

**JOHANN  
ULRICH  
BILGUER**

A DISSERTATION ON THE  
INUTILITY OF THE  
AMPUTATION OF LIMBS

Johann Bilguer

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of the amputation of limbs**

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**Johann Ulrich Bilguer**  
**A dissertation on the inutility**  
**of the amputation of limbs**

**ADVERTISEMENT**

**By the English Translator**

It is with particular pleasure I present the English reader with a translation of Mr. Bilguer's celebrated performance: It will meet, I doubt not, with the approbation of those, who have the true honour of surgery at heart, and are at the same time friends to humanity. After what is said by so eminent a judge as Dr. Tissot, as well as many others who are an ornament to the profession, I shall not launch out into any eulogium on the author: there is a spirit of modesty, candour and ingenuity runs through the whole, that to every sensible reader will prove a sufficient recommendation of the work. – If it in the least contributes to check the cruel and precipitate practice of taking off limbs that might be saved, thereby preserving the lives, as well as preventing the mutilation of numbers of our fellow creatures, I shall think myself amply recompenced for the labour I have taken in thus endeavouring to render Mr. Bilguer's beneficent design more extensively known.

**TO**  
**Dr. PRINGLE,**

Physician in Ordinary to Her Majesty, Fellow of the Royal Society, &c.

SIR,

Your excellent work on the *Diseases of the Army*, so useful to physicians in general, will always be considered as a standard for the practice of those in particular, who are intrusted with the important office of superintending the health of the soldiery. Mr. Bilguer has performed, on his part, what you have so ably done on yours, in pointing out to his colleagues and successors, the plan which they ought to follow. It has given me pleasure to translate his Dissertation, and you must derive a peculiar satisfaction from the perusal of it, because, from the extensive and painful experience you have had of the bad consequences resulting from the operation this able Surgeon so warmly opposes, you can more readily perceive the usefulness and value of this little work. It is therefore my duty to address it to you, and I eagerly embrace so favourable an opportunity of thus publicly declaring the sentiments of esteem and particular respect, with which I have the honor to be,

Sir,

*Your most humble, and Most obedient Servant,*

*TISSOT.*

Lausanne,

1 April, 1764.

## PREFACE,

By Dr. TISSOT

An extract of the Dissertation, of which I now publish a Translation, had given me a very high opinion of it; but on a perusal of the whole, I found it still better than I had imagined: It seemed to me one of the most useful and best executed performances on Surgery, and I hoped it would very soon be translated into French.

Eighteen months having elapsed without any such translation appearing, I thought of procuring one. I then endeavoured to find a translator, but failing in that, I determined to do the office my self. I imagined, that, in thus dedicating a few hours of my time to this work, I should do a considerable service to many unfortunate people. I shall rest well satisfied if, by rendering this excellent book more common, I prove the means of adding to its influence, and of inducing a great number of surgeons, who may now read it, to quit the cruel and fatal practice of amputation, for the method which Mr. Bilguer proposes, with a degree of sincerity and precision which leaves no room for doubt.

The title of the original is, *Dissertatio inauguralis medico-chirurgica, de membrorum amputatione, rarissime administranda aut quasi abroganda, quam, pro gradu doctoris medicinae et precipue chirurgiae rite consequendo, die vigesima una Martii, A. S. 1761. In alma Regia Fridericiana speciminis loco, publicae eruditorum censurae submisit, Johannes Ulricus Bilguer, curiarhœtus generalis præfectus chirurgorum exercitûs regii Borussici.*

This work contains a much greater variety of matter than its title implies, for it not only shews the inutility and danger of amputation, by several arguments, to which many others might be added; but not satisfied with levelling a tottering edifice, Mr. Bilguer frames and describes a plan for preventing and curing those accidents, which oblige surgeons to have recourse to amputation; and this is properly the most considerable and most essential part of the performance, which is, in fact, a treatise on gunshot wounds.

I have scarcely done Mr. Bilguer justice with regard to style: I hope, however, I have given his meaning, without depriving it of its perspicuity or strength. This work will begin a new æra in Surgery, and will reach posterity. I should have been sorry in any shape to have disfigured it.

It will give me very great pleasure, if the pains I have taken, and the notes I have added, prove agreeable to the author. He may be convinced that, being engaged in business as I am, his performance must have appeared to me extremely well executed, and much wanted, before I undertook to translate it.

I am informed he has lately published a work on Surgery, in the German language; I am persuaded it contains much valuable matter: He seems to me to have a genius for discovering new expedients to lessen the sufferings of human kind. I would have given this book the title of a *Manual for the Surgeons of the Army*, which it deserves to be, were there not already another so called<sup>1</sup>, which, although very little known, is by no means contemptible. The author had, even at that time, remarked that wounds of the tendons are not troublesome, owing to their want of sensibility, that the actual cautery is seldom proper; and some other facts, almost forgotten since that time. He describes wounds near the articulations with dislocation and fracture, he points out the accidents attending gunshot wounds, and, what deserves notice, he only admits of amputation in one case; namely, that of an incurable mortification, and mentions it as a cruel and doubtful expedient. I shall here cite his own words; they plainly shew that, if he lived in our time, he would be one of the most zealous encouragers

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<sup>1</sup> *Le Manuel du Chirurgien d'Armée*; or, The Art of methodically curing Gunshot Wounds, &c. By L. L. M. C. Printed for Houry, at Paris. My edition is the second, published 1693.

of the new method, since he was so sensible of the defects, and grieved at the barbarity of the old. “If, unfortunately,” says he, “a mortification, from whatever cause it proceeds, gains ground in such a manner as to baffle all our care and applications, there is then no expedient left but that of taking off the limb; the success of which is very uncertain, for if it be dubious in a healthful subject, it must be much more so in one which is otherwise: It is, however, the only method, dreadful as it is, of putting astop to the ailment, and saving the rest of the body. This nevertheless ought not to be done, except when the consent, age and strength of the patient permit us to try so dangerous an experiment.”

This author's manner of thinking is very far from being established as might be wished, amputations being still too frequent. Mr. Bilguer's work ought at this time to be so much the more favourably received, as a celebrated company, whose decisions ought to have great weight in matters relating to surgery, has formally declared, about seven years ago, *That amputation is absolutely necessary in gunshot wounds, complicated with fracture of the bones*; and have left unfortunate wounded men no other alternative, but that of losing the injured limb on the spot, or a few hours later. That line of Juvenal seems very applicable on the occasion:

Nulla unquam de morte hominis cunctatio longa est.

## SECTION I

Having resolved some little time since to publish in this learned university a Dissertation which might serve as a specimen of my Medical Acquirements, the subject which appeared the most suitable to my purpose, is one, that may improve the art of surgery, which I practised for several years during the heat of the late bloody wars, and may at the same time wipe away the old aspersion, first broached at Rome against Archagates, and so often repeated since, that surgeons are executioners, who cut and burn without mercy.

The cutting off a limb being the severest means employed in surgery for the relief of mankind, an operation which every one beholds with horror, I cannot, I imagine, more effectually accomplish my design, or do a greater service, than by demonstrating, *that the cases wherein amputation is necessary, are much less frequent than has been hitherto supposed, and that it may even be almost totally dispensed with.*

## SECT. II

My first thoughts on this subject arose from observing what passed under my own inspection in the military hospitals.

In the first place I remarked, that in a very great number of cases, where amputation was judged necessary by the physicians and surgeons of the army, and even by the wounded themselves, in order to preserve life, it seldom or almost never answered the end.

In the second place, I saw and had under my immediate care, a great number of patients whose limbs had been carried off by cannon balls, and in such a manner too, that all those who adhere to, and are afraid to deviate from established rules, would have performed a fresh amputation on the remaining stumps, whom I cured, as far as they were capable of being cured, without having recourse to such disagreeable means.

And lastly; many others, whose limbs were not intirely separated off, but so much detached, wounded, shattered and contused, that the ablest surgeons deemed it necessary to take them wholly off, were nevertheless, by my endeavours, contrary to the general opinion, cured without amputation.

## SECT. III

This success, partly owing to the efforts of nature, and partly to the means employed by art, strongly encouraged me almost never to have recourse to amputation, but to try every kind of remedy, internal as well as external, calculated to preserve the lives as well as the limbs of the unfortunate sufferers. My first attempts, so far from being unfavourable, confirmed me more and more in the opinion, that parts which have sustained the most considerable injuries, will much oftener get well than what is commonly believed: And although this opinion does not seem to be countenanced by many eminent physicians and surgeons; although I do not flatter myself I shall be able to induce them to alter their sentiments, I hope nevertheless, that some others, encouraged by my example, and this account of my success, will have the courage to follow the same method, and that their authority may afterwards contribute to convince the most incredulous.

## SECT. IV

But supposing, what I do not apprehend can be the case, that all the gentlemen of the profession should agree in declaring my method absolutely useless, the rest of mankind at least, will be obliged to me for my endeavours to mutilate the wounded as little as possible; as most people are shocked at the mention of any amputation, or at the sight of a poor creature who has lost an hand, an arm, a foot or leg, wretchedly crawling along upon crutches or a wooden leg; and consider the total privation of a limb, as a much greater misfortune than when it is preserved, though perhaps unshapely, and incapable of performing several of its primitive functions. If one reflects how much every body dreads the pain occasioned by the slightest incision, he will easily conceive the degree of horror a person must feel at the thought of amputation, and why many patients chuse rather to die than to submit to it<sup>2</sup>. Hence it is so uncommon to find men, like count Mansfeld, so famed in the war that lasted thirty years, who caused his wounded arm to be taken off amidst the sound of trumpets and beating of drums; or like the country fellow, whom Dr. Schaarschmid, late an eminent physician at Berlin, mentions in his collection of observations and remarks on physic and surgery, who cut off his own mortified leg with a saw, very unfit for such an operation<sup>3</sup>.

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<sup>2</sup> I would not chuse to lay much stress on this argument; for if one weighs the circumstances of pain, the amount of what the patient suffers from the treatment necessary for saving the limb, will often be equal to that arising from amputation. But the two strongest reasons for preferring Mr. Bilguer's method is, the saving the limb as well as the life of the patient; the loss of which is often occasioned by amputation, but never by the pain of an incision. It is also true, that pain when slighter, though longer continued, is more easily supported by the patient. Tissot.

<sup>3</sup> To these instances may be added, that of the son of Thomas Koulichan, a captain in the Austrian service, who, being wounded in the leg, and the bones shattered, in one of the latter battles of the war, held a candle with one hand and extracted the splinters with the other. He exhibited many other proofs, not only of courage in the field, but also of that fortitude in bearing pain which is very different from the other, and much more seldom met with. Tissot.

## SECT. V

But lest I should be charged with being weakly influenced by the cries of the patient, and with wanting that kind of fortitude which Celsus<sup>4</sup> thinks requisite in a surgeon, in treating of this operation, I shall take it for granted that the patients are men like those I have just now mentioned, and that an inordinate desire of life, an uncommon strength of mind, religion, and other moral reasons, induce them to consider pain as nothing, when it affords them any hope of preserving life.

It is foreign to my plan to inquire who was the first who attempted this operation, or to trace the history of it in the works of the ancients. I shall only take notice, that such wounded men as recovered, after having lost a limb by some accident, without doubt, shewed the possibility, and suggested the first hint of trying this operation. Neither shall I dwell upon the various methods of performing it from the infancy of the art to the present time; they are described in other books<sup>5</sup>, and I do not purpose giving a compleat treatise on amputation. I shall not even touch upon what is already generally known on this subject, but as little as I possibly can: This is the best way of handling any particular point; and I hope all those who pay more regard than I do to scholastic form, will pardon my inattention to regularity of method and stile, when they are informed how much my time is engaged; others will excuse me, when they call to mind the remark of Celsus, that diseases are cured by proper remedies, not by a display of eloquence.

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<sup>4</sup> *Celsus de re medica*, l. 7. præf. Nevertheless Mr. Dionis, in his course of operations, (*Demonstr. 2, Art. 9.*) acknowleges, that even the most intrepid surgeons tremble at the instant they are going to perform this operation. Of all the operations, says he, that which occasions the greatest horror, is the amputation of a thigh, a leg or an arm. When a surgeon is about to take off a limb, and reflects on the cruel means he must employ, he cannot help feeling a tremour, and pitying the misfortune of the poor patient, who is under a fatal necessity of being deprived, for life, of a part of his body. And in another place he says, This operation ought rather to be performed by a butcher than by a surgeon.

<sup>5</sup> *Memoirs of the Royal Academy of Sciences*, 1732. Art. 7.

## SECT. VI

To prove what I have advanced, I shall begin with enumerating those accidents for which amputation has been hitherto deemed necessary. I shall reduce them to six.

First, A mortification, which spreads till it reaches the bone.

Secondly, Any limb so greatly hurt, whether by fracture or dilaceration, that there is room to dread the most fatal consequences, a mortification and death.

Thirdly, A violent contusion of the soft parts, which has at the same time shattered the bones.

Fourthly, Wounds of the larger vessels, which convey the blood into the limb, either, as the only means of stopping the hemorrhage, or through the apprehension the limb should perish for want of nourishment.

Fifthly, An incurable caries of the bone.

Sixthly, If any part is either attacked with a cancer, or is in danger of being so, it is customary to take it off.

I shall treat of these different accidents more or less particularly, in proportion to the number of observations I have made on each of them, as no method of cure, however doubtful and alarming, should be rejected, till a better can be pointed out. Thus, this treatise contains only, in effect, an account of the methods I successfully employed in the military hospitals, for the relief of the above disorders; together with a few observations, and still fewer hypothetical reasonings, which induced me to condemn the use of amputation.

## SECT. VII

I shall begin with an account of the means I make use of, internal as well as external, when a limb is mortified, the effects of which have convinced me, that in such cases amputation is not necessary; and here I shall first gratify the curiosity of those readers who, doubtless, are desirous to know what I have learned from the extensive opportunities I must necessarily have had, with respect to the use of the Peruvian bark.

Experience has taught me, that this admirable medicine is possessed of a singular and specific virtue in mortifications.

I know that several physicians and surgeons only recommend it in those which proceed from weakness. I have heard it reported by others, that they found it of little service after the famous battle of Dettingen<sup>6</sup>. But perhaps the other circumstances, with regard to the treatment of the patient, did not contribute to promote those good effects which I always observed attended it when judiciously administered. And I make no doubt, but every practitioner who, in prescribing it in cases of mortification, observes the rules laid down by Dr. Pringle, Dickins, Wade, Cheselden, Douglas, Rushworth, Amyand, Shipton and some others, will find it very efficacious. I do not mean, nevertheless, that it should be considered as the only internal medicine; there are, doubtless, other bitters which are sometimes extremely proper on these occasions. I must add, that the bark appears to me to possess that quality which Celsus requires in medicines, whether in a solid or liquid form, adapted to the cure of a mortification, to bind the belly moderately, and brace the whole system. After having treated of the external applications, I shall point out the method in which I administered the bark.

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<sup>6</sup> Mr. Ranby, however, who was one of the surgeons of the British troops at the time of the battle of Dettingen, lays great stress upon the bark: It is true, that in one of his cases, having ordered it to an officer of seventy years of age, whose leg had been amputated, *on account of his ankle, with the neighbouring parts, having been terribly shattered by a cannon ball*, it did not keep the sore from growing worse, or prevent the patient's death. But that we may form a just estimate of the merit of the bark, and the effects of amputation at the same time, it will be necessary to compare this case with the one which precedes it. This comparison will, I imagine, be of use. – I shall quote the author's own words. “An Austrian officer, who had his hand miserably shattered by a cannon ball, was, by some accident, left in a wood near the field of battle, destitute of any manner of help, from Thursday till the Sunday following, when he was brought to Hanau. The next morning I was carried to see him, and to assist in taking off his arm. On viewing it, I found it mortified almost to the elbow, with a great swelling and inflammation quite up to the shoulder. As it was by no means advisable to attempt an amputation in such circumstances, I proposed giving him the bark; which being no ways objected to, he entered upon immediately. The next day he was rather better: But, on the third, was evidently so. The inflammation was less, the swelling began to subside, and the edges of the mortification were separating. The arm was fomented and wrapped up in the oatmeal and stale beer poultice, with theriaca: And the dreadful symptoms which forbad the operation, were now so much abated, that his surgeons did not at all hesitate to take it off. But this was done to very little purpose; for three or four days after the amputation, being attacked with convulsions, he expired.” I shall here subjoin five questions. Would Mr. Bilguer have amputated in these two instances? Would not his method have saved both these patients, especially the last? Does not amputation seem to have contributed to their death? Does it not evidently appear, that in the latter of these two cases, amputation destroyed the good effects of the bark, which seemed to conduct the patient to a speedy cure; and that in the former case, the bark had not power sufficient to repair the mischief occasioned by the amputation? Does it not follow from these two observations, that however salutary the effects of the bark may be, those of amputation are hurtful in a greater degree? Tissot.

## SECT. VIII

Whenever a mortification attacks any part of the body, whether it be owing to an outward hurt, or proceeds from an internal cause, as often happens in persons afflicted with the scurvy, dropsy, a vitiated state of the blood, phagedenic sores, or very aged people, who begin, as it were, to die in the extremities: Whenever, I say, the mortification begins to appear, it requires immediate help. We must begin by making incisions on the part affected, in order to procure a discharge of the corrupted matter, and to assist the action of the medicines. I make long incisions, not only on the mortified parts, but on those adjacent, which would soon be so; I make several of them, as nearly as the large trunks of the blood vessels, and more considerable branches of nerves will allow, not above an inch distant from each other. We ought always to cut to the quick; and if the bone be affected, the periosteum must be cut through, and the bone laid bare. These incisions should follow the direction of the greater number of fibres of the muscles that happen to be thus cut upon; but when the gastrocnemii, the glutei or deltoid muscles have been wounded by a ball, they must be cut cross-ways, otherwise convulsions, particularly the spasmus cynicus, will probably ensue. Several aponeuroses, especially that of the biceps, ought likewise to be cut transversally: It is true, if the longitudinal incisions are sufficiently long and numerous, they take off the tension of these membranes so much as to render the transversal ones unnecessary.

Neither ought the tendons to be spared; they must be boldly cut through transversally.

If a wound, or any other ailment, happens near the articulations, I also, without fear, make large incisions through the ligaments.

It will easily be understood that these incisions must differ from each other in length and depth; they must be longer in those parts of the sore where the disease has spread the widest, and shorter in others. Both must be more superficial at their extremities, and deeper in the middle, in the place where the complaint began, and where the mortification reaches deepest.

The number of incisions, and their distance, must also vary, as they may be found necessary; so that a skilful surgeon may make three, four, six or eight, as the case may require.

It is obvious, that in an operation of this kind, a surgeon should not be too precipitate; and when he does not know the depth of the ailment, he should not go too deep with his incision: he may repeat it if he finds he has not reached the quick.

## SECT. IX

After these incisions are made, we must carefully examine how far the part which is absolutely mortified, and which it is impossible to restore to life, may reach. This may be distinguished by the stench which exhales from it, by its change of colour, and want of feeling. These mortified parts ought immediately to be separated from the sound, and removed by means of a bistoury in the same manner as one muscle is divided from another in an anatomical dissection. In order to do this, the dead flesh must be cut through cross-ways, which puts the patient to no kind of pain. But care must be taken in this operation, not to separate such parts as may be somewhat affected by the mortification, yet not totally corrupted, as it often happens, after the removal of what is entirely dead, that they recover, by proper assistance, their natural state.

In making these incisions, we should take all imaginable care, as I have already remarked, not to wound the larger blood vessels or more considerable nerves; for this purpose, the gangrened parts which lie near them, should be separated with great caution: It is even better to leave behind a small portion of the mortified flesh which may adhere to them, and to trust for its separation to the ensuing dressings, which they will not fail to accomplish. The reason for this rule is, that we often see the vessels remain sufficiently sound, while the other parts are very much corrupted. We find for example, in the arm, near the joint of the elbow, near the wrist, and even in the lower extremities, the vessels intire, although the mortification of the parts which surround them be so considerable, as to oblige us to make our incisions to the bone; and it is these vessels, after the extirpation of the dead parts, that must keep up life in those which remain: We ought to preserve the greatest number we can, not only of the larger vessels, but even of the smaller ones: It was with a view to this particular, that I recommended not to make our incisions rashly, but with a good deal of caution, both with respect to the place where they were made, their direction and their distance. In operating with this circumspection, we shall avoid incurring the censure of Platnerus, who remarks, that we ought not to separate the dead from the sound parts with violence, "Because," says he, "incisions which cause an effusion of blood, often renew the inflammation." Now in my method, there is neither any violence, nor incisions attended with blood.

## SECT. X

When the incisions are made, if the neighbouring parts appear somewhat tainted, we must, by gentle compression, squeeze out the corrupted humour which may harbour there, and wipe it off with a bit of soft linnen rag. Afterwards, whether it may have been necessary to extract, either with the fingers, a scalpel, or with the instrument called a myrtle leaf<sup>7</sup>, any bony splinters too much detached from the substance of the bone itself to hope for a re-union, a circumstance which often requires a considerable dilatation of the fleshy parts; or whether the bones appear carious, or spoiled in any other shape; or, lastly, whether we may have been obliged to make deep incisions, even to the bone: In all these cases, we must at first employ such external applications as are proper for the bones, and for the soft parts that have a tendency to mortification, although they may have discharged a sufficient quantity of blood during these operations.

The bone, whether the periosteum be sound or destroyed, must be dressed with the following medicine: *Of frankincense, mastick, sarcocolla and myrrh finely pounded, true balsam of Peru, and genuine essential oil of cloves, of each equal parts; of balsam of Fioraventi, as much as may, in mixing all the ingredients over a very gentle fire, form a thin liniment;* which must be warmed when used, and which must be poured plentifully into the wounds I am speaking of, so that the bone may be well moistened therewith.

This medicine is of service in all cases where the bone is affected. When the bone is covered with it, some dry lint may be laid over it, and the soft parts dressed by sprinkling upon this lint a powder composed of *an ounce of myrrh finely pounded, half an ounce of sal ammoniac, camphor and nitre, each a dram.* After the first layer of lint is thus covered, fresh lint must be applied, and again sprinkled with the powder, till in this manner the cavity of the wound is quite filled up with alternate layers of lint, and this vulnerary powder.

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<sup>7</sup> See Dionis's surgery, page 18. 4th edition.

## **SECT. XI**

If the bone is not affected, or the periosteum laid bare, the balsam or thin liniment may be omitted. And the dressings may only consist of the layers of dry lint and vulnerary powder applied alternately.

## SECT. XII

Besides the dressings I have mentioned (§ X. and § XI.) for these kinds of wounds, we must likewise make slight scarifications upon the neighbouring parts, and sprinkle them with the powder; after this treatment, embrocate all the sores with oil of turpentine, and then lightly bandage up the whole with plain linnen cloth, which must be kept moistened, night and day, with warm fomentations.

## SECT. XIII

It is in following this method only, (§ X, XI, XII.) that these fomentations, so much recommended both by the antients and moderns, will be found truly serviceable and efficacious. Mr. Heister has collected a sufficient number of these forms, in treating of mortifications, in his excellent system of surgery, which is in every body's hands. It will be an easy matter for a surgeon, who understands the nature of the ailment and the quality of the medicines, to select such as will be most suitable to the case he happens to treat. Thus, for example, the fomentation consisting of a *pint of lime water, three ounces of camphorated spirit of wine, and an ounce or half an ounce of sal ammoniac*, is very useful in mortifications which are the consequences of high inflammation, as it relieves the inflamed parts that lie round those which are already mortified. The same effect may be obtained from the fomentation made with the *balsam of life*; namely, *soap, salt of tartar, and oil of turpentine, mixed and dissolved in lime-water*; and from the *cataplasm*, composed of the herbs called *species pro cataplasmate*, and *venice soap and saffron* added thereto<sup>8</sup>.

If, without any considerable inflammation preceding, a part is found mortified, or a beginning mortification appears attended with a swelling, which frequently happens to dropsical people, to those afflicted with œdematous tumours, and to aged persons, and whenever the ailment proceeds from a defect rather than an excess of the vital motions; the following fomentations are more proper.

1. *Take of water germander, wormwood, southernwood, rue, of each two handfulls; chamomile flowers, one handfull: Boil them together, and to two pints of the strained liquor add four ounces of treacle spirit, two ounces of venice soap, and half an ounce or even an ounce of sal gem.*

2. *Take of water germander, wormwood, feverfew, of each two handfulls; of mint and southernwood, of each a handfull: Boil them together in oxycrate, so as to have four pints of the strained liquor, to which may be added half an ounce of sal gem, and afterwards from two to four ounces of treacle spirit.*

3. *Take of martial ball<sup>9</sup> two ounces, sal ammoniac one ounce; dissolve them in about eight pints of spring water, and add two pints of rectified spirit of wine.*

4. *Take of crude alum, and white vitriol, each two ounces and two drams; lytharge of silver and myrrh, each an ounce; Aleppo galls, two ounces; juniper and bay berries, each an ounce; savin and rue, each two pugils; oak leaves, a handfull and a half; verdegriis, half an ounce; camphor, two drams; calamin, six drams<sup>10</sup>. After having mixed and reduced all these ingredients to powder, let two ounces of the composition be boiled with four pints of water, or with two of water and two of vinegar.*

The following embrocations applied to parts already mortified, will stop the further progress of the mortification; where it is just beginning they will prevent it, and will also help nature to separate the dead parts from the sound.

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<sup>8</sup> These two last applications are not in Heister: The *species pro cataplasmatic*, consists of *yarrow, wormwood, water germander, southernwood, chamomile, sage, hysop, rue, elder, St. John's wort, and red roses*. It is quite unnecessary to make use of all these ingredients at one time. Tissot.

<sup>9</sup> As the composition of the martial ball may not be generally known, I shall describe it in this place: *Take of filings of iron one part; white tartar two parts: Let them be reduced to a fine powder, and put into a matrass with as much French brandy as will swim about an inch above the powder; exhale to dryness, either in the heat of the sun or in that of a water bath. Pour fresh brandy upon the remainder, and evaporate them in this manner several times successively, till the mass appears resinous; then form it into balls nearly of the bigness of an egg.* I do not exactly know what quantity Mr. Bilguer means by *sextarius*; that measure, among the ancients, contained twenty four ounces, but here I believe it denotes somewhat less. If we suppose it to be about a pint, the medicine will be extremely good.

<sup>10</sup> This composition is commonly called *species pro decocto nigro*, or the species for the black decoction.

1. *Spirit of wine, three ounces; myrrh and aloes powdered, of each half an ounce; Ægyptian ointment, three drams*<sup>11</sup>.

2. *Vinous decoction of scordium, twelve ounces; vinegar of rue and of roses, of each four ounces; spirit of treacle, three ounces; and one ounce of sal ammoniac.*

3. *Lime water, four pints; treacle spirit, or that of feverfew, two pints; white wine vinegar, one pint; elixir proprietatis, six ounces; Ægyptian ointment, two ounces.*

4. *Decoction of elder flowers, six ounces; wine, eight ounces; vinegar, camphorated spirit of wine, treacle spirit, or that of feverfew, each two ounces; spirit of salt, two drams.*

Lastly, in order to soften the parts, separate the sloughs, and promote suppuration, the following application may be used.

Water germander, two handfulls; mallows and marshmallows, each a handfull; flower of linseed, three ounces; Venice soap and sal ammoniac, of each two ounces; linseed oil, an ounce. Let these ingredients be boiled together, in vinegar and water, to the consistence of a poultice.

It may be in general observed with regard to fomentations, that such as are emollient are serviceable, when hard dry crusts prevent a discharge; those which abound with acid, when there is a considerable degree of putrefaction; and, lastly, those which are spirituous, saline or strengthening, are most proper when swellings are flabby, and the body abounds with aqueous humours.

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<sup>11</sup> In using the external vulnerary medicines, in which aloes is an ingredient, it must be remembered, what Mr. Bilguer remarks in another place, that they often prove purgative.

## SECT. XIV

The diligent use of these fomentations will alter, in the space of twelve hours, the condition of gangrened wounds for the better; at the end of which, the lint and vulnerary powder, with which they were filled, may be removed, and at the same time, all the detached pieces of mortified flesh may be extracted, and the same dressings (§ [X](#), [XI](#), [XII](#).) applied, which must be renewed every twelve hours. The third or fourth dressing, the wound will discharge matter of a favourable aspect, so as to afford hopes of a cure: Then it will only be necessary to give the bark internally, and to dress the sore in the manner I shall mention by and bye. § [XVI](#).

## SECT. XV

The bark may be given by itself, in powder, or made into an electuary with rob of elder, or with the syrup of quinces, cinnamon, orange-peel, or any other cordial syrup; if it purges when taken in substance, it must be administered in the infusion or extract. If the fever be strong, the heat considerable, and the patient thirsty, the bark will be of no service<sup>12</sup>; but recourse must be had to medicines which may abate the fever and allay the heat, such as are commonly called temperants.

If the bark be judged necessary, it may be given in doses of half a dram or two scruples, at first every hour, afterwards every two hours, and at length, once every three or four hours: To each dose may be added a few drops of spirit of sea salt, or of dulcified spirit of vitriol, or a few grains of alum or catechu. If the patient be very weak, a small glass of some acid wine may be ordered with the medicine, such as Rhenish, Neckar or Moselle wine, &c. When it is thought proper to promote perspiration, an infusion of chamomile may be drank, as is recommended by Dr. Pringle. Let the strength be supported by the plain regimen, directed by that physician in the same treatise.

Let the drink be water and vinegar, weak veal and chicken broth, gruels of barley or oatmeal, acidulated with vinegar or juice of lemons, &c. I have not room, in this place, to enter into a more particular discussion.

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<sup>12</sup> Mr. Bilguer might have even said hurtful; the only true temperants are, repeated bleedings and the acids, which are preferable to nitre, which is not very proper wherever there is reason to apprehend a mortification. Absorbents, which in some parts of the country where Mr. Bilguer writes, are still ranked in the class of temperants, are very hurtful in the present case, and never afford any relief to wounded patients.

## SECT. XVI

I now return to the external treatment. When the dressings described, § X, XI, XII. have begun to procure a discharge of matter, the use of the vulnerary powder and oil of turpentine must be laid aside; but we must continue to assist and promote the suppuration for several days, sometimes even to the eighth; by dressing with the digestive, I shall hereafter mention, by keeping the parts constantly covered with emollient fomentations, and by avoiding to cleanse the wound too much, either by too strong compression, or by wiping it with too much exactness each time of dressing. We ought to be very much on our guard with respect to these two last points, till there be a sufficient suppuration; afterwards a somewhat stronger compression may be allowed, and the sore may be wiped with more exactness, but still, nevertheless, but very gently. For suppuration is the work of nature, an effort of the sound parts, by which they throw off whatever is vitiated and noxious; and it is the business of the surgeon to assist this salutary operation, by removing, with his instruments, such parts as are intirely corrupted; but this ought to be done, at least as much as possible, without causing any discharge of blood<sup>13</sup>

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<sup>13</sup> This precept, of which the very reverse is but too frequently practised, is of very great consequence: It is founded upon this, that a discharge of blood proves that an incision has reached the quick; now every such incision produces an inflammation, which retards the suppuration already begun, and hence we interrupt this operation of nature which we meant to promote, and, as it is the means of preventing a mortification, whatever interrupts it contributes to the disease: It cannot, therefore, be too often repeated, that in general, incisions which cause a discharge of blood, ought never to be practised after a suppuration is begun. Tissot.

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