistance, found him stretched on the floor in a state of insensibility, with the knife remaining in the wound. He would not extract it lest impetuous hæmorrhage should follow and extinguish the small remaining flame of life.

The knife was extracted with every necessary precaution, the wound dressed, and they conveyed him to the hospital.

The house surgeon, after examining the parts, and ascertaining the imminent danger of the patient's condition, immediately united the lips of the wound with adhesive straps, according to my practice. Dry frictions were made over the whole surface of the body with a warm flannel, and an antispasmodic draught was administered. He was relieved, turned voluntarily on the right side, and the animal heat gradually returned.

Several hours had elapsed, when the surgeon found him very uneasy, much agitated, and complaining of acute pain in the wound. He had torn off the dressings to destroy himself. A slight hæmorrhage had already

detached the adhesive straps, and extreme debility and syncope followed. The surgeon again united the lips of the wound, he became composed, and slept part of an hour. About ten in the evening, the pain and difficulty of respiration, and increase of pulse and heat, induced the surgeon to open a vein in his arm, which produced an apparent calm, and he passed the night without any remarkable occurrence.

On the 19th, when I paid him a visit in the morning, his debility was extreme, the pulse small and irregular, and the respiration impaired, but not very laborious: hurried palpitations were felt at the wounded part, the pain was acute, the voice feeble, he sighed frequently, his eyes were always suffused with tears, and he wished for death.

I encouraged him, prescribed warm oily camphorated embrocations over the thorax, a cooling mucilaginous drink, and gave him several glasses of ethereated emulsion of sweet almonds: in the evening he was directed to take a portion of chicken-broth, and a very small quantity of good wine. He passed the day without any alarming symptoms, and when visiting him in the evening, I found him tranquil and composed. He continued to lie on his right side. He was less calm the following night, and after one or two hours of imperfect sleep, awoke with an intense local pain. The slightest motion threw him into syncope. His sighs were frequent, and a distressing pain was felt on the outside of the left leg, whence it extended to the sole of the foot. The lips of the wound had now formed adhesions with each other. I directed cups to be applied near the wound below the breast, which afforded him relief. The camphorated oily embrocations were continued with the other remedies. I ordered some camphorated emollient enemata, and he passed several days in a state of calmness.

On the seventh day after the accident, the local pain returned, and became extremely acute. I prescribed a second and a third cupping, but without permanent advantage. A continual thirst now attended on the local pain, and insomnia and an evening paroxysm of fever followed. We persisted in the use of antispasmodicks internally, and camphorated anodyne emollients externally.

On the ninth day, the pain was more extensive and acute, the thirst more distressing, respiration impaired, the pulse intermittent, small, and corded, and the pain of the leg and foot were also more acute. A large vesicatory was applied to the præcordia, and the emulsions and antispasmodicks increased. He still lay on his right side, and was not able to turn himself, without feeling great anxiety and difficulty of respiring. The space about the false ribs was depressed, but there was no ecchymosis of the posteriour part of the hypochondrium, nor any sign of thoracick effusion on that side.

The inflammatory symptoms abated in some measure but the difficulty of respiration and anxiety remained nearly the same. The wound cicatrized. The sternal portion of the divided cartilage never came into apposition with the other part, but formed a considerable projection outwards. The alvine discharges which at first had been suspended, now became regular. But he slept imperfectly, and his pulse was small and corded.

On the eleventh day, the oppression, cough, imperfect respiration, and local pain had increased. I applied a second vesicatory, which alleviated the symptoms. They then appeared in a different character. The pain was oppressive, but less acute, and the palpitations which at first were very perceptible, now totally disappeared. The pulse lost every third or fourth stroke. He was extremely feeble, and moved with difficulty. I prescribed chicken-broth, good wine, a pectoral drink, gummous

anodyne juleps, and oily embrocations over the thorax and abdomen.

In this state he remained several days, and then the oppression and difficulty of respiration increased. The mucous expectoration was not free, the intermission of pulse increased, his strength failed, emaciation became extreme, the alvine evacuations were colliquative, he slept none, was tormented with thirst, anxiety and cough, which could no longer be supported, and life seemed to be drawing to a close.

He had heard me speak of the operation for empyema, in my clinical lectures. He begged me to open his thorax, or give a quantity of opium to produce sleep. I had several times thought of performing this operation in his case. I had pointed out the possibility of its success to my pupils, with the symptoms which characterised the collection of any fluid in the pericardium, or a particular cyst formed in front of the heart. I had shown, that the fluid in such cases has no communication with the proper cavity of the thorax. The constant position of the patient on the right side, with the head and thorax elevated; the total absence of the pulsations of the heart, and an undulation perceived by the finger of the surgeon, when applied during a cough between the fifth and sixth ribs, above the left breast, but more especially this latter epiphenomenon, and the absence of the pulsations of the heart were pathognomonick signs of a dropsy of the pericardium. For, a collection of water in the pericardium, or in a cyst, situated in front of the heart, must separate this organ so far from the walls of the thorax, that its pulsations can be no longer externally felt. Authors have never noticed this disappearance of pulsation, nor this undulation and fluctuation of a fluid, as discovered by the finger of the surgeon, after being set in motion by the cough, or by respiration. The shock given to the base of

the heart, the left ventricle, and the posteriour wall of the membranous cyst, displaces the fluid which must of necessity undulate with greater or less force towards the opposite wall of the sac, and may be felt through the space between the ribs, as I have before observed.

Add to these two epiphenomena, which should always exist in dropsy of the pericardium, the intermission of the pulse of which authors make no mention. The latter took place a few days after the accident, and continued to increase until the operation was performed. For, the state of confinement in which the heart was kept, of necessity prevented its contraction, and this disturbance would have continued to become more considerable in proportion to the pressure of the mass of fluid on this organ.

Authors have considered the disposition of the patient to lie on his left side, as a certain sign of hydrops pericardii.* But it is the reverse, as we have seen in the case of St. Ogne, who always lay on the right, and could not turn on his left side, without being threatened with immediate suffocation. The reason of this will be evident, when we take into view the relative situation of the parts.

The pericardium and the heart are contiguous to, and attached on the right and left to the dorsal vertebræ, to the mediastinum, and to the tendinous centre of the diaphragm, by large vessels, by membranes, and tendinous adhesions. Still the patient should lie at ease on his right side, when the fluid is inclosed in the pericardium, or in a cyst occupying the same region. The pressure and distension of the heart will be less when supported by its attachments, and the tendinous planes of the mediastinum or diaphragm. But when he reclines on his

* Work of Senac, Structure of the Heart.

left side, we might expect that the heart would be subjected to such a state of retroversion and distension, by the weight of the incumbent fluid before this organ could be supported against the ribs, that a mortal syncope might occur.

In the above case, the pain of the leg and left foot appear to have been sympathetick.

To these pathognomonick symptoms of hydrops pericardii in the case of this soldier, were added, difficulty of respiration, cough, œdema of the inferiour extremities, increasing emaciation, thirst, insomnia, and anxiety.

At the time when I announced the collection of a fluid in the pericardium, or in a separate cyst situated near the heart, I also declared it as my opinion; that no fluid had been effused into the proper cavity of the thorax. The absence of the signs which characterise the latter, as before noticed, induced me to advance this assertion.

Finally, seeing that this man must meet a certain and speedy death, I resolved to reduce the following operation to practice.* But I first called the physicians and surgeons of the hospital together, who all agreed in the necessity of the operation, and that it should be immediately performed. He was placed in a convenient posture on the edge of his bed, and I first divided the skin and cellular substance between the fifth and sixth ribs, below the nipple, and along the inferiour edge of the pectoralis major muscle, then cut through the layers of the intercostal muscles, in a direction parallel with the ribs. Having cut down to the pleura costalis, I proceeded with great caution, so that this last partition might not be divided,

* There is no well-authenticated case in which this operation has ever been performed. If the progress of the symptoms be attentively observed, as they appeared in the case of St. Ogne, they will show that it may be successful.

if the heart should be contiguous to it. The want of resistance, and a few drops of serum which now escaped, informed me that the membranous sac containing the fluid, which I mistook for the pleura, had been opened. Without removing my index finger from the bottom of the wound, I took a probe-pointed bistoury, and having introduced its point into the cavity, I enlarged the opening by an incision of sufficient size. A yellow serous fluid immediately flowed out, mixed with some clots of black blood, and filled a pewter basin. This fluid was discharged in very copious and frequent jets. I thrust my finger deeply into the thorax, and distinctly felt the naked apex of the heart, which, though much diminished in size, still retained its conical form. Mr. Sue, my colleague, also perceived the same. During this operation, the patient was in great agony, and ready to expire.— With my finger I alternately opened and closed this aperture, communicating with the seat of the disease. The first basin, which held about half a litre, was soon full, and in a few minutes a second, and a considerable quantity ran down on the bed, so that we may compute the whole quantity of effused fluid at two pounds and a half, or three pounds.

I closed the lips of the incision, and applied a suitable dressing. Generous wine and good broth revived him in some measure. From this time, the pulse became natural, and entirely ceased to intermit. Respiration was less difficult, and the cough abated. During the day, the fluid which had not been completely evacuated, flowed out at different times. The dressings were renewed, with the anodyne and antispasmodick draughts. During the first night, he slept a short time, and remained perfectly composed, except when disturbed by the cough.

During the first two or three days, the wound continued to discharge serum, and then closed spontaneously,

as if about to cicatrize. When the hand was applied to this part, the action of the heart, though feeble, was perceived for the first time since the accident; but it became less sensible every day, and had ceased to be felt entirely on the tenth day after the operation. New symptoms of disorder, and tightness of the thorax having made their appearance, with signs of a putrid gastrick affection, I resolved to break open the slight adhesion of the incision, and to introduce a tube into the thorax. This operation gave egress to three or four ounces of fluid of a serous purulent appearance, mixed with dark coloured floeculi. He was instantly relieved.

But when the tube came in contact with the heart, excessive pain was the consequence, and he was thrown into an alarming state of anguish. We therefore resolved that this instrument should never be introduced, except from absolute necessity.

A gentle emetick, which had been exhibited with a view to evacuate the primæ viæ, by the efforts to vomit produced a discharge of a considerable quantity of purulent matter from the incision. This purulent discharge diminished by degrees, so that the dressings heretofore renewed six or seven times in the course of the day, were now changed but twice. The cough also abated, the oppression became less, sleep was more perfect, and he was able to recline on either side. He took good diet, with good wine, and rose every day voluntarily, to have his bed put in order. The functions were soon in some measure re-established, if we except that of nutrition.

When we were authorised to entertain expectations of his recovery, his inordinate appetite induced him to eat a quantity of radishes, and other indigestible food, which one of the nurses, through a spirit of cupidity, had procured for him. He was immediately attacked by new symptoms beyond our control, namely, convulsive vo-

miting, accompanied by cough and acute colick, to which succeeded a dysenterick flux, and colliquative diarrhœa. His strength before diminished, was now completely destroyed, and he gradually sunk, and died with compo- sure on the 21st of May; sixty three days after the acci- dent, and twenty-three since the operation. During which time the general powers of life had struggled in a manner almost miraculous, against the operation of the most destructive causes.

Appearances of the foregoing Case on Dissection

In order to inspect the parts in their relative situa- tion, I made a perpendicular incision on both sides of the thorax so that all the anterior wall of this cavity, in which were the cicatrix of the original wound and my incision, might remain entire. Having divided the ribs with a saw in these directions, we cut up the trachea, œsophagus and jugular vessels to detach the lungs and heart with greater facility.

The left lobe of the lungs on the wounded side ad- hered firmly to the pleura costalis, and the whole sur- face of the lungs was of a deep reddish brown, much in- flamed, and of a texture almost solid: there was no ef- fused fluid in the proper cavity of the thorax, as I had formerly decided.

In pursuing our dissections, we met with a membra- nous sac, which at first was mistaken for the pericardi- um, situated between the mediastinum and the heart, ex- tending forward in front of this organ, and posteriorly to the spine. This sac or cyst was of moderate thick-

ness, and lined internally with a villous substance, which threw out the purulent secretion during the disease.

On the anterior wall of the cyst, below and near the sternum, we found the fifth true rib displaced where the point of the knife had entered. Here the internal mammary artery had been divided; more outwardly was seen the incision of the operation, near which the heart and pericardium were situated: the space between them was from ten to twelve lines. The pericardium was much inflamed, gangrenous in several parts, and adhering to the surface of the heart, a depression, or rather a contraction of its own substance was seen near this opening. I carefully divided this coat, and dissected it up with considerable difficulty from the surface of the heart, which was reduced to half its usual volume; a large clot of black blood was interposed between the pericardium and the *pulmonary* ventricle of this organ. Having removed it, we discovered a small deep furrow or groove, like a cicatrix, towards the right curve, and near the base of the heart, where a branch of the coronary artery appeared formerly to have passed along; for, an injection having been thrown into the arterial system, had stopped at the injured portions of these vessels. That part of the pericardium immediately contiguous also presented evident marks of a cicatrix, several millimetres in length, and without doubt had been made by the knife. The other portions of this membrane were very thick, inflamed, and covered with gangrenous spots; the surface of the heart was excoriated by gangrene, and as it were dissolved in some parts: its muscular fibre was black, and appeared as if macerated. There was a small quantity of black liquid blood in the cavities of this organ; the other viscera of the thorax and abdomen presented nothing remarkable.

After reflecting on these appearances, from what part can we admit the fluid to have been discharged by the operation? on this point it would be difficult to advance an opinion; but we shall attempt to give an explanation relative to the causes which produced the phenomena that were noticed after the operation.

It must be evident that the fluid which we discharged could alone have been produced by a membrane capable of secreting serous fluids, as the pleura or pericardium. If the collection had taken place in the former, the fluid would have flowed freely throughout the whole cavity, and the small quantity of it taken away could not have produced the alarming symptoms which preceded the operation. But the pleura, on the contrary, was dry, when we opened the body after death.

Could this secretion be thrown out by the pericardium, though it adhered to the circumference of the heart, with the exception of a portion of its right anterior surface, where the clot of blood was found? Is it possible that this membrane at first could have been so far distended towards the mediastinum and diaphragm, without totally losing its elasticity, and could afterwards gradually contract? The contact of atmospherick air, like mechanical irritation, inflamed it, after coming in contact with the heart, and adhesions were gradually formed between them. The opening made by the bistoury in the pericardium, allowed its walls first to sink in, and its substance to retract and undergo a degree of inflammatory obstruction. A cicatrix was the consequence, of which no traces could be found, except the diminution and gangrenous affection of the contiguous portion of the heart, of which we have spoken. That the cicatrix, or evidence of a division of the serous membrane cannot be always discovered, we can believe, as we have frequently known the peritoneum unite in such a manner, after wounds had

penetrated into the abdomen, that no trace of them could be seen.

It is in accordance with nature's plan to admit, that the pericardium, which was at first distended, had afterwards, by contracting, left a space or void between itself and the mediastinum, and that this space would be bounded by the natural or diseased adhesions which had formerly taken place. Thus the small quantity of serous fluid effused into this membranous sac, and the contact of air, may have produced an erosion of its walls, giving rise immediately to a purulent secretion, constituting an abscess or purulent collection, which was evacuated with the tube nine days after the operation. This purulent cyst was increased by the continued action of the united causes of disease; the neighbouring organs being already disordered, lost their own vitality by degrees, and general life was of necessity destroyed.

This explanation, with the symptoms which followed the wound till the period of the operation, all indicating the existence of hydrops pericardii, induce me to believe that the two pounds and a half of yellow serum, mixed with small clots of black blood, which we discharged on the forty-first day after the accident, were really contained in the pericardium, as I had supposed.

The case of St. Ogne appears to me important, as pointing out the diagnosticks of injuries of the pericardium and heart, the resources of art by which we can diminish or prevent the consequences of such injuries. It may also inspire us with confidence, when an operation is required to evacuate a collection of fluid in this cavity, in consequence of similar wounds.

I am of opinion, that if this indication had been sooner fulfilled, as I had contemplated in the case of St. Ogne, that the success of the operation would have been com-

plete; for it is evident, that in this case it revived the expiring flame of life.

John Baptist Bernadotte, commonly called *Cannon*, a miner of the infantry grenadiers, aged thirty-four, of an irascible character, athletick constitution, and uncommon bodily power,* wishing to put a period to his existence, in a paroxysm of passion plunged a knife in his thorax. The blade of this instrument penetrated into this cavity about two centimetres, between the third and fourth rib of the left side; he fell immediately after drawing out the knife with a sudden effort. A profuse hæmorrhage instantly followed, with all the symptoms of a punctured wound of the lungs. One of his comrades closed the wound, and conveyed him to the hospital. The surgeon then on duty gave it a simple dressing, and applied a compress and bandage: he passed the night in great anguish and frequent syncope.

When we visited him next morning, we found the dressings filled with blood, a considerable quantity of which had also run down into the bed. His face was pallid, his lips purple, and his eyes dull and watery; blood, of a vermilion colour, rushed through the wound, the circumference of which was now swollen, and when touched, a crepitation and fluctuation were evident in several parts. The pulse was small and corded, the respiration laborious, and the animal heat of the extremities scarcely perceptible.

From these symptoms it was evident the lungs or intercostal vessels had been deeply wounded. I inclined to the opinion that the intercostal artery had been divided.

* I have seen this man march before the emperour with a cannon (four-pounder) on his shoulder: hence he received the surname of *Cannon*.

I first dilated the wound in such a manner, that I could explore with my finger the aperture into the thorax; a considerable collection of clotted blood was concealed under this wound. I sponged it out, and immediately perceived a jet of vermilion-coloured blood issuing from the divided intercostal. I dilated the opening through the first layer of muscles, and with a common small curved needle, succeeded in securing the artery at the first attempt, and the hæmorrhage was arrested. But a considerable effusion had taken place during the night, which I feared could not be entirely removed: I thought proper to meet every indication, in order to evacuate this effused blood.

I applied several cupping-glasses on the wound itself, the first of which was soon filled with black liquid blood. I directed others to be applied on the emphysema, and on the lower part of the hypochondrium, to favour the absorption of the effused blood: but the quantity of it was too great, and it would have been more advisable in this case, as I had intended, to make a counter opening.

The calm which succeeded the operation, and the hope of effecting resolution, induced me to wait the result.— This tranquil state continued three days; he expectorated some grumous blood, his urine was highly coloured, and his pulse in some measure more natural; his anxiety was not so great, and respiration less difficult; he experienced considerable general improvement, felt an appetite, and eat some light potage and broth.

I prescribed mucilaginous drinks, mixed with nitrick ether, and sweetened with syrup of althea. In the evening, he took a strong anodyne and antispasmodick emulsion, with small doses of antiphlogistick powders: emollient enemata were administered, and camphorated oily embrocations applied to the abdomen. A vein in the arm was several times opened. The wound was dressed with

emollients, and being of a simple character, cicatrized in a few days.

He continued in this state of apparent improvement until the seventh day after the accident, when a large ecchymosis appeared behind the hypochondrium, and at the lowest part of his thorax. To this ecchymosis, which Valentin has pointed out as one of the characteristicks of sanguineous effusion, succeeded others which are its concomitants, namely, frequent cough without expectoration, difficulty of respiration, oppression, ardent thirst, loss of motion in the sterno-costal cartilages of the same side, fixed local pain, and sinking of the pulse. He found it impossible to lie on the side opposite the wound, and experienced alarming symptoms of suffocation.

I immediately decided on the necessity of the operation for empyema. The physicians and surgeons of the hospital, and many other medical men, who attended my lectures on clinical surgery, were collected together in consultation on his case. They were not unanimous in their opinion of the necessity of making the counter-opening, and the operation was deferred until the morning of following day (the ninth.) The symptoms having considerably increased during the night, I no longer hesitated as to the propriety of operating.

I selected the most dependent part opposite the interval of the fourth and fifth ribs, counting from below upwards. The incision was made, and two litres of black bloody serum discharged by a rapid and continuous stream; he experienced immediate relief. The fluid could not be completely evacuated, because the seat of disease extended very far backwards, but it continued to be discharged daily, during a period of five days, until it might be computed at ten or twelve litres.

The symptoms gradually abated, the wound very soon contracted in its dimensions, and was closed before the ninth day after the operation.

Bernadotte considered his cure as complete, when suddenly new symptoms appeared, and threatened his life a second time.

I immediately broke up the tender union of the counter-opening, and introduced a tube into the thorax, by which I drew off in a few minutes, two porringers of fetid purulent matter. We introduced a tent, and renewed the dressings two or three times a day. I prescribed for him pectoral drinks, a composing julep in the evening, and bark boiled with milk in the morning. I directed him to take some light articles of diet, such as potage, boiled rice, good broth, and wine. This plan was persevered in for a considerable time and the dressings carefully attended to.

The diseased parts passed through the different stages of suppuration. In the first, or inflammatory stage, the discharge was serous and copious, of a fetid odour, and gray brown colour. It was then necessary to change the dressings frequently.

The introduction of the tent, though covered with cerate, produced acute pain. The patient felt a burning heat in the thorax: he was troubled with insomnia, and slight paroxysms of fever in the evening.

After continuing the same treatment several weeks, membranous flocculi were discharged, together with a purulent serum, and the appearance of these eschars was generally preceded by slight accessions of fever, often accompanied by disorder of the stomach.

Gentle emeticks, bark combined with mucilaginous and ethereated anodyne draughts, alleviated the symptoms, and restored the vital powers.

This second stage, which might be called the stage of detersion, proved tedious, and presented a variety of changes dependent on the humidity of the atmosphere, and on the regimen and passions of the patient. They often gave us just cause of alarm.

Towards the conclusion of this period, that is to say, after the sixtieth day, the symptoms which attend that operation of nature by which the cavity is lessened, viz. the sinking in of the cartilages of the ribs on the diseased side, the reduction of the intervals between the ribs, and the gradual reduction or contraction of all this side of the thoracick cavity began to take place.

The quantity of pus now discharged was small, and in every respect laudable. The powers of digestion were re-established, the fever had almost disappeared, and every symptom predicted the completion of his cure. This work of nature continued to go on without interruption, and its effects became daily more and more evident.

The cicatrix of the wound caused by the knife, which was formerly opposite the space between the third and fourth ribs was now opposite the interval of the fourth and fifth ribs. The small nipple also descended in the same proportion, until it was four centimetres, or more, below a horizontal line, drawn through that on the right side.

The left shoulder also followed the descent of this side of the thorax, and sunk down about four centimetres lower than the right. The transverse diameter of the thorax was also evidently reduced. I have no doubt that the growth or extension of the membranous walls of the left thoracick cavity was in proportion to the contraction of these bones which surround it. The heart itself, with its membranous sac (the pericardium) was pressed in a considerable degree towards this vacant space, formerly

occupied by the fluid ; for its pulsations could no longer be felt externally. .

When a probe was introduced through the opening now become fistulous, its progress was confined to very narrow limits, and within a very short distance from the opening met with a resistance which could only be afforded by the growth or extension of the internal membranes, and their organick capillary vessels. This work of nature was carried on in a gradual manner, and there is now only a small fistulous opening, which I think will have closed before the expiration of a year from the date of the operation, which the patient has now survived more than eleven months. All his functions are regular, he is becoming corpulent, he walks with ease, and breathes with freedom.

This cure is the more interesting, as the subject of it was of an age too far advanced to authorize us to expect it, for reasons before given in my memoir ; and, moreover, the disease was very acute.

It will be observed that in this case I threw no injections into the thoracic cavity. I have always considered them injurious, and hence we confined ourselves to the use of tents and frequent dressings, to produce a constant discharge of pus. These dressings were simple and methodical.

Paul Cohanier, a fusileer, aged twenty-three years, was admitted into the hospital on the 30th of December, 1810, with a fistulous punctured wound of the thorax, received six months before in a duel. The sword had entered between the fourth and fifth ribs, below the right axilla. A quantity of laudable pus was discharged from this fistulous wound at the pleasure of the patient. He favoured its discharge by leaning over the side of the bed, and in some measure inverting the thorax.

The introduction of a flexible tube of gum-elastick, led us to believe, that the disease extended perpendicularly to the bottom of the hypocondriack region, where the pus collected, more especially during the night. I was induced to make a counter-opening between the ribs, opposite the bottom of this sac, which was done on the 6th January.

This operation was at first attended with the wished for success. Through the counter-opening, a considerable quantity of a purulent matter was discharged, and some injections of warm water and honey passed freely from the fistulous opening, to that made by the operation.

We introduced a tent into the inferiour wound, and attended to that above, in order to make it cicatrize. He was put on the use of suitable medicines and regimen, and the dressings were changed twice a day.

The suppuration having been tinged with a little blood immediately after the operation, now resumed its natural colour, and diminished in quantity. He had no fever, and all his functions were well performed.

The reduction of the disordered thoracic cavity also appeared to go on gradually, for, notwithstanding the difficulties under which Nature laboured in the evacuation of the pus, she had commenced this work of reduction.

He now appeared to be convalescent, and walked out into the court of the hospital, on a clear cold evening of the 23d of the same month. He was suddenly seized with a general and distressing chill, which obliged him to retire immediately to bed. He passed the night with rigours, acute pain of the side, and great distress. When I first visited him next morning, the wound was dry and painful: he still had a most acute pain in his side. The fever was returning with severe paroxysms. The urine

was diminished in quantity, and of a reddish purple. He also experienced general pain of the thorax, and colick, and the least pressure on the abdomen obliged him to cry out. These symptoms evidently pointed out a complete inflammation of the serous membranes of the thorax and abdomen, arising from no other cause than the sudden suppression of cutaneous perspiration, and the secretion of pus.

I immediately applied cups over the whole thorax, and on the greater portion of the abdomen, prescribed general venæsection and antiphlogisticks, and subsequently large vesicatories were applied on the parts most affected. These means were not sufficient to arrest the progress of inflammation, which terminated in gangrene and death on the night of the 4th of February, and the seventh day after the invasion of the inflammatory disease.

Appearances after Death.

Next day we opened the body, and found the diseased cavity of the thorax reduced to three fourths of its former diameter. An oblong space of about twelve inches was left, extending from the superiour wound, to the counter opening. The lungs of this side were contracted, and adhered to the vertebral column, and their surface contiguous to the seat of the disease, was in a state of gangrene, as well as all the internal surface of the cyst. The patient had before asserted that he performed the act of respiration with that lobe of the lungs only on the opposite side.

The ribs had lost much of their curve, had increased in thickness, and their edges were in contact. The vertebræ were brought forwards forming a curve, the reverse of that in the natural state. The portion of the sternum on this side, was also pushed inwards. Finally, the mediastinum and diaphragm had approached each other, to unite in the obliteration of the cavity, left by the discharge of the fluid. This thorax is now among my collection.

On opening the abdomen, we found the peritoneum and intestines inflamed; and in many parts, in a state of gangrene.

From this examination, we concluded that this young soldier might have been cured, but for his exposure.

I should omit the report of the following case, were it not important to draw the attention of practitioners to the true signs of effusion, and the injurious results which follow the collection of blood in the cavities of the body, provided it be permitted to remain there some time.— This case also demonstrates that a clot of blood is insufficient to arrest hæmorrhage.

Claude Ferret, a grenadier, entered the hospital of the guards January 23d, 1811, with a wound from a sword in the superiour and internal part of the right arm. I saw him soon after his admission. He suffered much from an acute pain in the wound, and in the direction of the axilla. His respiration was laborious, his countenance pale, his pulse feeble and concentrated, and his extremities cold. These symptoms, and the direction of the wound, which was obliquely from the insertion of the tendon of the deltoid muscles upwards, and inwards towards the posteriour space between the first and second ribs, led me to suspect that an important artery of the thoracic

wall had been injured, and that a considerable internal hæmorrhage and effusion had taken place.

I first dilated the wound to a considerable extent towards the axilla, but could not reach its limit with my finger. Without making further examination, I ordered it to be simply dressed, and directed cupping-glasses to be applied on the thorax wherever there was pain or an appearance of emphysema. The patient used sweetened mucilaginous drinks, with the addition of nitriek ether, and we awaited the result.

On the 24th, the restoration of animal heat, elevation of the pulse, and colour of the skin, led me to believe the hæmorrhage had ceased spontaneously, or at least had been arrested for a time. I prescribed venæsection in the arm several times during the same day, and a porringer of blood was taken at each operation: but in opposition to this treatment the fever came on the same day with additional severity; he complained of a burning and insupportable heat in the wounded side of the thorax, was tormented by an ardent and insatiable thirst; could not lie in a horizontal posture, and the labour of respiration was great.

Venæsection was now repeated several times; cupping-glasses were applied, and the antiphlogistick articles continued with regularity. These means appeared to calm the symptoms for some time, but they re-appeared on the 31st January, with increased violence, and with the ecchymosis described by Valentin, as the pathognomonick of effusion.

I then resolved to perform the operation for empyema, between the fifth and sixth ribs, reckoning from below upwards. About two litres of black thick blood were immediately discharged, and about the same quantity some hours afterwards, when the dressings were changed;

it was of the same consistence, and a portion of it was mixed with small clots of blood.

This operation afforded him great relief, and he passed the five succeeding days in calmness; but on the seventh, symptoms of inflammation again returned, and continued in the ascendant, until the evening of the eighth, and then terminated suddenly in gangrene. He expired on the 8th night after the operation.

On opening his body, we found the right division of the lungs, and the sac of the pleura in a state of gangrene. A considerable quantity of black coagulated blood still occupied the bottom of the thoracick cavity. The viscera of the abdomen were also inflamed as in the preceding case.

After having emptied and washed the thorax, we discovered a transverse opening of the internal mammary artery, near the place where it is given off from the subclavian, and hence that hæmorrhage was poured, which the thick clot of blood surrounding this artery had not been sufficient to arrest; and indeed this clot appeared as if it had surrounded the artery, until the strength of this soldier was quite exhausted. The great quantity of effused blood of necessity rendered this wound mortal; the operation then could only prove a palliative.

Many cases came under our care, in which the lungs were superficially injured, and emphysema had taken place to a greater or less extent about the wound. After dilating such wounds, and procuring the discharge of the blood effused under the muscles, and of the air which had insinuated itself into the cellular membrane, by applying cups over the wound and the parts in its immediate neighbourhood, we passed a roller over the wound, with compresses dipped in warm camphorated wine,

and a supporting bandage, after first closing the edges of the wounds.

This treatment, with cooling drinks and rest, generally restored the patients in a time proportionate to the extent of the injury.

In the case of **Despaigne**, a *chasseur*, symptoms of thoracic effusion supervened, after an apparent cure of five or six weeks; cupping and vesicatories produced no favourable change in his condition: I resolved to make an opening into the thorax at that part nearest the seat of disease.

My first incision did not meet the cyst, but next day the wound was filled with pus, which now continued to be discharged through this opening, until the patient was in the way of recovery. The cartilages of the ribs on the same side had already sunk in, as was evident on inspection, and the thorax was diminished in capacity. He was discharged from the hospital, in perfect health on the 15th of November.

Yung, brigadier of dragoons, received a punctured wound of the thorax, between the sixth and seventh ribs of the right side, which passed along the diaphragm on the convex surface of the liver. The direction of the wound, its depth, and the distance to which the probe entered before it arrived at its termination, the character of the pain, the general jaundice which succeeded almost immediately, the discharge of yellow oleaginous blood through the wound, the sympathetic pain of the right shoulder, and difficulty of respiration, were all signs of an injury of this organ.

The same plan of treatment generally adopted by us in wounds of the thorax, was successfully adhered to in this case. We depended more particularly on scarifica-

tions and cupping, on diluting drinks, with the addition of aëtick ether, and mild laxatives.

This brigadier left the hospital perfectly restored to health. The case shows, that wounds of the liver are not always mortal.

Nicodemus Joseph Michaud, a chasseur, was admitted into the hospital on the 30th of December, with a wound on the right side of the thorax: a sword, after dividing the external soft parts, pierced deeply into the thoracic cavity, between the sixth and seventh ribs, the latter of which had two-thirds of its bony substance divided, and the point of the instrument had passed inwards and downwards.

The inferiour edge of the lungs was merely touched, but a part of the tendinous centre of the diaphragm was probably wounded; the direction and depth of the wound, and the symptoms which succeeded, pointed out the injury of this part.

The pain was intolerably acute, and extended from the wound to the xiphoid cartilage; the features of the face were strongly contracted, more especially the eye-lids and lips, the teeth were exposed, and a complete risus sardonius was the consequence. He was obliged to continue in a sitting posture, and could be understood with difficulty, from his imperfect pronunciation; while his respiration was laborious and hurried, his pulse tense, feeble, and accelerated: he was in a state of extreme distress and most imminent danger. We applied cupping-glasses over the wound, and thus extracted a considerable quantity of coagulated blood which was effused in the cellular substance and in the thorax.

The edges of the wound were then brought into a state of approximation, and thus retained by means of adhesive straps. Scarifications and cupping-glasses were used

on the most painful parts of the thorax, and venæsection was performed twice in the twenty-four hours. I prescribed mucilaginous cooling drinks, antispasmodick draughts, with milk of sweet almonds, emollient enemata, and camphorated oily embrocations over the abdomen.

All these means had but little effect, and next day the symptoms were more alarming; he could no longer speak, but he understood when spoken to, and answered correctly by signs. The tetanick contractions of the face were more violent, and the oppression and pain extreme; the functions of the brain were not at all impaired; the introduction of the tube through the wound into the thorax, satisfied me that no effusion had taken place; there was no ecchymosis on the posteriour part of the hypochondrium. Indeed a collection of fluid could not take place, because the wound was situated at the lowest part of the thoracic cavity.

I increased the doses of the antispasmodicks, and directed the cupping-glasses to be applied on the part opposite the injured diaphragm: the symptoms were moderated by these means, and from this time gradually abated, the convulsive laugh disappeared, he was able to lie horizontally, and deglutition, before difficult, was now performed naturally. Several hours sleep brought out a copious perspiration, and effected a great and general improvement in his condition; he now felt no pain except at the xiphoid cartilage, and that yielded to a vesicatory: the lips of the wound were soon united, the features of the face resumed their natural appearance, the functions were re-established in succession, and he left the hospital in perfect health on the 10th of November.

This case proves—

1st. That the risus sardonius is not always accompanied by delirium, or loss of reason, as authors assert.

2dly. That wounds of the tendinous centre of the diaphragm are not always mortal.

3dly. It makes us acquainted with the manner in which the risus sardonius is produced; for it is not simply an irregular action of the mouth and lips, as is generally understood, for in this case the lips were not the only parts of the face which partook of contraction, as is observed in the common or natural laugh; but the eye-brows were also drawn towards the middle of the forehead, the eyelids considerably opened, giving the eye a frightful aspect; the muscles of the jaw, of the larynx, pharynx, and œsophagus, participated in this tetanic contraction: for he lost his voice, swallowed with difficulty, and deglutition was frequently interrupted with sighs or hiccough.

4thly. This case enables us to appreciate the immense advantages to be derived from the use of cupping-glasses and scarifications. The irritation produced by them on the parts to which they are applied, removes the irritation produced by the wounding cause on the internal nerves and contiguous parts, and thus prevents inflammation. By disgoring the capillary vessels of the skin, they facilitate the general circulation, and the obstruction and pain of the disordered parts is removed. Cups are to be preferred to common venæsection, which debilitates the whole system, and often effects no favourable change in the disease. I have often seen an acute phlegmasia yield suddenly to the abstraction of blood, by means of cups from the contiguous parts, when it had resisted a repetition of general venæsection. I have made this observation more particularly in partial inflammation of the pleura costalis or pulmonalis, the consequence of wounds of the thorax.*

* If we admit the theory of inflammation advanced by Dr. Lubbock and Mr. Allen, and allow that the vessels are rendered weak by inflammation, and that there exists a

The application of cups also produces surprising effects in emphysema which follows complicated injuries of the lungs: if one of the scarifications or orifices communicate with the cellular substance in which the air is diffused this fluid will be instantly absorbed by the cup. The wound may be dilated, if necessary, before the cups are applied, and its lips should be brought into contact, and so retained when the cup is removed, in order to exclude the introduction of the atmospherick air into the thorax, and to prevent the inflammation of the internal organs. I am of opinion that this chasseur may attribute his safety principally to cupping, and the use of vesicatories.

Having now given a view of the most important facts in military surgery, which have fallen under my notice during one voyage and twenty campaigns, I may be permitted for a moment to call the attention of the reader to the loss which the surgery of France has sustained in the death of two of our most celebrated practitioners.

The first of these, Mr. Sabatier, my preceptor and guide through the most difficult paths of the science of surgery, sunk under a chronick disease, at the end of his 80th year, after having fulfilled his destiny, and completed his career of glory. The vast accession of matter

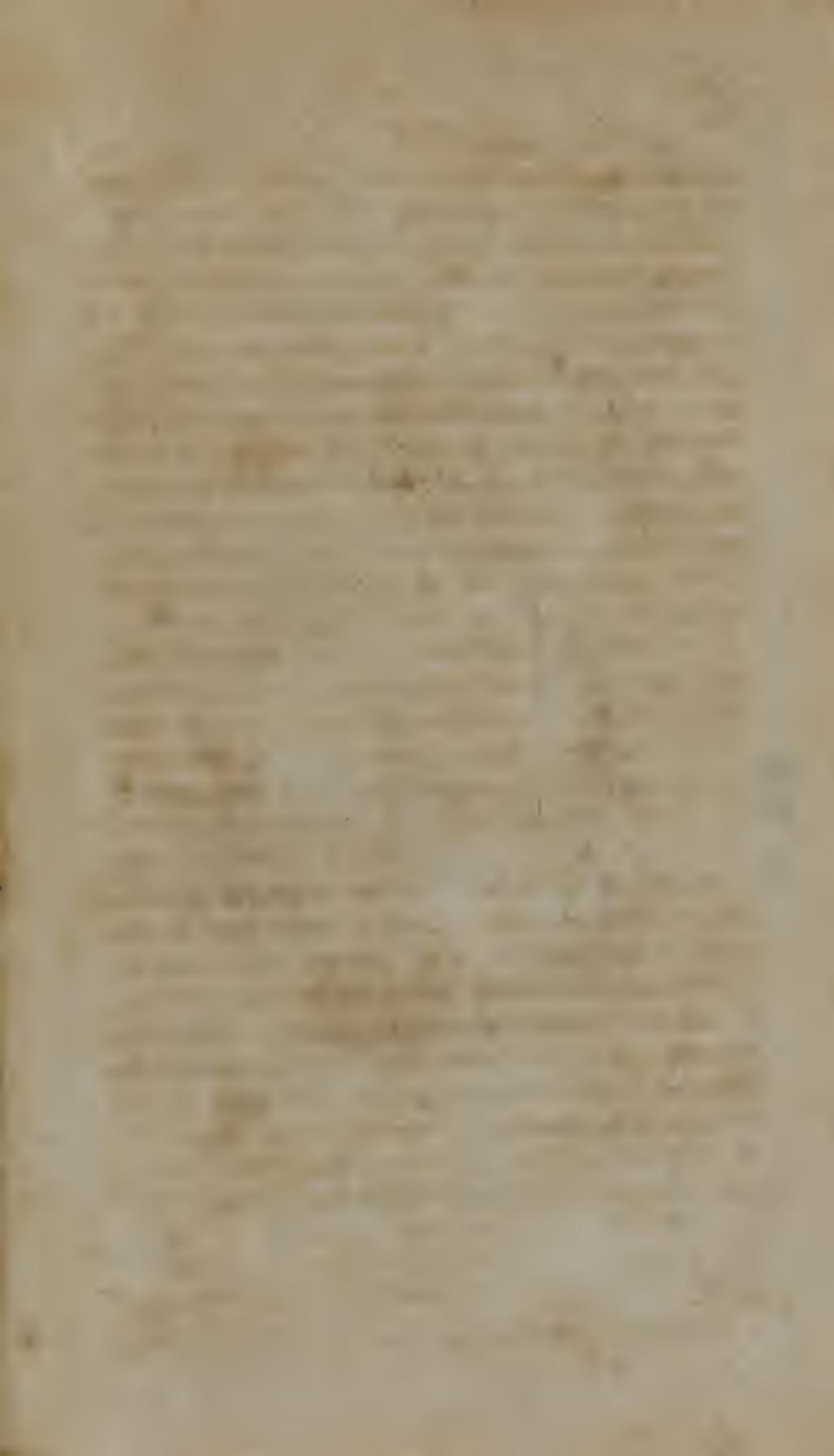
want of relative power between the inflamed vessels and the heart, (the engine of circulation), we should endeavour to re-establish a due relation or balance of power between them. This indication then cannot be effected by directing our attention exclusively to the inflamed part; the heart must be subdued or calmed by general remedies, to prevent the vessels, already weak, from being more injected, and falling into gangrene; while at the same time we relieve the inflamed vessels by unloading them, giving them tone, and restoring them to a healthy state. With this view cupping is advantageously used as an auxiliary.—TB

with which he enriched the temple of science, will render dear to posterity the homage justly paid to his memory by Messrs. Pelletan and Percy. His virtues have always commanded my admiration, and his friendship shall live in my remembrance.

The second, Mr. Mark Anthony Petit, late chief surgeon of the Hotel Dieu, at Lyons, and one of my fellow-students, was cut off in the vigour of his days, as he was about to reap the fruits of his labours and his sacrifices. Professour Desgenettes, in a learned eulogium, has assigned him the rank that he shall henceforth hold among the distinguished surgeons who have preceded him.

His admirable "*Essay on the Medicine of the Heart,*" speaks his noble sensibility. As a surgeon and philosopher, he has there, with the greatest delicacy, defined the reciprocal duties which unite the patient and physician. His precepts may serve as rules of conduct, and appear to have been intended for the instruction of his son, who was educated to the profession of surgery under his parental care.

Though the tender age of my son at present deprives me of the happiness of directing his professional studies in the same manner, yet while presenting to young army-surgeons the fruits of my observations and practice, I may also hope, that hereafter the perusal of them will make him emulous to excel. Should he be discouraged by the difficulties I have encountered, and the dangers to which I have been exposed, he will also be cheered by the success which has attended my labours, and the munificence of the hero who presides over our destinies.





PL. VII



