

Observations on the means of preserving the health of soldiers and sailors : and on the duties of the medical department of the Army and Navy : with remarks on hospitals and their internal arrangement / by Edward Cutbush, M.D.

Contributors

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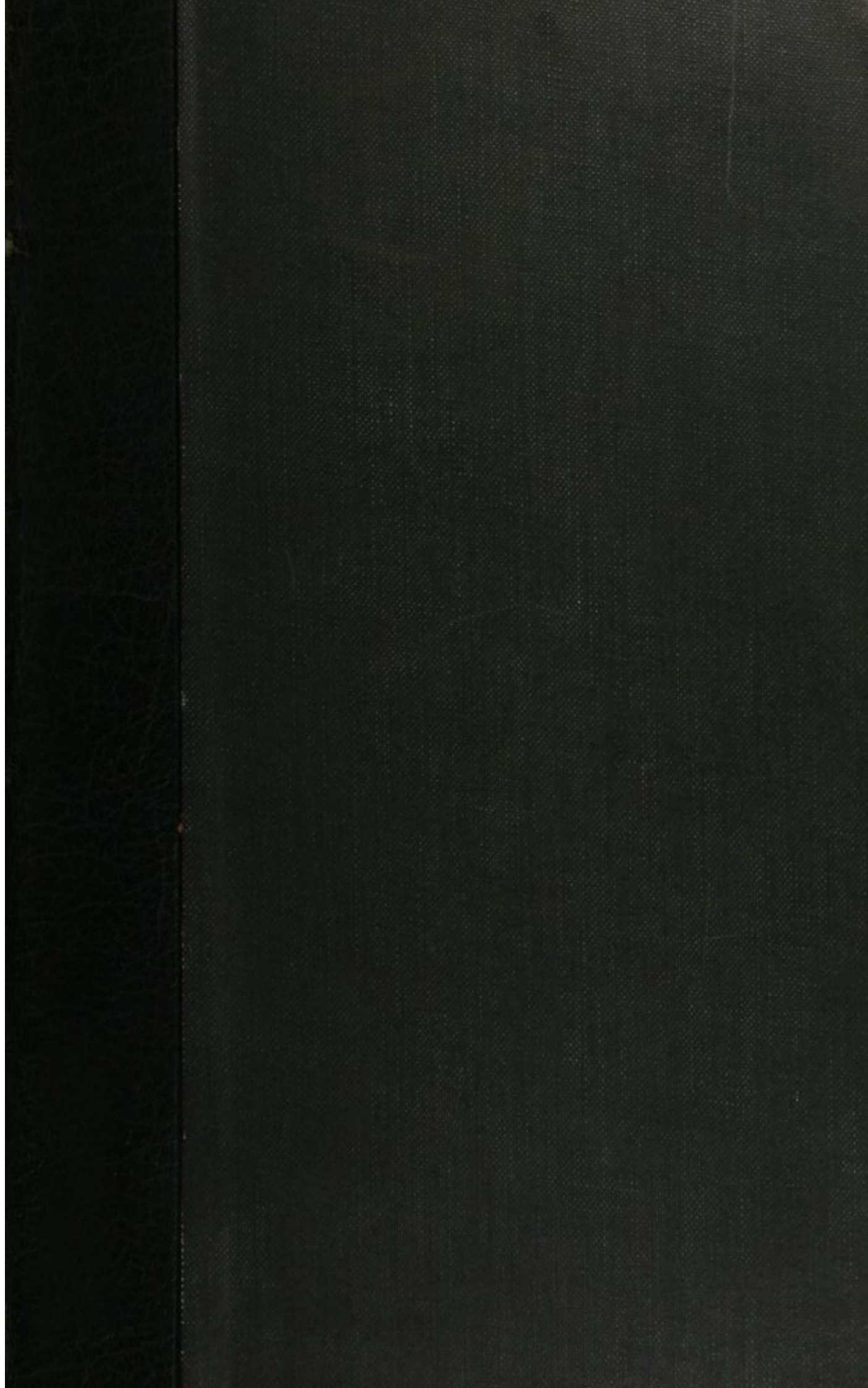
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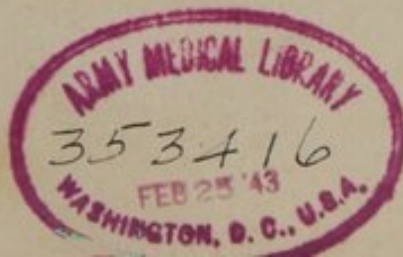
WASHINGTON, D.C.

OBSERVATIONS
ON THE MEANS OF
PRESERVING THE HEALTH
OF
SOLDIERS AND SAILORS;
AND
ON THE DUTIES OF THE MEDICAL DEPARTMENT OF THE
ARMY AND NAVY:
WITH
REMARKS ON HOSPITALS
AND THEIR
INTERNAL ARRANGEMENT.

✓
BY EDWARD CUTBUSH, M. D.
Of the Navy of the United States.

Let us endeavour to preserve the health of those who bravely enter the field of battle, or expose themselves on the boisterous ocean in defence of their country.

PHILADELPHIA:
PRINTED FOR THOMAS DOBSON,
At the Stone House, No. 41, South Second Street.
Fry and Kammerer, Printers.
1808.



District of Pennsylvania, to wit:

***** BE IT REMEMBERED, That on the twenty-sixth day of
SEAL. November in the thirty-third year of the independence of the
***** United States of America, A. D. 1808, Thomas Dobson of the
said district, hath deposited in this office, the title of a book the right where-
of he claims as proprietor in the words following, to wit:

“Observations on the Means of preserving the Health of Soldiers and Sailors; and on the Duties of the Medical Department of the Army and Navy: with remarks on hospitals and their internal arrangement. By Edward Cutbush, M. D. of the navy of the United States.”

“Let us endeavour to preserve the health of those who bravely enter the field of battle, or expose themselves on the boisterous ocean in defence of their country.”

In conformity to the act of the congress of the United States, intituled, “An act for the encouragement of learning, by securing the copies of maps, charts, and books, to the authors and proprietors of such copies during the times therein mentioned.” And also to the act, entitled “An act supplementary to an act, entitled, ‘An act for the encouragement of learning, by securing the copies of maps, charts, and books, to the authors and proprietors of such copies during the time therein mentioned,’ and extending the benefits thereof to the arts of designing, engraving and etching historical and other prints.”

D. CALDWELL,
Clerk of the District Court.



CH 37N45 NMT

To the Honourable
ROBERT SMITH
AND
HENRY DEARBORN, ESQUIRES,
SECRETARIES
OF THE
NAVY AND WAR DEPARTMENTS
OF THE
UNITED STATES:
THE FOLLOWING PAGES
ARE
RESPECTFULLY INSCRIBED
BY THEIR MOST OBEDIENT
AND VERY HUMBLE SERVANT,
EDWARD CUTBUSH.

ERRATA.

- Page 20, line 16, for soldiers read soldier.
30, 13, for alcalic read alcali.
53, 13, for exceeds read exceed.
67, 9, for complection read complexion.
181, 12, for subtilty read subtilty.
234, 22, for mercury read silver.

PREFACE.

IN all well regulated armies and navies, physicians and surgeons are appointed to take charge of those who are wounded; or who suffer by the insidious attack of disease.

Nations differ in establishing their rank and number; the latter, however, is generally regulated by the strength of the army, and the *climate* where it is to operate; the former, according to the *liberal* or *illiberal* opinion they entertain of the profession of medicine and surgery.

Some governments *educate* and *support* in their public institutions a number of young men, who are always in readiness to be called into actual service. In these institutions they are taught *every branch* of science connected with their profession.

Others order all candidates who apply for an appointment, to undergo an examination before a *medical board*, to ascertain their capacity to fill the station for which they apply. The examiners have the power of determin-

ing the *grade* or *class* that they consider the applicant entitled to, or of rejecting him. Those who have graduated at a respectable university are not examined, except when diplomas are supposed to have been *too readily* obtained.

Others, indifferent to the welfare of their subjects, are satisfied with a name, (and surgeon attached to it on the muster rolls of their ships and armies) without considering, whether the person whom they clothe with this title, have any pretensions whatever to the science of medicine.

Others again, totally regardless of the lives of their fellow creatures, provide neither hospitals nor surgeons for the relief of those who suffer in defence of their country, or in support of their ambitious princes.

The two last may, with much propriety, be linked together; though I confess, of the two, the latter, where men depend on the friendship of their brother soldiers for assistance, deserves in my opinion the preference; as they will generally fare better under them than under the care of those, who are furnished with medicines which they know not how to administer.

In most parts of Europe, the advantage of good surgeons in time of war is so well un-

derstood, that men of the first abilities* in their profession have been enrolled in the army and navy, and encouraged by *liberal pay* and a *highly respectable* rank. Such was the attention of the emperor of Germany to the education of his surgeon majors, that after the usual studies in Germany, they visited the different hospitals in Europe for three years at *his expense*; during which time, they corresponded regularly with his physician at Vienna, to whom they communicated their observations on the medical and surgical practice of the different hospitals.

“ With respect to staff surgeons, the nature and extent of their duty in actual service is such, that they should be men of considerable knowledge in their profession. Every officer, from the commander in chief down to the pri-

* Among whom I mention with pleasure, a Pringle, Monro, Jackson, Blane, Trotter, Lind, Robertson, Ranby, Rouppe, Reid, Richter, Le Dran, Desault, Desgenettes, and Larrey.

I should do an injustice to my feelings, were I to omit the names of Drs. RUSH, JONES, SHIPPEN, CRAIK and HUTCHINSON, whose patriotism and humanity, during the American revolution, led them from their domestic enjoyments to the tented field, to preserve the lives of those who were engaged in defence of their LIBERTY and RIGHTS.

vate, may have occasion for their assistance; and no man, who has not given *some proof* of his practical knowledge, should *be appointed* to an office of so much importance."

It has been very generally remarked, that diseases in an army or navy destroy more than the sword; to combat these therefore, with success, both policy and humanity ought to induce governments to direct their attention to the regulation of the medical department.

Those who are acquainted with public service will, doubtless, acknowledge the propriety of system and regularity in all the various departments of the army and navy. To none will this remark apply with more force than to the medical department.

It will, I presume, be acknowledged by those in service, that, on their first entering on the duties of their appointments, they have found themselves at a loss to conduct the business of their stations with satisfaction to themselves or to those under their direction. We have many valuable treatises on the diseases of the armies and navies of Europe; but none, that I have met with, give a detail of the requisite duties to be performed by the individuals of the medical department. I therefore beg leave to offer the following pages as an *outline* of

what I consider to be the duties of medical officers, and others of this department, which I trust will be useful to those who may hereafter enter the service of their country: and on which, they may make such improvements as their experience may suggest.

Although I have not been in a *regular* army, reflection on this subject, and the observations I made while attached to the militia of Pennsylvania in 1794, first as hospital surgeon, then as surgeon general, where I had an opportunity of witnessing many irregularities during a very short campaign, from a want of discipline and a knowledge of the necessary duties; and the experience since acquired in the naval service of the United States, have enabled me to make some general remarks on the medical department. To make the subject familiar to those who have not been in public service, I have added the forms of returns* and hospital books, for the surgeons and stewards. I have also added an estimate of medicines, hospital stores and utensils for a ship of

* The reader will perceive that I have (for the purpose of giving all the necessary *forms of returns* for the navy) anticipated the period when the United States will probably be in possession of ships of seventy four guns; which, for form's sake, I have named after the several states.

war, from which the regimental or naval surgeon, who is just entering on the duties of his appointment, may make a selection of, or add such articles to the list, as he may think proper, according to the number of men under his care. I have taken a general view of the means recommended for the preservation of the health of soldiers and sailors; in this part of my subject I am indebted to the works of Monro, Pringle, Revolat, Jackson, Trotter and Turnbull. I have also made some remarks on the subject of hospitals and their internal arrangement; and have finally added an *Appendix*, which contains a description of the permanent and portable disinfecting apparatus of Moreveau, which I have translated from the Italian, with remarks respecting the utility of fumigation by Gimbernath of Madrid, Queralto and the French council of health. Also a table of the analysis of atmospheric air by Messrs. Humbolt and Gay Lussac; and a short Essay on the analysis of mineral waters by reagents, with a list of the necessary tests, to assist the military surgeon in the examination of the mineral waters of the country through which he may march.

As it is a difficult matter to procure nurses or orderly men, in the army or navy, who are

well acquainted with their duty, I have added brief directions for the preparation of the diet for the use of the sick, which I trust will be beneficial. I have also added gleanings of dietetic articles for the use of officers and men; and some account of the regulations established in the medical department of the British navy.

Since the following sheets were put to the press, Dr. Rush has politely favoured me with the perusal of a pamphlet which he published during the American revolution, on the means of preserving the health of soldiers. As it contains many judicious remarks, which will corroborate what I have endeavoured to inculcate on a subject of so much importance to the army and government; I beg leave (by permission of the doctor) to add it to this treatise; being confident, that every remark from the pen of so meritorious a physician, will be highly acceptable to my readers.

Philadelphia,
November 26th, 1808.

E. CUTBUSH.

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ON
THE PRESERVATION OF THE
HEALTH
OF
SOLDIERS AND SAILORS.

WE have many valuable observations on the means of preserving the health of those, who bravely enter the field of battle or expose themselves on the boisterous ocean in defence of their country. But, as these are in separate treatises, or imbodyed in voluminous works, I will devote a portion of my time in making a selection of such regulations as are inculcated by writers, who have actually experienced the vicissitudes incidental to a military or naval life, and who are consequently more capable of giving instruction on this important subject, than those, who have written without having witnessed the operations of an army or navy. To which, I will occasionally add,

such observations as my opportunities in service have enabled me to make, or reflection to suggest.

In order to render this part of the treatise more convenient and acceptable to the naval and military surgeon, and to those who may wish to engage in the service of their country, I will divide the subject into two heads. Under the first, I will consider the choice of troops, their clothing, and the preservation of their health; and secondly, the preservation of the health of seamen.

ON THE CHOICE OF TROOPS.

WHEN a country has been at a considerable expense to raise an army, its preservation may be considered an object of national concern. In raising an army, much attention is necessary to procure men, who are free from disease, and capable of undergoing the necessary fatigues inseparable from a military life. The state of a military man is truly the most exposed, it is therefore of great importance that he possess a sound constitution. The size of a soldier, whatever service he may be chosen for, ought to be proportionable and vigorous. Men from the country should be preferred; they are generally accustomed to bear the vicissitudes of the weather, to the carrying of burdens, and are generally more active and sober than those who have resided in cities, where they have led a sedentary life, or have been accustomed to participate in the debaucheries common to populous towns. The size of that class of men, who are generally employed as infantry, is commonly preferred. The size usually received for a foot soldier is five feet four inches; for a dragoon or hussar, from five

feet three to four inches; for a grenadier, five feet, five or six inches*. The age most proper for the first entrance into service is from eighteen to twenty five: but the age most proper to carry arms is from eighteen to forty. The body does not acquire sufficient strength for service, before the age of eighteen; and after forty, it usually becomes weighty and stiff, consequently it does not possess that agility, which the exercise of a soldier requires.

But the age is not the only consideration in the choice of a soldier; an examination of his constitution is also indispensably necessary. Negligence on this point will be attended with discredit to the officer commanding, and with serious injury to the service, when the force is to be found only in the daily returns and not in the field. An inspection by a medical officer, as well as by an intelligent military character, is necessary to judge if the individual be proper for the service. He should be *apparently* sound, his limbs perfect and free from ulcers, also from constitutional venereal affections. He should not be ruptured, neither should he have the itch or scrophula; and I will add, that those who are known to be, or have the appearance of having been *habitual*

* French service.

drunkards, should always be rejected. The cost of men of this description to government, who are generally subject to swelled and ulcerated legs, besides being for a long time unfit for service, is very considerable. It is usual to direct that men who are subject to *convulsions* should not be received; this cannot be ascertained unless from the confession of the recruit, but I will venture to assert that seven tenths of those, who are *habitual* drunkards, will be found subject to this disease. Obstructions in the urethra, and fistula in ano are generally kept a secret for some time after the enlistment; the best plan, to obtain a true statement of a man's situation would be to affix a penalty to his enlistment, by which, he should forfeit the first three months' pay, should he not prove sound. Were this plan established we should have fewer impositions.

The movements of the body and limbs in various positions should also be examined. Colombier, in his choice of troops, observes, "that a compressed breast is a sign of weakness and bad health. The face pale and the eyes dull are also symptoms of a bad state of the body. A constrained gait and *bow legs* are also contrary to service. Swelled legs show a disposition to disease; we must, however, ob-

serve that this accident is sometimes transient and only the effect of fatigue. Difficulty of respiration, an habitual cough, ulcers, scars from the scrophula, the mutilation of the noble parts, hernia, obstructions, &c. are all imperfections, which render a man incapable of serving. A man who is blind of an eye, lame or hunchbacked, *who has a disagreeable effluvia arising from his body, or whose eyes are fistulous and watery, who wants a part of his fingers or toes, who is meagre in the extreme, or whose abdomen is very large will also be improper for service.*" Neither should a man be received as a soldier who stutters.

Besides the care we may take in choosing men who are healthy, other circumstances should be attended to: the figure, for the profession of arms, ought not to be defective. They should likewise be active and manifest a natural courage. Their prevailing character and temperament should also merit the attention of a judicious observer. If they be lively, quick and hardy, we may hope to see the germ of that heroism, which ought to animate a soldier, developed. It is of great importance to animate young soldiers, otherwise their minds will be continually occupied on the subject of their friends and homes, which may arise to

a species of disease, called nostalgia; they ought to be insensibly attached to their duty and new mode of life, and treated with humanity.

CLOTHING.

Much attention is necessary to adopt suitable clothing for troops. To maintain the activity and health of a soldier, his dress ought to be simple, that he may be quickly clothed on cases of emergency; it should be easy to all parts of the body, that none of the functions or movements may be embarrassed; he should not be unnecessarily loaded, but his clothes should be of a texture sufficiently close to prevent the sudden action of the cold or moisture on his body.

We will in the first place examine the usual dress of a soldier and make such remarks and improvements as may be beneficial. We will commence with the head dress, which is an object of much importance in the preservation of the health. A soldier has his head exposed to frost or rain by which his hair, if long, becomes wet, whilst his body is dry; harassed and fatigued by a long march, he turns into his tent in this situation to sleep, and disease

is very often his companion on waking. The hair is doubtless the most natural ornament to the head, but it may become very often troublesome and disagreeable by the powder which is used being converted into paste by rain or profuse perspiration; independent of the loss of time in dressing and powdering, it also becomes a nidus for vermin, it should therefore *be cut close.*

Most authors generally agree in admitting for a soldier's head dress a hat, cap, or helmet, and have generally given the preference to the latter. The Hebrews, Greeks and Romans without doubt adopted it, on account of preserving the head from sabre wounds, and of giving an imposing air to their troops; but it is too weighty and voluminous, heats the head, fatigues the neck, and is more an object of parade than defence. Hats also in various forms are not free from inconvenience; they are generally made of low priced materials and spongy; they consequently absorb a great deal of moisture, by which the head is kept continually wet during heavy rains, and is frequently a cause of disease. The chapeau bras, adopted for some troops, is not only inconvenient, but liable to all the objections above stated, and after having been once wet, it

gives the soldier a sorry appearance. Instead of hats, I propose a cap made of leather, and *varnished* to make it impenetrable to rain; it should be eight or nine inches high in the crown and formed somewhat like a truncated cone; it should be lined with linen and constructed in such a manner that there should be a space of three inches or more between the crown of the head and the top of the cap; and should have a buckle and strap at the base to enlarge or diminish its diameter. Two semi-circular or oval pieces of stiff, green leather, or any other colour that may be fancied, should be attached to the front and back part of the cap, with a moveable joint; these also should be highly varnished to prevent the rain from being absorbed: to the front piece, an escutcheon, with the arms of the U. S. may be affixed, or the number of the regiment. The front piece may be occasionally drawn down to guard the eyes from the rays of the sun, or from the rain; the moveable piece behind may also be drawn down to prevent the rain from wetting the back of the neck. The cap may be ornamented with a feather, cord and tassels, and when highly varnished and placed on the head with a slight inclination, would, in my opinion, give

a soldierly appearance.* A soldier should likewise be provided with a woollen cap with wings, to cover his neck and shoulders when exposed to bad weather on duty. The dress of the body and extremities during the summer months should be light. The soldier should not be incommoded by tight ligatures below the knees; pantaloons are therefore preferable, but they should not be so large as to give him a *slovenly* appearance; they should therefore be altered by a taylor of the regiment; the waistbands should be loose and supported by suspenders; the gaiters should also fit the leg without a *wrinkle*. The socks generally worn in winter are not sufficiently warm. Indian shoes or mocasins with soles are much warmer than common leather ones. The shoes which are

* Since writing the above I have seen in the 11th vol. of the Repertory of Arts, for 1807, a specification of a patent granted to Robert Bowman, for the means of making hats, caps and bonnets for men and women from whale-bone, &c. "Hats for military men or other persons, manufactured as above, will prove to be very light and durable, and besides will be found to be incapable of being penetrated by the *cut of a sword* or other weapon. They will also be impervious to water, be thereby comfortable to the soldier, and will free him from much labour and attention he was formerly obliged to bestow." These hats may be varnished with copal or any other elastic varnish.

generally supplied for the use of soldiers are not sufficiently strong and *well made*; the soles are like a sponge in wet weather, and during the dry would separate from the upper leather in a march of one hundred miles; consequently the soldiers' feet will be cut by marching over rough roads and be rendered unfit perhaps for duty by the inflammation excited. Therefore, I must give a decided preference to the *iron bound* shoes made in Philadelphia, according to a patent of Mr. Bedford's. The first cost perhaps will be a trifle more than that of the common kind, but this ought not to be placed in competition with the services of a single soldier, the cure of whose feet, together with the loss of time would cost the government perhaps twenty times more than the difference in the price of shoes. Besides, when it is considered that a soldier is allowed but four pair a year, this alone ought to be an inducement to have those supplied that are *strong* and *useful*. Pantaloon and half boots or Suwarrows are preferable for cavalry. When breeches are worn, the tight knee bands compressing the popliteal artery, when the men are mounted, produces a pain and numbness of the legs which prevents them from being active, should necessity call

them into action immediately after a long march.

Instead of foot soldiers carrying a heavy blanket, I propose a cloak or coat made of thin coating, which may be put on, when the evenings are cool, and will serve also to *sleep* in; it may be made lighter than a blanket and may be rolled up neater and in a less compass. Instead of linen shirts, I am of opinion that thin flannel ones would be preferable, either for *winter* or *summer*; in the *former season*, flannel worn next the skin will keep a soldier much warmer than double the quantity of clothes over a linen shirt; and in the *summer*, will enable him to wear a light uniform,* without risking his health by exposure to the cool nights; and will absorb the perspiration without producing the chills that are common to those who wear linen. In fact it maintains a uniform temperature and prevents the vicissitudes of the weather from affecting him. A soldier may also be supplied with two or four "*Dickeys*," with chitterlings to be worn on parade, or when on duty; if the latter number

* I have seen volunteers, during the present summer, almost ready to sink under the extreme weight of their cloth uniform, knapsacks, and blankets; in consequence of fatigue and heat from their weight.

be allowed, which would not cost more than a shirt, they may be worn constantly. This dress will guard the soldier against the pernicious effects of cold damp nights, which are a fruitful source of disease in encampments. The neck, during the winter, should be kept warm by lining the stocks with flannel. They should not be drawn too tight around the neck; this is a practice in some services to make the men have a ruddy appearance.

The clothing of men should be inspected by the sergeants, under the direction of the captains of the respective companies weekly, and a list thereof taken and compared with that of the preceding week, to discover deficiencies, and to see if the *clothing be clean*. All clothing found in possession of sutlers, &c. should be taken from them; by this means they will be deterred from receiving soldiers' clothes in exchange for liquor. The clothing should also be marked with the owner's name, by which, thefts may be discovered. If any thing be deficient, strict inquiry should be made into the cause of it; and should it appear to have been pledged, sold or exchanged the offender should be punished.

GARRISON AND WINTER QUARTERS.

SOLDIERS are quartered in private houses or barracks. In either, the men ought never to be crowded together. The emanations from their bodies and lungs, the odour from the privies that are near, may produce disease; therefore when circumstances will allow a choice of situation for barracks, it ought to be high and airy, distant from every cause that may impregnate the air with any noxious effluvia. A situation, near a river or *current* of water, would be preferable, where the soldiers may frequently bathe and wash their clothing. In constructing barracks, the prevailing winds during the summer ought to be taken into consideration, that they may be advantageously exposed to a current of air. The privies should be fixed at a considerable distance from the building, and no person ought to be permitted to ease himself in the vicinity of the barracks or make water against the walls; a place might be fixed on for this purpose, from whence a tube should be constructed to convey the urine into the *privy*. The straw of which the beds are made should be renewed every month, *at least*, or indeed every two weeks, if the wea-

ther *be damp* and *hot*. The bedding should be frequently exposed to the sun and air, and the windows of the barracks opened. No *dirty* clothing should be suffered to be put into the knapsacks or under the heads of the beds. No meat or soups, nor in fact *any article* of diet, should be suffered to remain in any of the rooms. In order to prevent this more effectually, the messes should *be obliged* to breakfast, dine and sup at regular hours. In winter quarters, soldiers are very apt to become slothful and dirty, unless they be particularly attended to: in order to preserve their health, they should be frequently exercised and not suffered to lie in their beds because it is cold. They are also very apt to keep the rooms in which they sit too warm, especially the guard room. This is extremely improper for those who have to mount guard; their tour of duty perhaps may come on when they are in a profuse perspiration near *a close stove*, they relieve guard, the cold checks the perspiration suddenly, and there will generally be a number on the sick report the following day in consequence of it. *Stove rooms* are also improper for men who have just been relieved from post, during intense cold weather. The sudden change from a cold to a warm atmosphere produces pains

of the head and breast, and I have seen hemorrhage from the nose excited by this cause. In fact, I believe this sudden change from a cold to a hot atmosphere is more frequently the cause of inflammatory diseases than the reverse. The patient may be truly said *to have caught a heat*. It rests with military officers to establish proper regulations on this head and to *enforce* them. Moderate warmth, *exercise, cleanliness, dry warm clothing*, and attention to the diet will ensure the health of men in barracks. To promote this desirable state, officers should be particularly attentive that the men keep themselves and their barracks clean; the duty being light, no excuse should be taken for deviating from the established rules on this head. The same regulation respecting cleanliness ought to be adopted, which we shall notice under the head of hospitals. It should not be sufficient that a soldier appear on parade without a *soil* on *his clothing or accoutrements*, but that his face, neck and hands show the good effects of the application of soap, sand and water to them: their feet should also be frequently washed. All who are *filthy* should be punished by confinement to the barracks, and by the stoppage of spirits until they appear decent. If the effect be not produced by these

means, I have no hesitation in recommending a moderate application of the cat, or in advising the delinquent to be drummed out. *One filthy man* may infect a whole barracks.

With respect to the *diet* in the barracks, I think it ought occasionally to be changed; for example, in hot weather a diminution of the quantity of meat, and in lieu, vegetables issued. Salt beef, or pork *occasionally* with cabbages and potatoes, or any other vegetable, would be highly gratifying to the soldier and would have a tendency to preserve the health. A deduction of two or three cents from the value of the meat in a ration would be amply sufficient, when taken aggregately, to supply vegetables.

DISCIPLINE AND EXERCISE OF TROOPS.

DISCIPLINE and exercise are intimately connected in the preservation of the health of troops. Discipline, to have a proper effect, ought to influence the mind, by exciting hope or fear; by exciting the one or the other, the ancients gave to the world a sublime spectacle of their effects. By inspiring them with the love of glory and of country, they may more readily be led to conquest than through fear. But in order to preserve strict subordination and discipline it is necessary that fear should be sometimes excited. "Nothing" says Montecuculli, "is more necessary than discipline; without it, troops are more dangerous than useful, more formidable to their friends than their enemies." But military discipline should be always established by laws, and these laws *reciprocal*, and enforced with strictness. All punishments should be *exemplary*. If laws are not enforced, it would be far better that none be promulgated. What can be more farcical than to threaten daily to put the laws in execution, when the soldier is convinced, at the time, that it is but a threat; hence, he proceeds

day after day in irregularities, which injure his health, and finally perhaps, render him unfit for service, or insensible to punishments.

Though I confess myself an advocate for strict discipline, I by no means think that corporal punishment is correct for *trifling* crimes, unless the delinquent be *incorrigible* by other means; but whatever the penalty be, that is attached to certain crimes, *that* penalty ought to be absolutely and justly inflicted; and *the necessity for it* will most assuredly *be less* frequent.

Hope and fear are the natural guides of all the actions of men; the hope of being recompensed will cause them to be more zealous, whilst the fear of punishment, unless the mind be perfectly callous, will prevent the commission of crimes and ensure that discipline, which is the soul of an army. Military rewards are powerful incentives to good behaviour either in battle or garrison, but these should be made with discernment and *justice*.

A strict observance of military duty is intimately connected with good morals; without morals the soldier will expose his health continually, neglect his duty and become a burden to himself and country. Two objects,

which singularly interest the health of soldiers and merit much attention from the commander, are the *indiscriminate* commerce with women and intemperance. Revolot is of opinion, that almost unlimited severity should be used with regard to these two points. Intemperance ruins the constitution of a soldier; he becomes slovenly and insensible to the smallest spark of military pride. A sober, simple and laborious life are the only proper means of retaining the vigour of youth. Intemperance and health are incompatible. The evil effects of an *indiscriminate* commerce with females are too well known to merit, in this place, particular consideration; suffice it to say, that it renders the constitution of the soldiers more susceptible of disease, and his wounds are cured with more difficulty, owing to a syphilitic taint which is too often his companion. "Occupy a soldier and you will cause him to be discreet," is an axiom which ought not to be lost sight of. Idleness in garrisons is the loss of troops; by "indolence and debauchery one half will perish in the first fatigues of a campaign."

Every military man must be well acquainted with the utility of exercise to the health and service. The men should therefore be exer-

cised, in time of peace, in all kinds of work. It is important to accustom them to every species of military manœuvre with as much exactness as though they were actually opposing an enemy; such as marching, passing rivers, scaling walls, attack and defence of intrenchments and redoubts, to familiarize them with every attitude and operation, and finally to conduct them *insensibly* to the hardest duty; such as marches and countermarches, during inclement seasons, in a word, to exercise them in all the duties of a laborious campaign; by these means the constitution will be brought to bear every vicissitude, without receiving so much injury, as when they are *directly* led to perform them without any previous preparation. "Hardy soldiers, well armed, whose bodies and souls have been exercised in times of peace to continual images of war, fear neither enemies nor fatigue." To dissipate gloomy ideas common to young soldiers, military music is of the utmost consequence. Where is the heart that will not beat in unison with the spirit stirring drum? Will not the soldier march with more cheerfulness and a greater distance without fatigue, when inspired by military music, than when travelling in silence.

ON THE SUBSISTENCE OF TROOPS.

DRINKS.

WATER is generally the principal drink of soldiers, serving likewise for the preparation of their food and other purposes; that which is lively and agreeable, transparent and without odour, which boils beans or peas readily and dissolves soap without curdling, should be preferred. Water that is most pure and healthy is that which has been agitated and combined with the air of the atmosphere; water from dissolved snow is not considered healthful. Of the different waters those from rivers, or from sources, which are limpid and running, are the most salutary and agreeable. Care should be taken to use those only that are perfectly free from impurities. Limpid waters issuing from mountains, rocks or high lands, composed of clean earth and gravel, are very proper for *common use* provided they be not impregnated with any *mineral substances*. Waters of lakes and ponds* have long been consider-

* Nec perniciosus vel paludosis aquis utatur exercitus.
Vigetius.

ed prejudicial to health, unless they are frequently renewed from their source. Marshy and stagnant waters are extremely pernicious and should never be used unless necessity absolutely require it, and then some mode of purifying them should be adopted; in fact the same should be practised when river water is muddy or otherwise filled with impurities. Muddy water may be cleansed by adding two or three grains of alum to each pint; if hard, it may be rendered soft by adding ten grains of alkali to every pint. Chalk may also be used for the same purpose. There have been various means adopted for the correction of the pernicious effects of impure water. Some recommend frequent agitation in a trough with the bough of a tree, and then suffering it to settle; others propose filtering it through a sponge placed in the bottom of a cask. Portius proposes straining it through sand. Dr. Lind's plan is very simple: he directs a cask of a large diameter to be procured with one head out, in which, another of less diameter, but longer and with both heads taken out, is to be fixed; about one half of the inner cask is to be filled up with clean sand and the *space* between the casks is also to be filled one third of its height, with sand; the casks are then prepared for filtering.

Fill the cavity of the *inner cask* with the impure water, it will filter through the sand and rise in the space between the inner and outer casks; from whence it may be drawn off into vessels placed to receive it, by means of a cock put into the side of the outer cask about fifteen or twenty inches above the level of the sand. The water may be permitted to run into a fosse about three or four feet in depth, the bottom and sides of which should be covered with stones and gravel. Each man who carries water from the fosse should be obliged to fill up the filtering cask from the lake or pond, by this plan there will be a continual supply of water *to drink*. As casks cannot always be procured, a large box or trunk may be constructed by the artificers in camp. But if circumstances absolutely oblige troops to use stagnant water, it may be rendered less noxious by pouring it frequently from one vessel into another, or by infusing a small quantity of *calamus aromaticus* in it, which may be found in most swampy situations; it will give a bitter taste to the water but will make it more healthful. Water from marshy situations ought to be boiled, to kill the *animalcula* which it contains, and then strained and passed through a cullender or camp kettle pierced with a number of small

holes to render it brisker by its union with the air of the atmosphere. Vinegar may sometimes be added with advantage. Though ill effects are produced by an excess in the use of water, yet, if drunk in moderation, it assists digestion, quenches thirst and is almost a universal vehicle for solid food; it dilutes the fluids, corrects acrimony, promotes perspiration and the secretions. It is consequently an article of primary importance.

Although we have said that water is the principal drink of soldiers, yet we do not find that they use it when other articles can be procured. Their choice of drink depending very much on the country where they serve; the ration of spirits is seldom sufficient to gratify their appetites; which are too often governed by the price of the article, consequently they frequently purchase pernicious whiskey or rum, fresh from the still, because it is cheap, to the great injury of their constitutions. As I do not, in these instructions, contemplate the employment of troops out of the United States, I shall confine my remarks to such articles as soldiers readily procure, viz. whiskey, beer, cider and the compound called cider-royal.

Whiskey is made from grain of different kinds, such as barley, wheat, rye, oats, buck-

wheat and Indian corn; also from apples, peaches and many other articles. Rye, wheat, apples and peaches are more commonly used for distillation in the United States; all of which give to the spirit more or less of their odour, owing to the phlegm and essential oil which come over during the distillation. That spirit which possesses the flavour of the apple and peach has a great many admirers, when it is old. But that which is drawn from grain, when new, is extremely nauseous to those, who are unaccustomed to its use. Like all other ardent spirits, when used to excess, it is attended by a train of consequences highly pernicious to the constitution. It is true that the stomach will, by degrees, become accustomed to the use of ardent spirits, and will at length bear the most pungent or fiery, without feeling immediately their effects; but they operate like a secret enemy, the stomach will be deprived of its natural functions, the appetite for solid food impaired, the nervous system and intellectual faculties will be assailed. Obstructions of the liver and viscera, swelled legs with ulcers, dropsy and convulsions will too frequently be the fatal consequences of a liberal use of this "*liquid fire*." Whoever has attended to the effects of spirituous liquors, when used to excess, espe-

cially among those, who use the worst quality, must have witnessed the whole or part of these baneful consequences. Within a few days past, I have seen a case of hæmorrhagy from the intestines brought on I am confident by the free use of *new whiskey*.

The practice of issuing whiskey in an undiluted state to soldiers in garrisons ought to be abolished; few men take the trouble to preserve it to use at their meals; the allowance is swallowed, though they are apprised of the pernicious consequences. Soldiers are like children in many respects; it therefore becomes the duty of their commanders to see that they do not abuse their constitutions by excesses. Were I to indulge myself in enumerating all the pernicious consequences of new rum or whiskey, on the constitutions and *morals* of soldiers, I should enlarge this part of the subject beyond the limits I have proposed; I will therefore conclude by observing that the effects which have already been noticed ought to point out the necessity of enforcing the penalties attached to drunkenness by the acts of congress for the government of the army.

Cider.

Cider furnishes an agreeable and healthy beverage, nourishing and refreshing; it excites a pleasant warmth in the stomach and is free from the pernicious effects we have noticed above. It should be perfectly sound and well refined. But when recently made and used in immoderate quantities, it occasions flatulence, colic, or diarrhœa. To remedy these a teaspoonful of powdered ginger may be added occasionally to every quart, or a heated iron may be plunged into it; this is a common practice in the northern parts of the United States.

Cider-Royal.

This is an article of which I have very little knowledge; but am informed that it is cider boiled with ardent spirits; it is a very insidious drink, which quickly produces intoxication; and therefore improper to use without being diluted with water. Its use is common in most of the German settlements of Pennsylvania.

Beer.

It were to be wished, that beer was more commonly used among soldiers in garrisons. I am aware of the difficulty of transporting a sufficient quantity for an army, but in all garrisons on the sea board or in the interior where beer can be procured, it should be issued in lieu of ardent spirits. The beer that I would recommend is not that, which becomes *sour* in ten or fifteen days; it should be made with the proper quantity of *malt* and *hops*, but not with disagreeable bitter herbs; which, though useful as medicines, will be disgusting to soldiers in health; neither should it contain any article to make it "*heady*," (*Coccus Indicus* for example.) It should be sound and well depurated from feculent matter, and have a sufficient quantity of hops to preserve it.

An extract might be made from malt and hops, which would facilitate the brewing of beer, would be very proper for garrisons, and might be conveniently transported to all parts of the United States. Care should be taken in evaporating the infusion of these articles that the extract may not be burnt; a *water bath* should therefore be used for this purpose. The

extract from six bushels of barley malted and two or three pounds of hops would be sufficient for two hogsheads of beer. The yeast for fermenting may be preserved by drying it on a board, layer after layer, until it be an inch thick, when it may be cut into squares and preserved in a tight vessel for use.

Beer when properly made is very healthful and nourishing, but when *too new* it is apt to produce flatulency and colic. Should it become tart in the summer season (which will seldom be the case when there is a proper quantity of hops used) the addition of an alcalic or chalk will correct it; the former I have seen used frequently in the West Indies, among porter drinkers.*

Oranges and Lemons.

For the use of the sick of an army in the interior of the United States, where these fruits cannot be procured fresh, an essence may be made and transported thither, which will answer the purpose of fresh fruit.

“ Let the juice of these fruits be well cleared from the pulp, and depurated by standing some

* “ Heureux les régimens qui tombent dans un pays à bière.”

time; after which it may be poured off from the gross sediment: let it then be poured into any clean open vessel of china or *stone* ware, which should be wider at the top than bottom, to expose a larger surface for evaporation. Put this into a pan of water over a clear fire; let the water come almost to boil, and continue nearly in that state, with the bowl full of juice in the middle of it, till the juice is found of the consistence of a thick sirup when cold. The slower the evaporation of the juice is, the better; that is, it ought to continue twelve or fourteen hours over the fire: when it is cold it is to be corked up in a bottle for use. Two dozen of good oranges, weighing five pounds four ounces will yield one pound nine ounces and a half of depurated juice; and when evaporated there will remain five ounces of extract, which in bulk will be equal to less than three ounces of water: so that twelve dozen of oranges or lemons may be put into a quart bottle, and preserved good several years. When this is mixed with water, and made into punch, few are able to distinguish it from the fresh juice mixed up in the same manner. A small quantity of the outer rind of the orange or lemon added to the extract a little before it is taken off the fire, or a little of the essential

oil, will give it the flavour of the fresh fruit, so that the nicest taste will scarcely be able to distinguish the difference."

Vinegar

Is considered, and very justly, an indispensable article in provisioning an army; not only to season the food, but also in times of great heat, to preserve the body from disease, especially in garrisons where salt provisions are used without vegetables. It is, in my opinion, an article of so much consequence that troops should *never* be without it. A small quantity mixed with molasses and water makes a very wholesome and agreeable beverage during the summer season. It is very commonly used in some parts of the United States noted for sobriety. The Romans considered vinegar as one of the primary articles in provisioning their troops.

ALIMENTS.

THE quantity and quality of aliment ought to be proportioned to the exercise inseparable from the service of military men, and to the climate and causes of disease to which they are exposed.

The nature of the alimentary substances and the choice to be made for their preparation are objects of importance. Bread, meat, herbage, peas, beans, potatoes, &c. ought to form a part of a soldier's ration, and be varied according to circumstances. The preparation of a soldier's food is generally very simple, it is rarely seasoned except with salt or vinegar. It should be thoroughly dressed; flesh that is tough, fibrous or half dressed being hard to digest. Salt, taken in moderation, excites the digestive powers and gives an agreeable savour to the food, favours the excretions and secretions, but when used in too large a quantity produces dangerous effects.

It is of primary importance to furnish the soldier with nourishment of a good quality, and essential likewise, to avoid excess or deficiency; it is very rare, however, that a soldier

is furnished with *too much*, on the contrary the quantity, owing to the situation of the army and state of the country in which it acts, is not sufficient to support him under the fatigues to which he is unavoidably exposed. Here the love of country and the expectation of being crowned with glory ought to animate him to bear every deprivation with heroic fortitude without a murmur. Hunger, it is true, is an imperious want, which enervates the courage and strength, but the love of glory should make up the deficiency of stimulus from food; in these deprivations, officers should always participate; examples of this kind pass like electricity among all classes of troops. The hope of supplies arriving should always be cherished.

Good Bread

Is an article of importance among troops; it is considered of so much consequence in the French armies that, I am informed, bake ovens are fixed on travelling carriages to accompany them. Bread for soldiers is frequently made of a mixture of one fourth or a third of rye, with two thirds or three fourths of *wheat*. By the mixture of bran the bread is said not to digest

so quickly, consequently keeps the digestive powers longer in action, and renders frequent calls for food less necessary; "by the mixture of rye with wheat flour the bread contracts an acid taste which makes it refreshing." This is the usual mode of making bread for the French army. But I presume that American soldiers are perfectly satisfied with wheat bread without *any admixture*. Bread should be *light* and *well baked*, otherwise it is apt to produce acidity and flatulency in the stomach.* The ra-

* The Enquirer gives a letter from Mr. Haggitt, Prebendary of Durham, to the bishop of Durham, in which he discovers the advantages to be derived from making bread with bran water. The experiment was taken from an ancient work. After boiling the bran the strained water was put into the bread. From one experiment he thus reports: from the strained water in which five pounds of bran had been boiled, he kneaded fifty six pounds of flour with the usual quantity of yeast and salt. When put into the oven it weighed above eight pounds more than bread kneaded in the common way, and after two hours' baking it yielded above eighty three pounds, and in the common way only sixty nine pounds, so that the increase is one fifth of the usual quantity of bread. This is accounted for from the consistency, quantity and glutinous nature of the water used, which is less subject to evaporation. The bran had gained twelve pounds, and was better for the use of pigs and poultry, as probably it becomes more nutritive, as rice, when incorporated with water. It is a subject which at

tion of bread should never be less than a pound per day. In the French service it varies from a pound and a half to two pounds (*poids de marc*) according as it is issued with or without meat, pulse, &c. Bread is certainly one of the most valuable articles of diet; it is frequently agreeable to stomachs that loathe every other kind of food and is alone extremely nourishing. Bread should be *twice baked* for soldiers who are going on an expedition; it will then continue sound for a month; or biscuit may be issued; both are very proper when there is no furnace for baking near the army. In damp weather, if bread be not baked daily, it becomes mouldy and soft, consequently injurious to the health. I have seen, in many places in the Mediterranean, a species of *rusk*, which would be very convenient for soldiers to carry. It is of a middle state between *ship biscuit* and *fresh bread*, and will keep for a considerable length of time; when put into water it becomes spongy.

once appears to deserve attention, and as it is an old experiment, the history of it would be useful, as it might show how far it was adopted, and upon what account it fell into disuse, and has been so long forgotten. It is truly in the Rumford style of discovery, and claims examination.

Relf's paper.

“ Pure white bread nourishes more, but opens less, than coarse or brown bread; but the latter, though it does not nourish so much, keeps the body opener. Leavened or fermented bread passes freely and easily through the body, and is consequently light in digestion; but though the stomach can subdue unfermented bread, and though it is more nourishing, yet it is heavy in digestion, and does not pass off so freely.”*

The choice of grain, the preparation of the flour, and a frequent examination of the magazines where the bread is made for an army, are necessary to detect frauds which are too often practised with impunity. The least negligence or fraud in preparing this very necessary article of a soldier's diet should not be overlooked; it should be made a criminal act to add plaster of Paris, chalk or any foreign matters to the flour of which the bread is made. Among the Sicilian troops great attention is paid that there is no deception of this kind; but the bread, at best, is miserably bad, being composed of a large proportion of bran. The magazine or public bakehouse for the garrison of Syracuse is under the direction of a *commissioned officer*.

* Hippocrates.

The ration of *meat* is another article which demands rigorous attention. The quantity usually allowed of fresh meat is from eight ounces to a pound and a half; it should be of a good quality. Beef is generally issued. It is worthy of remark that "beef issued immediately after the animal is slaughtered, while it is yet warm, *loses* considerably of weight, by which the soldier is deprived of a part of his ration." But the loss of weight is not worthy of consideration provided *the meat be good*, and that the animal did not die in consequence of disease, or was not slaughtered when diseased. It is therefore advised by Dr. Revolat to examine with scrupulous attention, the beeves, sheep and other animals, before they are killed, to be assured that they are not in a diseased state; if they are, they should be *rejected*. The doctor is very particular on this head. He observes that the eyes should be lively, the gait easy, the appetite natural, the skin smooth and even, and the animals generally speaking embonpoint, to render the use of them salutary: on the contrary, the eyes dull and languishing, the head drooping, brown or livid spots on the roof of the mouth, the gait slow and apparently painful, the hair bristly, the body lean, &c. are sure signs of a diseased state, and ought not to be

killed for provisions;" and I will add that the state of *the excretions* will sometimes furnish us with proper grounds for rejecting animals destined for the use of soldiers. If *necessity force* the use of animals that are diseased, we should have recourse to acids and vegetables to correct their pernicious effects. Salted beef and pork are sometimes issued to troops in garrisons; these should not have the appearance of having been salted *more* than *one* year; after this period they become very hard and indigestible, and afford very little nourishment. The latter becomes rusty; and the former, when cut, presents a bluish, hard, shining surface. "Pork has sometimes been forbidden in camps. Sanctorius says it retards perspiration; and as it corrupts sooner than beef or mutton, it may be presumed to afford less proper nourishment when there is a tendency to putrefaction; it certainly, however, constitutes more than one half of the animal food consumed by American farmers, and when mixed with vegetables is found to be very nourishing and wholesome diet."

Tainted meat should *never* be issued, unless from *absolute* necessity. It should then be boiled with charcoal, ashes, or a little ley, or potash.

Vegetables,

As I have already remarked, ought to make a part of a soldier's ration, especially *in garrisons*. Indeed I see no reason why troops might not be supplied with some of the cheaper kinds of vegetables in camp. It would ultimately, by the preservation of the health of men and consequently reducing the number of objects to be supported in an hospital, prove a saving to government, though the ration should cost a few cents more. I have already hinted at the propriety of diminishing the quantity of meat in *hot weather* or *hot climates*, and of issuing vegetables in lieu. A certain portion of cabbages, potatoes, onions, turnips, beans, peas or rice might be occasionally served out with fresh meat, and *always* with salted beef or pork with great advantage on the score of health. For example, for forty men, thirty pounds of meat or less might be issued, and the value of the deficit might be expended for cheap vegetables. These boiled with the meat would make a sufficient quantity of good soup. Besides, the addition of vegetables gives an agreeable acidity which corrects that tendency to scurvy, which soldiers confined in garrisons are

subject to; even celery tops, which are frequently thrown away by those who attend markets, would make a grateful addition to soup. Beans, peas, and potatoes are principal articles of nourishment, which are readily procured, and next to meat and bread, are the most nutritive, and ought to make a part of the provisions of men, especially in garrisons. Many of the above articles may be preserved for winter.

Among the grains which offer for the nourishment of soldiers in garrisons or camps, when the common provisions of an army are reduced, *rice*, barley, Indian corn and the different preparations of these with wheat hold the first place.

Rice simply boiled, or made into flour (when it occupies a much less space than the grains and may be preserved for years in salt petred casks) is a valuable article of diet and readily cooked, especially, when in the form of flour. The flour would be an important article for moveable or permanent hospitals. Barley ground into flour may also be preserved for a long time in tight casks. When it is used, a small quantity should be mixed with cold water, then added to boiling water and stirred to keep it from forming a "*pudding*." It should

continue on the fire half an hour, when it will be fit for use. It is very serviceable in armies; and is said to *prevent dysentery*. Indian corn, with which our country abounds, affords nourishment to most of the Indians on the frontiers; its use is also very common in the southern states. It contains a great deal of fecula and saccharine matter, and is a very pleasant and nourishing food; it is unnecessary to point out to my countrymen its utility or the mode of preparing it.

Among the recent discoveries in articles of diet, none claim more attention than that of Dr. Papin, improved by the celebrated French chemists, Darcet, Pelletier, &c. and simplified by Cadet de Vaux. I mean the process for extracting the *gelatine of bones*. An instrument for this purpose should be furnished every *fortification* to be used when *necessity* requires it; it would be of immense utility in besieged places where there is a scarcity of provisions or a *probability* of it; the besieged might then begin to economize by preparing the bones of animals for food. The bones should therefore be *preserved* in every fort or garrison besieged. They should be reduced into powder or a species of paste, and boiled slowly in water to extract the nourishing part.

The bones of cows or oxen furnish a broth of a good quality, to which beans and aromatics may be added. Fish bones may also be used. *One pound* of bone gives *three ounces* of fat, and *eight ounces* of dry gelatine, which, dissolved in three pounds and a half of water, forms four pounds of the consistence of jelly. These four pounds of jelly will serve to prepare *twenty four bowls* of broth to which powdered barley or rice might be added with advantage. This economical plan might also be employed with advantage in hospitals where a sufficient supply of meat cannot be procured.

The application of gelatine to alimentary economy is also of immense importance in *large* cities, where the means of obtaining subsistence are difficult.

The ration of the troops of the United States, fixed by act of congress, consists of

1 $\frac{1}{4}$ lb. of fresh beef or 1 lb. of salted.

$\frac{3}{4}$ lb. salt pork.

18 ounces of bread or flour.

1 gill of whiskey: and for every hundred rations,

4 lbs. of soap.

4 qts. of vinegar.

1 $\frac{1}{2}$ lb. of candles.

2 quarts of salt.

The quantity of soap is not sufficient for a soldier to keep his clothing and person clean, which doubtless is an important point in the preservation of his health: the quantity allowed being very little more than *half an ounce* per man.

With respect to the component parts of the ration, I think it defective without an allowance of vegetables or pulse occasionally, especially in garrisons.

ON THE
DIFFERENT THEATRES OF WAR,
AND THE MEANS OF CORRECTING THE
INFLUENCE OF CLIMATE.

THE sudden transition from the bosom of cheering plains to the centre of marshes or to the summit of sterile mountains; from temperate to burning regions, to which the soldier is exposed, evidently points out the necessity of guarding him against their pernicious influence. In passing from a cold to a hot climate, the first effects which occur to be considered, are produced by heat. Head-ach, nausea and an increased velocity of the pulse are the most common. The arterial system sometimes suffers considerably from expansion, and the increased frequency of the action of the heart; hemorrhages from the nose are common; and if the subject be predisposed to phthisis, hæmoptoe is frequently the consequence. A fullness is felt in the body and limbs until the vessels accommodate themselves to the rarified fluids, or the quantity of their contents be diminished by natural or artificial means. Those who perspire freely are less sensible of the ef-

fects we have described; whilst others complain that "their skins are so hot that they cannot sweat;" these persons suffer very much unless relieved by bloodletting and purging. I have felt this sensation and relieved myself by sponging my body and extremities with vinegar and water, lukewarm; which appeared to bring the cuticular vessels to the sweating point.

Perspiration acts by diminishing the volume of the contained fluids and producing cold by the evaporation; the body however ought not to be suddenly cooled by exposure to a current of air. Perspiration and evaporation are of immense importance in the animal economy. In order to guard soldiers against the pernicious effects of heat, nothing is more absolutely necessary than a strict regard to temperance in eating, and particularly in drinking; excesses in either are attended with the most pernicious consequences; hence it becomes the duty of their officers to enforce their compliance with what is proper, and to preclude them from obtaining that which is hurtful. The ration of meat should be diminished, and plenty of vegetables issued in *lieu* thereof. The allowance of spirit might also be changed for some agreeable beverage; molasses and water, acidu-

lated with vinegar or cream of tartar, would be very beneficial. The spirit *should never* be drunk alone. The men should not be exercised during the heat of the day; and the sentinel duty should be shortened. I have already remarked that the uniform for summer or warm climates should be lighter than that which is usually worn, and have recommended thin flannel shirts; when these cannot be procured, *thin cotton* shirts, which may be manufactured in the United States, will answer the purpose of preventing the bad effects of the sudden changes of the atmosphere, and perhaps would not excite so much cuticular irritation as flannel. The cloak which I have recommended in the place of a blanket might also be made of *coarse flannel* of American manufacture, and may be worn to sleep in, or when exposed to the moist atmosphere after sunset. The men ought never to be suffered to sleep in hot or damp situations. The most certain preservative, against the effects of a warm climate, is the diminution of the plethora which accompanies men from northern climates, either before their arrival, or *immediately* after, by a change from a full diet, a dose or two of sal: glaub: and by venesection. The limits of this treatise will not permit me to enter fully into

the consideration of the effects of hot climates on the health of soldiers; but from the observations which have been made by judicious writers, I am of opinion that a proper *selection* of troops ought to be made for the service of warm climates. Men, who have passed the fortieth year of their age, and *whose habits* of life are *fixed*, would be preferable for the most southern stations in the United States; if recruited in the vicinity, where they are to serve, the greater will be the advantage; as they have been already acclimaté or seasoned. Men in colder climates begin to lose their activity and strength after forty five; they consequently would be, in some measure, renovated by being transplanted to a southern climate and would make good soldiers;* whilst the young and plethoric might be employed with advantage in the northern states. I need not say what the consequences would be of recruiting young men in the extreme northern parts of the United States, and transporting them to the southern extremity of the union to undergo the vicissitudes of a campaign *during the summer*

* It is therefore not necessary to discharge soldiers when they arrive at the age of forty five years.

months; they must be obvious to every one, who will reflect for a moment.

To guard against the inclemency of the winter, warm clothing is of primary importance; flannel shirts, as I have already remarked, worn next the skin, will keep a man much warmer than double the quantity of covering over a linen one. Sentinels should have watchcoats allowed them. A full ration may be allowed during the winter season, and beer will be preferable to the whiskey usually furnished soldiers. Plenty of fuel should also be allowed to keep the barracks or quarters *dry*. *Moderate heat* will be found most healthful.

It is not my intention to enter into a description of the diseases peculiar to warm or cold climates; this would lead me into a lengthy examination of the different questions which have been agitated relative to their causes and the varieties of which they are susceptible in their origin, progress and termination. I will, however, remark for the benefit of those who may visit hot climates, that the sudden impression made on men newly arriving from northern climates, by the various causes which produce disease, requires prompt and *bold practice* to combat it with success; the surgeon of course will consult the strength and constitution of

the patient, but he should not be intimidated by the remarks which are too frequently made, in the West Indies, against this or that remedy in use for the cure of fevers, &c. The sooner we change the given state of the system when diseased, by so much the sooner will healthy action be restored; this I know from experience; but if you wait for *a crisis*, before you employ this or that "*powerful* remedy," your patient will most assuredly be numbered with the dead.

It has been generally remarked that a removal from a warm to a cold climate is not attended with so much danger to the constitution as a removal from the latter to the former. This remark, however, is susceptible of some modification relative to the age of the individual and his physical and moral habits.

As to the *embarcation* of troops, what I shall say under the head of the means of preserving the health of seamen will apply generally to soldiers; except, that as they are not employed on board of transports, the greatest attention should be paid to prevent the indolent from skulking below; they should therefore be mustered twice or thrice a day to see that they are clean. They should be obliged to comb their heads *daily*, wash their hands, face and feet,

and shift themselves as often as possible; in short, they should be as clean as though they were going on parade. For the better preservation of their health, if the season will permit, they should bathe occasionally; for this purpose there should be a bathing tub on the fore-castle, or a rum puncheon, with one head knocked out for this purpose; if these cannot be procured, they may be bathed by pouring buckets of sea water on each other. This will cleanse the skin and preserve the tone of the cuticular vessels. For *more particular* information on this subject, I beg leave to refer my readers to M'Clean, Jackson, and Hunter, on the diseases and preservation of the health of troops.

ON THE
OPENING OF A CAMPAIGN

AND THE DIFFERENT MOVEMENTS OF AN ARMY WHICH MAY
INFLUENCE THE HEALTH OF SOLDIERS.

THE opening of a campaign presents a new kind of life to men unaccustomed to service; here the precepts, which we have endeavoured to enforce on the necessity of fortifying the constitution and courage, by habitually exercising the men in all the operations inseparable from war, and by these means rendering the body insensible to the vicissitudes of the elements, the seasons, climates and all kinds of fatigue, will be of the utmost consequence.

The change of habitation, new wants and habits are the first troubles which accompany a soldier on entering a campaign. He will suffer from forced marches, encampments in insalubrious places, and will be exposed to fœtid vapours, and perhaps obliged to live on tainted meat and to drink corrupt water. He will sometimes be obliged to sleep on the earth without shelter, in the middle of burning plains; in a marshy country, or upon the bleak mountain; he will be exposed perhaps to con-

tagious or epidemic diseases; in a word, he will be subject to all the unhappy accidents which are attendant on battles, assaults, sieges and other operations incidental to a military life. All these ought to teach a soldier the absolute necessity of avoiding every means that may injure his constitution, and prevent him from bearing these vicissitudes and deprivations with heroic courage.

A march is the first species of fatigue to which a soldier is exposed on the opening of a campaign. Marches are distinguished into forced and ordinary; the former seldom exceeds twenty five miles, the latter fifteen. The first movements of an army show the necessity of the exercises which we have spoken of, and the bad effects of inactivity and indolence in garrison. Recruits, who have been accustomed to a sedentary life, will feel sensibly even a common march, when loaded with their knapsack, blanket, musket and accoutrements; but if they had been brought *by degrees to this exercise*, they would move with more ease and with less depression of bodily strength.

The first days' marches subject the young recruit to a painful trial; tortured perhaps by *tight* uniform, by his knapsack, utensils and war equipage, he will almost succumb under

the weight and heat, in the midst of dust; or perhaps suffer from the effect of cold, rain, snow or hail in a road almost impassable.

At the place of encampment should the baggage waggons *fortunately* arrive with the tents, they are to be pitched; wood, straw, water, provisions and forage are to be procured, before a soldier can take refreshment from diet or sleep. Taking all these circumstances into view, they point out the necessity of regulating the first movements of an army, to inure the young recruits by degrees to the changes and fatigues they must undergo, inseparable from war. It appears difficult to prevent, or correct promptly, all the disorders which are occasioned by the first movements of an army. It is of the first importance that all *excesses* be prevented. The season, the hour of forming the line of march, the *order* in marching, the halts, the necessities occasioned by hunger and thirst, the cleanliness of soldiers, their lodgings, the time of retreat, their diseases and wounds are all objects which merit attention.

The first march of troops generally commences in the spring or beginning of summer, rarely during the winter season. It is of great consequence that the soldier be not permitted to skulk from the column without *real* neces-

sity; in that case he should be obliged to re-join it promptly; without this attention it will be difficult to keep men within bounds. Under the pretext of getting a drink or attending to the calls of nature they will maraude,* or commit excesses in villages or at farm houses, very injurious to their health; these calls of nature, &c. are generally *more powerful* when they arrive near a farm house or village.

The marches during the summer season should be ordered early in the morning; that the men may not suffer from heat; a moderate pace ought to be directed, unless, as before remarked, necessity require the men to arrive at a place in a given space of time. The march should be so regulated that the men may arrive at their destination in time to permit them to procure bread, water, wood, &c. to repair their strength, cleanse themselves or dry their clothing. When circumstances make a *winter* campaign necessary, the marches should not commence before sunrise. It has been generally remarked that a soldier will resist for a longer time the effects which the temperature of the air occasions, if he be permitted to take

* Marauding is the cause of *all disorders*. Inst. Milit. du roi de Prusse.

his nourishment and drink a glass of brandy or other spirit before he marches: this may be the case in the winter season, but I know from experience that a man can travel with more ease and alacrity if he takes but a *very light* breakfast without the use of spirituous liquors, which is a bad custom and ought never to be encouraged. The distance intended to be marched should be completed *before* he dines; he may perform double the distance in the morning without eating, that he can after eating a *hearty meal*.

A halt is often necessary in the middle of a march that the soldier may be enabled to breathe at ease; but he should not be permitted to lie down in cool, damp situations; or to throw open his vest or shirt to expose his breast to a current of cool air. The sudden check given to the perspiration by this imprudence is frequently the cause of pulmonic affections and diseases of the bowels. Officers ought never to permit their men, either *during ordinary* or *forced* marches, to drink freely at wells or cold rivulets without previously washing their hands and face and rinsing the mouth and eating a morsel of bread, and even then, a small quantity only ought to be taken. Whenever a soldier feels any disagreeable effects from tak-

ing a draught of cold water, he should take immediately a small quantity of whiskey or other spirit, and lose no time in sending for the surgeon or his assistants; neglect to make early application for relief has caused the death of numbers. Neither should they be suffered to drink any bad water that they may meet with: the waters of rivers, creeks, or rivulets exposed to the sun will be preferable to cold spring water, provided they be not filled with impurities, which is frequently the case after heavy rains; a small addition of vinegar may be used with advantage. Forced marches are *seldom* ordered except on pressing occasions to surprise an enemy or to take a favourable position. They are extremely inconvenient and fatiguing to new raised men and are frequently the cause of disease; they should therefore be conducted with prudence, that the men may be able *to act* on arriving at the point desired. The soldier should not be destitute of nourishment in his knapsack, or of a little stimulus in his canteen, which, when used, should *always be diluted* with water.

*Of the formation, position, salubrity, mode of
living and duty in camps.*

HAPPY is the general, says Colombier, who can unite *health* with *security* in his camp. It is therefore desirable to make choice of such situations as will be favourable to the army, and advantageous for the preservation of the health of troops.

The formation of a camp is conducted with ease and promptness when the place is previously fixed on, and the weather good, the camp equipage near, and the *enemy at a distance*. It is far otherwise when an army has performed its route in tempestuous weather; even when the soldier is borne down by a fatiguing march and has braved the rigours and changes of the weather, he is obliged to pitch his tent, draw straw and forage, and cook provisions before he can take rest, and perhaps not then, if he should unfortunately be on the roster for duty. For the preservation of his health and to refresh him, before he takes his rest, he should cleanse himself from mud or dust, dry his feet, and if the skin be inflamed and swelled, he should wash them with a little cool vinegar

and water; he should dry his clothing by the fire or in the sun, if wet by perspiration or rain, and by no means sleep in them, if it can be avoided; he should wash his face, mouth and eyes in cool water, which will refresh him and enable him to partake of his ration.

When the retreat is beaten, every man off duty should repair to his tent to sleep, that he may be enabled to bear the fatigues of the ensuing day; no riotous *drinking assemblies* should be permitted in *any* of the tents.

The first and most important object which should engage the attention of the general and the officers of health, whom he may consult on the site for the formation of temporary or fixed encampments, is the nature of the soil, its elevation, declivity, its inequalities and proximity to woods, rivers, marshes, towns and the field of battle; the quality of the water and the ease or difficulty of procuring a sufficient supply for the camp; its purity should be examined by chemical tests, which the surgeons should have in their possession. Dr. Jackson very justly remarks that it has been known for many ages, that the cause of intermitting and remitting fevers, the most formidable diseases of hot climates, owes its origin to exhalations from swampy and moist grounds. It often hap-

pens likewise, that those low and swampy grounds are the most accessible parts of a coast, or that towns and settlements have been placed near them; to attack or defend which falls to the lot of the soldier. It not being therefore in the power of a military commander to remove the natural disadvantages which I have mentioned, it is only in his power to show his judgment and attention, by applying the best remedies to obviate their effects. It is certainly an object of the utmost consequence to preserve troops in a state of health fit for action: and no person will deny, that every care ought to be employed in choosing the best situations for quarters, or even temporary encampments, that the nature of the duty will permit. We learn from experience that fevers are little known in rough hilly countries, where water flows with a rapid course; while we likewise know, that they are common in low and champaign countries, where water stagnates, or has only a sluggish motion: independent of which, those situations, which are in the neighbourhood of swamps or near oozy banks of large rivers, have always been observed to be particularly liable to such diseases. If therefore the circumstances of the service do not forbid, no room can be left to doubt about the proprie-

ty of stationing troops in the mountainous or hilly parts of a country; while I may likewise add, that where necessity confines them to a plain, the sea shore will in general be found to be the most eligible. But, besides the above general character of local situations, there are likewise some subordinate circumstances, which deserve to be particularly attended to in choosing the ground of encampments. It is very commonly believed that high and elevated situations are uniformly proper for this purpose; but this in fact is not by any means a general rule. A high and dry situation does not contain any thing hurtful in itself; but it is more than others exposed to the effluvia which are carried from a distance. It is the peculiar nature of exhalations to ascend as they proceed from their source; in confirmation of which truth, I have had several opportunities of witnessing, that this cause of disease was carried to rising grounds in a state of great activity; while it apparently passed over the plain or vallies which lay contiguous, without producing any material effects. From the knowledge of this fact we are furnished with this obvious remark, that it will be proper to *interpose woods or rising grounds* to the progress of those noxious vapours; or where such natural

advantages do not exist, it might be serviceable to *burn a chain of fires* in a temporary encampment, or even raise a parapet wall to overtop the barracks, where necessity requires a more permanent station. It would be a matter of utility could we determine with any certainty to *what distance* from its source the *noxious effluvia extends*; but this is a question which we cannot hope to ascertain very exactly. It is not uniformly the same in all situations, depending on the concentrated state of the exhalation at its source, the obstacles it meets with in its progress, and the nature of the ground over which it passes, or to which it is directed. I have known its influence very remarkable at the distance of *a mile and a half* on the top of a hill of very considerable elevation. Sir John Pringle has recommended open grounds for encampments in preference to woods; and the same favourite idea, viz. a free circulation of air, has influenced his advice. I will not contend, that *open, dry and cultivated grounds* may not be preferable to grounds covered with wood, where the heat of the climate is moderate; but I have no doubt in asserting, that encampments on lands, the woods of which have been newly cut down, as is generally the case in times of war, are of all

others the most unhealthful. Perhaps it is in a great measure owing to this cause, that new countries are generally fatal to the first settlers; as also, that troops suffer so remarkably in carrying on sieges of places which are surrounded by woods; it being constantly observed, that effluvia from moist lands, when first exposed to the action of a powerful sun, are always highly pernicious. The Romans, whose observations on subjects which relate to war may be opposed with confidence to the authority of the most celebrated moderns, were fully sensible of the advantages of encamping under the shelter of woods. We learn from Vegetius, that their armies resorted to the cover of a wood not less carefully than they avoided the vicinity of swamps or marshes. If troops are encamped in the body of a wood, the noxious effluvia, which may be carried by the winds from the neighbouring swamps, are stopt in their progress; the shade of the lofty trees preserves the air cool and more refreshing than the atmosphere of the open country; while we know from experience, that moist and swampy lands do not send forth their noxious vapours in any remarkable degree, unless where they are acted upon by the heat of a powerful

sun.* Portius, Ramazzini, Pringle and most authors who have written on the diseases of armies attribute, as a principal cause of those diseases which have a putrid character, the odour and fœtid emanations from the excrements of the men and beasts in camp. Moses, the divine lawgiver, was highly sensible of the propriety of cleanliness in a camp; he therefore issued his orders to the Jews, as every general should, who is anxious to preserve the health of his troops. His orders were, thou shalt have a place *without* the camp, whither thou shalt go forth abroad; and thou shalt have a paddle upon thy weapon, and it shall be when thou wilt ease thyself abroad thou shalt dig therewith, and turn back and cover that which cometh from thee.† This order will be of the utmost consequence when dysentery prevails in camp; indeed a frequent change of encampment is sometimes necessary to stop its progress. Dr. Pringle recommends the digging of deep *pits for privies* in camp, and the covering of the excrements with earth daily, until the pits are nearly full, when they are to be filled entirely with earth, and new ones

* Jackson on Fevers.

† Deuteronomy, chap. xxiii.

opened. In fixed encampments the tents should be struck or thrown open in fair weather, and the straw turned and aired; it should also be frequently changed to prevent it from becoming putrid and engendering pestilential miasmata.* A piece of coarse painted cloth of the square of the tent might be advantageously employed for the preservation of the health; it should be laid on the earth to prevent the humidity arising therefrom; dry leaves may be used instead of straw. The tents during very

* A patent was granted last year to John Maberly of Middlesex, "for making and constructing tent-poles and other machinery, so as to expel and carry off noxious and contaminated air by a readier and more effectual ventilation than can be accomplished by the tents in common use." Vid. Repertory of Arts, vol. II. second series.

The plan appears to me to be very useful in wet weather, when the tents cannot be thrown open for ventilation. It may, however, be simplified. The upper ends of the tent-poles are hollow, and have small holes in their sides; the rarified air will rise to the most elevated part of the tent and will pass through these holes into the open air; by these means the ventilation will be promoted and kept up with more or less rapidity in proportion to the elevation of temperature; that is to say, in proportion to the necessity there may be for ventilation. A curved tube formed of leather or tin inserted in the top of a tent or marquee will answer the purpose of ventilation I conceive as well as hollowed tent-poles.

hot weather may be covered with the boughs of trees. During the winter season, the tents should be pitched with the openings towards the south. Soldiers should not be permitted to eat in their tents, except during bad weather. It is necessary to change encampments occasionally to prevent the bad effects of the concentrated miasmata, which constantly exhale from the bodies of men and animals. Alius Sejanus, a Roman general was so much impressed with the bad consequences of encampments near cities, that he ordered his camps distant from them and villages, that the soldiers might have *no* communication with the inhabitants, by which he prevented disorderly conduct among his troops and preserved their health.

We may be sometimes deceived by the appearance of the soil of a country; it may look dry and healthy, when in fact it is neither. Sand a few inches in depth on a hard clayey soil may conceal the water which has filtered through it, and will consequently be unfit for an encampment. This may be discovered by driving a tent-pole into the earth and withdrawing it, the water will rise in the aperture. All low grounds, covered with aquatic plants are also improper for camps. Cold weather

enables us to encamp in the vicinity of marshes with impunity.

As it is extremely dangerous for troops to encamp in places where the air is vitiated by putrid exhalations, it may be of consequence to remark that, we may very generally form an accurate opinion, as to the salubrity of situations, from the appearance of the inhabitants, their complection and the size of their abdomen. There is a tract of country, but a few miles in extent, not far from Syracuse in the island of Sicily, from which, I never saw a person, who had not a *swelled abdomen* and an *icteritious appearance*; and, where I have been informed, no European ever remained a single night without being attacked with an intermittent or bilious remitting fever. I have passed through districts in the United States, where I have observed a sallowness in the complexion of the inhabitants; and have remarked, that an enlargement of the spleen was common among children and young men. No dead animals and offals from the slaughter grounds should be suffered to remain *unburied* in the vicinity of the camp. To conclude this part of our subject, we may remark, in a few words, that a camp should be spacious, dry and well ventilated; the tents should be large and separated

at a greater distance apart than usual, and trenches should be opened around them to carry off the rain; they should be occasionally thrown open to dry the straw; the utmost *degree* of *cleanliness* should be preserved in the arrangements of it; and in the appearance of the men.

The *rations* issued, *ought* at all times to be composed of articles that are perfectly *sound* and *merchantable*; indeed, if otherwise, I have no hesitation in declaring, that they should be rejected, after having been *regularly surveyed*; as I am confident it is not the intention of government, that such articles should be received. There ought to be no excuse for the issuing of tainted or wormeaten articles; or beef and pork which have been salted for *several years*, or which have been two or three *East India* voyages, except in towns or garrisons, that are besieged. No part of the ration allowed by government should be retained from soldiers except by order of the commander in chief, for the preservation of the health of the army, or when a *scarcity* prevails; the soldier should then receive the value of the retained articles in money, if others be not issued in lieu; due bills I disapprove of, as they may *be lost* by the soldier; the more that are lost the grea-

ter will be *the gain* of the contractor. That very necessary article, *vinegar*, ought never to be retained. The officers should always see that justice be done the privates under their command; it is not only, I conceive, their duty, but humanity dictates it. What can be more gratifying to a soldier than to see his commanding officer anxious for his welfare? Who would not prefer fighting under a man of this description, rather than under one, who is indifferent to the wrongs to which soldiers are exposed?

Mounting Guard.

The mounting of guard in camp is less toilsome than on advanced posts; in both, the soldiers are exposed more or less to the intemperature of the air. Dry leaves and fire are their only remedies against cold and moisture. Sentinels in cold weather should be frequently relieved; and they should receive orders, when on post, to be continually in motion, lest they suffer *from frost*. The hospital guard ought not to be suffered to have any communication with the sick, especially if there be contagious diseases therein. The duties of the guard at the general quarters are less toilsome and dangerous, and occasions for debauch are less fre-

quently presented. I have already remarked that every sentinel should be allowed a *watch-coat*.

The health of troops depends very much on the regularity preserved in camps, and in enforcing strictly all the wise regulations that may, from time to time, be issued by the commander in chief. Exercise is an object of the greatest importance, but unfortunately it is too little attended to; those exercises only, which contribute to the preservation of the health of troops, should be encouraged. Dr. Jackson in his valuable treatise on fevers observes, "that the essential art of disciplining troops, consists in implanting sentiments of heroism and virtue in the minds of the men, in improving the exertions of their limbs, and in acquiring a knowledge of the correspondence of their exertions when called into action." The doctor thinks that the ordinary exercises are flat and insipid in their nature, that they occasion no exertions, and excite no emulation: they neither improve the active powers of the body, nor inure the soldier to bear fatigue and hardship. "The Romans, who owed more to the discipline of their armies than any nation on earth, were extremely rigorous and persevering in their exercises. They practised their soldiers in every spe-

cies of service that might occur; so that nothing at any time happened with which they were unacquainted. Actual war was to them a time of relaxation and amusement. The Romans were not only sensible of the advantages which those habits of exercise procured them in action; but had also the penetration to discover, that they were eminently serviceable in the preservation of health. I observed, when the men were in the field, sometimes even complaining of hardship and fatigue, that few were reported in the list of the sick: when removed to quarters, or encamped for any length of time *in one place*, the hospital was observed to fill rapidly. This observation was uniformly verified, as often as the experiment was repeated." These remarks point out the bad effects of indolence in camps, therefore the men should be encouraged to take exercise by the example of their officers or by small premiums to those who excel in leaping, running, wrestling, &c. *Excess* however should be guarded against in hot weather and *during sickly seasons*, when the seeds of disease may be excited into action by fatigue.

Bivouacs.

By *bivouacs*, I understand an extraordinary night guard for the security of a camp; or that situation of an army when it is under arms all night. Dr. Revolat defines it the situation of troops during the night, when they are exposed to the air *without tents* or *barracks* to oppose the enterprise of an enemy, as well as to prevent ammunition and other supplies from entering a place besieged, also to prevent the surprise and attack of a camp.

The bivouacs expose the soldier to many calamities; his intemperance, his imprudence and the state of the atmosphere, very often, in this position of an army, become the germ of an infinite variety of diseases. On this account the necessity of attending to the precepts proper to guard them, ought not to be forgotten; even in a temperate season, during clear weather, the bivouacs are not exempt from danger, and may occasion catarrhs, rheumatism and other diseases which proceed from a suppression or diminution of the perspiration, or a determination to the internal organs.

To *obviate* the inconveniences inseparable from this position of troops, and to prevent the

baneful consequences, we should advise the soldiers never to lie down immediately on the ground, but to cover their bodies; for, although clothed warm, the dress will suffice only to guard them against the cold during the day, but will not be sufficient for the night. The cold moreover is much more sensibly felt after sunset; and this is the period in which changes most frequently occur in the temperature of the air in our climate. These circumstances point out the utility of the cloaks, I have recommended, also the woollen caps with wings to cover the shoulders. If the soldier have not these articles of covering, I would advise him to sleep but for a short period, and to take exercise after waking; indeed, it will be more prudent not to sleep at all, but to keep in continual motion.

Bivouacs are less dangerous, when soldiers can lie with their feet towards a fire, with their heads upon their knapsacks; but this can be rarely practised, as the fires would point out to the enemy the situation of the troops. Dr. Colombier has frequently observed, particularly in 1797, during a rigorous winter, when the earth was covered with snow, and the rivers frozen, that soldiers, who were kept in motion or marched, suffered

less than those, who lay with their feet to the fire, for they burnt one side of them, whilst the other was frozen. The soldier, when he feels his hands or feet benumbed by frost, ought not to approach a fire except by degrees; they should be rubbed with *snow* or put *into cold water*, but never *in hot*.

It will be proper to distribute oil to anoint the parts, which may be exposed to the cold. Xenophon and Hannibal caused it to be used with great advantage among their troops, to guard them against the action of cold. This application is also said to be useful, when soldiers are obliged during a cold season to work at intrenchments and other manual labour, with the precaution, however, of washing the parts greased or oiled, with warm water, immediately after the necessity for the preservation ceases.

The Greeks, in their retreat under Xenophon, having arrived at the mountains of Armenia, were obliged to encamp without tents or coverings: a great quantity of snow fell during the night; the soldiers were covered by it, arose with difficulty and were benumbed with cold. This repose had near been fatal to them, had not Xenophon excited them by his example to cut wood and light up fires; they then rubbed themselves with greasy substances,

which they happily found in that place in great quantities, such as hog's lard, oil of almonds, &c. and turpentine. They also readily procured pomatums made with these different substances which they used. (Xenoph: retr: des dix mil:)

The Carthaginians proved, on a similar occasion, the success attending the use of oil to *preserve* and likewise *remove* the effects of frost from different parts of the body. The soldiers of Hannibal, after having pursued their enemies, and suffered by a considerable fall of rain during the following night, their bodies became stiff and immoveable by cold. Hannibal caused fires to be made opposite the tents, and distributed *oil* to the soldiers to rub their limbs. (Tit. Liv. lib. 21.)

The inhabitants of northern climates make themselves less sensible to the effects of cold, and march for a long time in snow without being incommoded by it, by greasing occasionally their hands, face and feet. Kryger advises mutton suet boiled with strong beer in preference to oil and attests the most quick and remarkable success from its use.

Soldiers on expeditions without tents, &c. should be well clad; they should have a sufficient allowance of provisions ready cooked. Fat meats are generally considered more nu-

tritive than lean; hence, doctor Jones* observes that two ounces of suet will afford more nourishment than eight or ten of lean meat; and consequently in long marches, through uninhabited countries, a soldier's provision might be rendered much lighter, by taking only *suet* or *fat pork* with his biscuit. A small quantity of spirit may also be distributed with advantage, but it should never be taken in an unmixed state, except during damp cold weather.

* Jones on gun shot wounds.

ON THE
PRESERVATION
OF THE
HEALTH OF SEAMEN.

WHEREVER men are collected together, it is necessary to superintend the healthfulness of the enclosure within which they are assembled. Much depends on the officers of a ship of war or transport for the preservation of the health of men under their command.

When a ship is to be put in commission, she should be thoroughly cleansed, and fires placed during the day in the hold, berth deck, *well*, and other parts to dissipate moisture; after which, the beams, sides and carlins of the berth deck should be white washed with lime. In the selection of ballast, care should be taken to procure that which is perfectly free from *mud* and animalcula: gravel should be preferred; it ought to be frequently washed before it is used. The water casks should be cleansed

before they are filled. The greatest regularity should be observed in fitting out a ship, that no excesses be committed by liquor smuggled on board.

The berths for the complement of men should be marked off and numbered, that each man may take possession of his berth immediately on coming aboard, and be supplied with a hammock, numbered to correspond to the berth allotted him; by this means, much confusion will be prevented and the men will not be obliged to lie about the decks at night, to the great injury of their health.

All *unnecessary* fatigue after night should be avoided, as it exposes the men in most of our rivers to the pernicious effects of the miasmata arising from marshy shores and heavy dews, during the summer and autumnal months; fatigue predisposes them to their operation and renders them frequently unfit for service for weeks after leaving the anchorage.

The consequences of meeting an enemy immediately on going to sea, with a fourth or more of the crew sick from this cause, or reduced by diarrhœa or dysentery from drinking the *impure river water from along side*, must be obvious to every one, who will reflect for a moment. Therefore nothing but the most *ur-*

gent necessity should induce a commander to employ his men in our rivers after night; from the dawn of day until twilight affords sufficient time for labour.

Upon the first fitting out of a ship, the men should be examined with the most scrupulous attention, that the disordered and infectious, or foul ulcerous persons, may not be admitted.* In this duty, the *medical officer* must pay the greatest attention, by which, he will discover more craft than he was aware of, for many will put on the air of healthy alert fellows, who will not *bear examination*.† As land-

* For this purpose an assistant surgeon should attend the rendezvous to examine every man, who may offer to enrol himself. As it is a very disagreeable task, especially during warm weather, he should receive an additional compensation for his services; independent of the disagreeable duty of "overhauling" men of this description, and the confinement in a room where numbers are waiting to enter the service, he certainly runs a great risk of his health.

† Young hearty men should be preferred. "Old worn out men are generally very inactive and troubled with some *bodily disorder*, the greater the number of these, the more unhealthy the crew is in general. By their groans and complaints they deprive those who are near them of their natural rest, and impregnate the air they breathe with noxious exhalations, which are of the most prejudicial consequences to those who are well."

men, who ship, are generally speaking of that class, who are too frequently inattentive to personal cleanliness, they should be directed, when they receive their advance wages, to supply themselves with clothing and to cleanse their persons; if they do not, this very necessary instruction should be enforced immediately on their arrival on board ship, their old dirty clothing, if of no value, should be thrown overboard, otherwise it should be immediately cleansed; their bodies should be washed with soap and water; their hair, if it has been neglected, should be cut short; *and if necessary*, they should be delivered over to a *boatswain's mate* to be scrubbed, the head shaved, and a supply of clothing issued from the purser's stores. These precautions are very necessary; as it is impossible to know from whence men of this description come, they may be the means of preventing a train of diseases which sometimes make great havoc amongst the crew. After the crew is organized, no strange man should be received on board without these necessary precautions respecting the cleanliness of his person and clothing; the writings of naval physicians afford us abundant testimony of the danger of an indiscriminate reception of men of this description; although they may

have the appearance of health, it has been known that, even when no disease could be suspected in the stranger at the time, sickness has afterwards broken out, which could not be otherwise accounted for. One instance of this kind occurred in a ship to which I was attached. Typhus gravior with the most malignant symptoms was the consequence. Men, who are in reality seamen, are seldom found in the state we have described; with few exceptions, landmen are generally the most inattentive to personal cleanliness.

Having made these preliminary remarks, I will proceed to consider the means which have been found most conducive to the preservation of the health of a crew, after it is organized, and the general causes of disease. In considering this subject, I shall frequently consult the most respectable writers on sea diseases, and add such regulations as may be applicable to our service. I will first proceed to the consideration of air, cleanliness, clothing, and diet; and conclude by making a few succinct remarks on that part of naval discipline, which relates to the preservation of health.

Air.

AIR, that continual pabulum of life, justly commands our primary attention. The air of the atmosphere, which we breathe and in which we live, has long since been proved, by the labours of celebrated chemists and philosophers, a compound of oxygene, azote and carbonic acid gas. The atmospheric air respired and again respirable contains a less portion of oxygene, but the diminution is not so great as we have been hitherto led to believe. We are highly indebted to the experiments of Messrs. Seguin, Humboldt and Gay Lussac for this information, which I have noticed under the head of hospitals. The atmosphere at sea is considered *purser* than on shore; this is true, so far as it respects the absence of the effluvia, which are common to cities, arising from the putrefaction of animal and vegetable substances; but it does not possess, as we have already said, a greater proportion of oxygene (pure air.) Many experiments have been made on the air at sea, and in various places, on lofty mountains and on plains, which prove, that the air, whether at sea or on land, and even in

hospitals crowded with sick, is composed of the three gases above stated, and *in nearly the same proportions*.* Hence we must look for the cause of diseases in heat and cold, moisture and dryness, and in the different *impregnations* of the air from animal and vegetable putrefaction or to some *obscure properties* of the atmosphere with which we are unacquainted; as the the eudiometrical experiments, hitherto made, do not point out to us any material changes, which possibly could affect the constitution, except in the vicinity of marshes; and even there, the *usual proportion* of oxygene is found. But carbonic acid gas has generally been found in larger quantities, which, from its specific gravity, is more abundant immediately over the surface of marshes than in their vicinity; hydrogen gas has also been detected by experiment and considered by some as the chief agent in marsh effluvia.

Holds of ships that are not kept *clean* and *dry*, and the persons and clothing of men that are filthy, frequently impregnate the air with a noxious effluvia: from these causes, highly malignant cases of typhus have originated, which, in some climates and situations, seem

* See Appendix.

to partake of the *bilious remitting* fever common to them. The origin of typhus is so well established in the British service, that this disease is almost uniformly traced to filthy persons or their clothing; and therefore points out the necessity for positive regulations respecting the cleanliness of the ship, persons, and clothing, which ought to be *strictly* enforced. If sufficient attention be paid to this important subject, seafaring men would be more healthy, whilst at sea, provided all circumstances were alike favourable, than on shore: except the scurvy, diseases are less frequent at sea, than on making land, or coming into harbour. How far from the shore, land air, impregnated with the effluvia from marshes or putrid animal and vegetable substances, will exercise its noxious power on the constitution, in the production of disease, I am unable to decide. I think, however, that I have seen intermittents produced by the effluvia from the marshy grounds on the southern coast of the United States, when cruising within sight of land, and have observed them less common on sailing *from* the coast; but this is a point very difficult to determine, as intermittents do arise even at sea, very distant from land, which may be owing to the heat and moisture of the hold acting on vegetable

matter (timber badly seasoned) and producing an atmosphere therein resembling that of a marsh. Intermittents, according to Dr. Trotter, sometimes occur in ships, where typhus *contagion prevails*.

Although we cannot determine at what distance land air will operate at sea in the production of disease, yet it is certain that the effluvia, with which it is sometimes impregnated, may be smelt, three or four days before soundings have been obtained; this is a fact, which I have noticed in the spring of the year off the coast of the southern states. The effluvia from the pine lands was very perceptible four days before we came on soundings. A good spaniel will discover, by the acute sensibility of his olfactory nerves, a change in the air long before soundings are obtained, or the water coloured. I have seen a remarkable instance of this, the dog barked and showed evident signs that he smelled the land air by running *always* to the gangway *towards* the coast, and by frequently attempting to jump over board. Cows will bellow on smelling the land air long before the mariners have any idea of getting soundings. I mention these facts to show that we are unacquainted with the distance that marsh air may be conveyed, when not ob-

structed by trees, although it may be rendered innoxious by diffusion in the atmosphere. I believe, however, that it is a fact well ascertained that the air of marshes will operate at a distance of a mile or a mile and a half, which points out to us the necessity of making choice of an anchorage at a distance from these sources of disease, or of anchoring to windward of them: in all warm climates advantage should be taken of the prevailing winds. But if a ship should from necessity anchor near swampy or marshy grounds, and the wind blow from thence in hot weather, the gun ports should be closed; if she ride with her head to the wind, it has been usual to direct "a thick windsail to be kept up to the foremast to carry up the smoke of the galley and prevent its coming aft over the ship;" this advice, in my opinion, is not judicious. I would rather increase the quantity of smoke, when she rides in this situation; it will tend to dissipate moisture, and counteract the effects of the miasmata which are conveyed by the wind over the ship. Men should never be employed, before sunrise or after sunset in these situations, in wooding and watering; this duty is almost to a certainty the source of disease. I have never been at Prince Rupert's bay in Dominica, without having a num-

ber on the sick list with intermittents, and *remitting bilious fevers*, even when the men have been employed on this duty during the day; indeed the harbour generally speaking is extremely unhealthy.

Men who have been on watering parties should be obliged to put on dry clothing as soon as they return on board; they should never be suffered to leave the ship, when there is a probability of their being ashore all day, without their ration of food and liquor; fatigue, hunger and damp clothing render them more liable to suffer from the miasma arising from marshy situations. They should not be suffered to sleep ashore without a *covering* and *fires*.

In cold climates, except during severe frosts, the air is chiefly vitiated by being charged with moisture, rather than by any impure impregnation. This state of the atmosphere produces a general debility and relaxation of the system. It lays the foundation of obstructions, by checking the exudation from the skin; and frequently disposes to the scurvy. Hence the sick list is generally increased during moist weather.

There are many circumstances which contribute at sea to increase the moisture of the

atmosphere betwixt decks. Ships built of new or ill seasoned timber are found to be more unhealthy than others. The wood therefore of which ships are constructed should be felled before the sap rises; it is more compact and durable than when cut down during the spring or summer.

Another source of moisture in a ship is the dampness of the hold; this diffuses itself over every part of the vessel. The hold should always be kept as dry as possible, and the pumps employed so frequently as never to permit the water to collect above a few inches; this being very difficult in sharp ships, some other mode should be adopted besides the common pumps to free them from the water; in some ships, I have known the pumps "to suck" when from twelve to fourteen inches of water remained in the well.

It would be preferable to keep the hold constantly dry, if it were not for the putrid matter which is apt to collect there; the accumulation of a certain quantity of water, to be afterwards pumped out, becomes necessary to wash off whatever is offensive. The ballast should not be earthy or sandy, as it readily soaks up the moisture and filth, which it retains; but proper shingle or pebble ballast al-

lows the water to pass through it and subside, it is consequently less difficult to wash it free from impurities.

Even washing of the decks, though necessary on the score of cleanliness ought to be limited. Doctor Trotter very justly remarks, that "the nature of cleanliness is too often misunderstood; and I know of nothing of that kind which is so much mistaken, as the too *frequent* and *indiscreet drenching* the decks, and more especially those where the people sleep, with water, and particularly in cold latitudes during the winter. By this means I have known dreadful sickness *introduced*; and I have known it *removed* by a contrary practice. It would be deemed extravagant to advance an opinion that the decks should *never* be washed; but I feel no reluctance in making a direct assertion, that it were far better that they should not be *washed at all*, than with that want of discretion and precaution which so generally prevails. It has caused the death of thousands!"*

To render the air of a ship, when at sea, completely healthy, we should recommend free ventilation in all parts of her; the ports should be kept open when the weather will permit:

* *Nautica Medicina*. T. Trotter, M. D. physician to the fleet, vol. I.

the only objection to this measure is the exposure of the men which must necessarily take place in cold climates. Fire will form a proper substitute. By means of fire betwixt decks, a constant change of air ensues from the draught which it occasions: it cannot, however be used with safety in all parts of the ship. A close stove betwixt decks with a pipe to carry the smoke into the galley has been recommended, by which a smaller quantity of fuel will be necessary to dissipate moisture, and may be employed in stormy weather when open fires are impracticable.*

This free ventilation should be employed for airing the hammocks and bedding, when bad weather has prevailed for a long time. In order to air them properly, they should be unlashd; this operation should be performed regularly throughout the whole. When we consider the number of men that are generally confined on the berth deck of a ship of war, the propriety of frequent ventilation must be evident. Hence the necessity of berthing the watches alternately; that is, one half of *each watch* should be stationed below, at a different side from the other half. The men will not

* See the Appendix.

then sleep so much confined, or be incommoded by the breath or emanations from the bodies of each other. Wherever men are huddled together, and *the berth deck taken up by lumber, barrels or hogsheads of stores*, sickness will be the consequence; the interstices of the latter serve as reservoirs *for all kinds of filth*, which cannot be removed until the stores are struck into the hold, or removed ashore, and which uniformly contaminate the air. The moisture of the *well* commands also particular attention; whenever circumstances make it necessary to descend into it, a candle or lamp should be previously let down; if it be extinguished, which is sometimes the case, no person should venture into it until the noxious air be expelled. This may be done effectually by causing a current of air to pass from the windsail into it, or by letting down fire in a pot or grate. The practice of occasionally putting fires in the well is a very proper one, both to dry the surrounding parts of the vessel and to purify the air.* There should be windsails to every

* “ Nothing is so useful as this practice of having fires in different parts of a ship; when frigates formerly had their kitchens between decks, instead of being stationed, as at present, beneath the forecastle, they were more salubrious and comfortable to the seamen. So sensible are

hatchway, each one should have two legs, that the air may be conveyed from the body of the sail into the store rooms occasionally and every crevice of the ship; the magazine should likewise be aired, and the casks of powder turned; the moisture of the air penetrating the wood, decomposes the powder, and frequently renders the greater part of it useless, without being remanufactured. Windsails should be constantly kept trimmed during the night; they are more necessary then, when half of the crew are below, than during the day. A wooden tube might be constructed next to the fore and main masts to permit the air below to pass up, when the hatchways are battened down during a gale, as the air becomes insupportably oppressive.

A free *ventilation*, the use of fires to dissipate moisture, and the necessary precautions to prevent the long retention and concentration of *human effluvia* are of primary impor-

other nations of the utility of this old plan, that the French still continue their kitchens and *ovens* between decks; and the Dutch ships of the line have theirs on the *orlop deck*, which is still more salutary." The sides and beams of the berth deck should be whitewashed with lime every month. Lime should be taken to sea *slacked* to prevent accidents.

tance for the preservation of the health of a crew; neglect on this head is unpardonable.

In situations ashore, where the effects of noxious air cannot be avoided, all practicable means should be adopted to prevent the pernicious impressions which these noxious vapours will have on those who are employed in wooding and watering; for this purpose, medicines which give a temporary vigour to the system are usually recommended; such as bitters, aromatics, garlic and a small quantity of spirituous liquors; the officer commanding the party should, however, be very cautious, that the men do not abuse the use of the latter article.

Cleanliness.

ORDER and cleanliness are the most powerful resources for the preservation of health; but there are numerous circumstances apparently of minor consequence, which also contribute to so desirable an object. The impropriety of deluging the decks with water at improper seasons has already been noticed; but my reader must not infer, that the decks should not be cleansed; on the contrary they cannot be kept too clean, but they should be made so

by *dry scrubbing*, except the weather be such, as will soon cause them to dry, or that you have the means of drying them by fires. This observation applies to every deck in a ship; but in a particular manner to those where the people chiefly reside, or from whence the humidity particularly affects them: nor should they ever be permitted to go below after a washing, until the decks are perfectly dry; for it is a fact universally admitted, that moisture is the chief predisposing cause to almost every malady with which a seaman is afflicted. It particularly induces scurvy and putrid fevers. Dr. Trotter further remarks that seamen are naturally indolent and filthy, and are mere infants as to discretion, in every thing that regards their health. They will assist in washing decks, and sit the whole day afterwards, though wet thereby, half way up the legs, without shifting themselves to the great injury of their health. They should be compelled to put off their shoes and stockings, and roll up their trowsers on those occasions, which will not only cause their feet to be dry and comfortable the rest of the day, but necessarily cause *a degree of cleanliness* which would otherwise be disregarded.

Men should be obliged to keep themselves clean in their persons and clothing. The practice of dressing to pass muster, and reserving the same clothes for the ensuing week, ought to be discouraged by stopping the grog of every man, who may be found guilty of it, or otherwise punished. The neglect of cleanliness not only renders a man loathsome and offensive to himself and messmates, but as inveterate and fatal diseases are produced thereby, those who will not attend to admonition should be scrubbed in the presence of the crew, and their grog stopped. Every man should be compelled to have a proper change of clothing, which should be examined by the officer to whose division he belongs, once a week. This will prevent them from laying up dirty linen in a wet or unwashed state; a list of the articles should be taken to ascertain whether any of the clothing has been bartered for grog; they should be marked, and if ragged, the tailors on board should be obliged to mend them; whilst engaged in this duty, they should be excused from keeping watch.

The practice of appointing a day for washing is very proper; soap or potash should be allowed for this purpose; *blankets* should also be occasionally washed; when it is considered

that men sleep without sheets, this ought never to be neglected: a small quantity of distilled or fresh water from the hold should be allowed as rinsing water to free the blankets from the soap and salt, otherwise they will remain moist for a long time.

A bathing tub should be provided for every ship, that the crew may wash themselves occasionally.

The hammocks should likewise be kept clean: whenever they are washed, the men should not be permitted to sleep in them until they are perfectly dry; for they had better spread their bedding on the deck than lie in a damp hammock. It would be very proper to have a change of hammocks in use for the crew; this may be managed without much additional expense to government. But as doctor Trotter very justly remarks, what are expenses compared to the health and comfort of the people!

The practice of having hammocks put into the nettings to admit a free circulation of air below is very judicious, and would be more so, if they were occasionally opened and exposed to the *sun* and *air* during good weather.

Clothing.

SEAMEN should be furnished with such clothing as will guard them against the effects of a moist atmosphere, which must either be combined with heat or cold, according to the climate they are employed in: a woollen shirt appears to me to be the best calculated for this object; it will prevent the perspiration from being checked suddenly, and an equable degree of temperature will be maintained thereby; in warm climates, where there are heavy dews, they should be obliged to wear their blue roundabout jackets at night; they should have a proper change of woollen shirts. A seaman should have very little in his power with respect to his own dress; they are generally too inattentive to suit their dress to circumstances, unless they are forced to it. It is a very common thing to see men with light linen trousers on in cold weather, and thick woollen ones in summer. To prevent this a *uniform* should be established for summer and winter.

For the summer season, a thick cotton cloth might be manufactured in the United States, with blue or red stripes, or plain white, which should be made up, to furnish the men accord-

ing to the present plan; or the first suit may be given as a bounty. If made of white cotton the jacket and vest may be bound with blue tape, and the buttons made of horn or leather varnished, impressed with a device, an eagle and anchor for example, which would give a neatness and uniformity to a ship's crew. A white shirt over their flannel, and a black neckcloth; a small, round hat, varnished to make it water proof, with the name of the ship to which the sailor belongs printed on the front or the letters N. U. S. (Navy of the United States) on a band, which may be shifted when a man is turned over to another ship. For the winter a blue cloth jacket, red vest, and blue trowsers with buttons as above. Each man should have a pee jacket to wear when on watch at night.

The crews of the different ships would be known by the hat bands, which would excite a spirit of ambition to appear clean and orderly.

Besides this attention to the body and head, the legs and feet also require some care, as they are much exposed to wet and cold. *Good shoes and stockings*, and socks should be furnished by pursers, if cruising in a cold climate; and the men should be compelled to

wear them, and never suffered to go barefooted. Seamen should never be allowed to turn into their hammocks with wet clothes on, or "*all standing*" to use their term; this practice is a fruitful source of disease.

Diet.

WE come now to the consideration of the most important object in the preservation of the health of seamen. We have observed that a sea life, merely as such, is not so prejudicial to the health as might generally be supposed; on the contrary many diseases are removed by it, and even a more uninterrupted share of good health can be enjoyed on that element than on land, provided sufficient attention be paid to cleanliness and clothing, and a proper supply of nourishment be furnished. Aliment is properly divided into what we eat and drink. Of the former the chief articles allowed in our service, are salted beef and pork, biscuit, peas and rice. Salted meat used for a lengthy period may be considered, more than any article employed, as the cause of disease, in consequence of the deficient nourishment it affords, especially if it has been salted *a long time*, the effects of which cannot be corrected by the

vegetable matters in common use, as they lose much of the principle necessary for this purpose by drying. It is therefore necessary to diminish the quantity of salt provisions, to adopt some plan of curing it without the use of so much salt, or to add vegetable substances to counteract its pernicious effects. Query. Might not beef or pork be preserved for one or two years by slightly salting, and packing it in tight casks with *powdered charcoal*? The charcoal may be readily washed off when the meat is to be used. It has been proposed to add a certain quantity of spices with the salt, in order to preserve it. By this plan a less quantity of salt will be required; and spices are known to be among the most powerful correctors of putrescency in warm climates. The following plan of preserving meat may perhaps be acceptable to some of my readers. "At Tunis, we had a great many ships to victual in the hottest season; we had not only to provide for their expenditure, but also to lay in a large sea stock, which if not effectually cured in a very few hours, the whole would be inevitably lost. We killed upwards of forty bullocks in the hottest season, and, by observing the following method never spoiled one ounce of meat. The animal should be killed as quiet-

ly as possible; the best method of killing a bullock is by thrusting a sharp pointed knife into the spinal marrow, behind the horns, when the bullock will immediately fall, without any struggle; the arteries about the heart are then to be divided. As soon as he is skinned and quartered, begin to cut up in six pound pieces, not larger, particularly the thick parts."

"Take half a pound of *black pepper*, half a pound of *red* or *Cayenne pepper*, half a pound of the best *salt petre*, all beat or ground fine; mix these three together, then mix them with about *three quarts* of very fine salt: this mixture is sufficient for eight hundred weight of beef. As the pieces are brought from the person cutting up, first sprinkle the pieces with the spice and introduce a little into all the thickest parts; if it cannot be done otherwise, make a small incision with a knife. The first salter, after rubbing salt and spice well into the meat, should take and mould the piece, the same as washing a shirt upon a board; this may be easily done, and the meat being lately killed, is soft and pliable; this moulding opens the grain of the meat, which will make it imbibe the spice and salt much quicker than the common method of salting. The first salter hands his piece over to the second salter, who moulds

and rubs the salt well into the meat, and if he observes occasion, introduces the spice; when the second salter has finished his piece, he folds it up as close as possible, and hands it to the packer at the harness tubs. The packer must be careful to pack his harness tubs as close as possible. All the work *must* be carried on in the shade. Meat may be cured in this manner with the greatest safety, when the thermometer in the shade is at 110° , the extreme heat assisting the curing. The person who attends with the spice near the first salter has the greatest trust upon him; besides the spice, he should be well satisfied that the piece is sufficiently salted, before he permits the first salter to hand the piece over to the second salter. All the salt should be very fine and the packer, besides sprinkling the bottom of his harness tubs, should be careful to put plenty of salt between each tier of meat, which is very soon turned into the finest pickle. The pickle will nearly cover the meat as fast as the packer can stow it away. It is always a good sign that the meat is very safe, when the packer begins to complain that his hands are aching with cold. By this method, there is no doubt that the meat is perfectly cured in three hours from the time of killing the bullock: the saltpetre in a

very little time strikes through the meat; however, it is always better to let it lie in the harness tubs till the following morning, when it will have an exceeding pleasant smell on opening the tubs, then take it out and pack it in tight barrels with its own pickle."

Prime Beef

For cabin or particular private use, take the thick flanks, briskets and tops of the ribs, and after curing them as above described, add a little clay *sugar*, with *pimento*, which serves to give it a very rich flavour. These parts should be packed in kegs, about sixty pounds each, and when packed to be preserved any considerable length of time, should be in its own pickle, which is much better than any made pickle.

Provisions cured in this way will keep during the longest voyages, are more wholesome and palatable than any other, and a sure preventive against *the scurvy*, partly owing to the spices that are made use of in the curing; and also, that a careful cook may always make good soup from this meat, as the salt is very easily extracted* by rubbing it well in water.

* Reflections on the commerce of the Mediterranean, &c. by John Jackson, esq. F. S. A.

I am inclined to think that there is more salt than necessary used in the packing, but as I have never seen any meat cured in this way, I cannot be a competent judge.

Meat should be prepared for the table by dressing it *in steam*: part of the saline matter will be thus carried off and its texture will become gradually and properly softened without losing any part of its nourishing principle which it is very apt to do by the common mode of boiling. I have already remarked in this treatise, that beef or pork, which has the appearance of having been salted more than a year, ought not to be purchased for a long cruise. The former may be known by its appearing hard, and when cut, presents a shining bluish surface, and the latter is generally rusty. Meat in our service is generally issued to men four times a week. Most maritime powers, finding that the crews of their ships of war suffered very much by the constant use of salted provisions, have wisely directed the use of other articles as substitutes or correctors of this kind of diet; much, however, remains to be done to preserve men from its pernicious effects. The chief articles that have been furnished seafaring men are molasses, sour crout and the preserved juice of lemons. The latter is now very

liberally supplied for the use of the British navy; to which have been added oatmeal and occasionally rice and raisins for puddings. The first of these articles is doubtless a very good corrector of a salted diet, but it is not issued often enough in our service, (once a week;) in the British navy it is issued thrice a week and mixed with oatmeal. Indian meal would be a good substitute with us.

Sour crout spoils very soon in hot weather, unless properly prepared, and produces a very disagreeable effluvia in a ship; it is therefore not a part of the ration in our service. I am of opinion, however, that some of the cheaper kind of pickles might be issued in lieu, with great advantage, and the quantity of meat diminished; such for example as green or red cabbage, beans and cucumbers. These articles put up at a proper season would not be costly, and if preserved in *good vinegar*, would be a very acceptable treat to a sailor. They are far preferable to the sour crout, grateful to the taste, need no washing or cooking, and will quench thirst, when water grows scarce. Portable soup is another article which might be issued once or twice a week in lieu of beef or pork, to which peas or beans may be added:

when prepared* in large quantities it would not be costly. Potatoes were formerly issued, but in consequence of their tendency to putrescency, when packed in casks, they do not make a part of the ration; this however might be obviated by *partially drying them* in ovens before they are put into casks; the drying does not appear to injure their quality.

We come now to speak of the staff of life, so justly called, but when kept for a long time it is far from deserving that epithet, as it loses much of its nourishing principle, unless great care is taken to preserve it. The practice of stowing it away in bread rooms or bags is far from being the proper mode of preserving it for a long voyage. Bread should be well baked and put into *water tight casks*; those which have been used for spirits or impregnated with salt petre should be preferred. It has been remarked that bread put into bags which had contained saltpetre was preserved for a long time free from weavils. The method of preserving bread in tight casks was attentively observed by captain Cook, with the addition of giving the biscuits a cast in the oven before being used, which gives them a fresh crisp taste: by these means the bread was preserved sound

* See the method of preparing it, in the Appendix.

for *three years*. Nothing can be more pernicious to the health than biscuit rendered acrid by being kept long in a warm climate. From this cause affections of the stomach and bowels frequently occur among seamen.

It would be preferable, in order to avoid this cause of disease, to have a greater proportion of flour of which bread may be formed. It would take up much less space in the ship and could be baked as occasion might offer. This plan of baking at sea has been constantly practised in the French navy, and has likewise been adopted in the British service at different times, under peculiar circumstances, when the superior advantages of it have been very apparent. Yeast may be preserved as directed under the preservation of the health of troops. But where yeast cannot be procured, water impregnated with carbonic acid gas (fixed air) will be sufficient, without yeast, to make a very light and palatable bread; the water may be readily impregnated with fixed air, as the surgeon generally is furnished with the requisite articles.

Many articles of grain have been lately introduced into the sea diet; such as wheat, barley, rice, &c. which have already been noticed in the preceding pages. Butter is an article which we must not pass unnoticed; it is allow-

ed, it is true, but once a week and then in a small quantity. The principal objection to it is its tendency to rancidity, especially in hot climates; this with very little trouble may be remedied by the following plan, which I believe has long since been adopted in the British navy, where it is served out three times a week, two ounces each day. Instead of firkins, let the butter be put up in waxed canvas bags, containing each about fifty pounds' weight. Let these bags be thrown into casks constantly kept filled with salt water, which should be renewed once or twice a week, according to circumstances, by drawing off the old from a cock fixed near the lower end, while the new water is admitted from a bung-hole made in the upper end. By this plan the butter will be preserved always sweet, and will be a considerable *saving*, as none will *be condemned*.

Ships should be supplied with fresh provisions and vegetables, whenever they go into port. The following is the allowance of vegetables in the British service issued for the first fortnight after returning from sea, *on meat days*, which is at the rate of *four days* in the week, for mixing with the broth; it has been recommended to distribute the onions to the messes, that the seamen may use them as they please.

For every hundred men of the complement and in proportion,

Cabbages or greens in season, 50 lbs.

Onions, 10 lbs.

Other vegetables are substituted when these cannot be procured.

Water,

I HAVE said, in the preceding pages, is the principal drink of soldiers; and to sailors it is likewise a beverage of the first importance. Spring water is preferable to any other for sea use, as it contains a less quantity of decayed animal and vegetable matters than running water, consequently it may be preserved longer. This preference is more especially to be attended to in warm climates, where every thing teems with life, and where the materials of putrefaction are so abundant. I have already pointed out the usual means of purifying water under the head of the subsistence of troops, in which doctor Lind's method is described. It remains for me to notice the best methods of *preserving* it, as the health and comfort of men depend much on its purity. Water, however pure, is liable to corrupt when kept in wooden vessels, therefore different means have been

devised to obviate it as much as possible. There is a great deal of difference between old and new casks, the former are seasoned by age, the latter, being generally made of new moist wood, favours the putrefaction of the water. To obviate this tendency it has been recommended to burn the internal surface of the staves, so as to form a charry coat. This it is said will preserve the water *pure* and *sweet* for any length of time, and will have the same effect as another improvement, that of filtering it through charcoal, which has been found to correct the *most putrid* state of the fluid, and to render it pure and wholesome, although somewhat insipid; but this may be corrected by agitating it in the air. The most common expedient, however, for the purification of water, has been by means of quicklime; and it has the advantage of being both cheap and of possessing in a certain degree a medicinal quality which checks a tendency to bowel complaints.

To render corrupted water drinkable, Mr. Bisset proposes, that the casks should be unbunged three or four days before the water is to be drunk; and thinks that in the West-Indies, where it soon becomes verminous, the vermin might be destroyed and the water ren-

dered wholesome by suspending, in each cask of water, two or three days before using it, about half a pound of quicklime, tied up in brown paper. This he thinks will produce the good effects just mentioned without impregnating the water so much with lime as to render it nauseous. Perhaps a flannel or linen bag to contain the quicklime would be better than brown paper. Another method has lately been proposed which consists in impregnating impure water with lime and precipitating it by means of fixed air. Nothing in my opinion is so desirable at sea as good water, I will therefore give the plan proposed at full length, but I am apprehensive that it will be a difficult matter to introduce the use of it. "In proportion as water putrefies, it is well known that it produces insects; and that the glairy matter which occupies its surface, and also collects on the sides of the vessel, is a species of vegetation connected with it. Quicklime acts as a poison on all such matters and restores the water to its natural purity. Quicklime is equally effectual for this purpose whether slacked or unslacked, but it should always be carried to sea slacked, to obviate the danger arising from the generation of heat, which is apt to ensue on its being touched by water in an un-

slacked state. To every cask of water containing one hundred and twenty gallons, add two pounds of well burnt quicklime, either fresh from the kiln or properly preserved. When the lime has been in the casks some minutes, and the heat and effervescence occasioned by the mixture are completed, let the cask be stopped from any communication with the external air. Then let a cask be prepared of a form somewhat narrower, in proportion to its depth, than usual; the top should be formed of one plank, and should have a piece cut out of the centre, of a circular form, and as large as can be allowed without weakening the sides too much. This piece or bung should be made to fit as closely as possible, and should have an iron handle affixed to it, for the purpose of lifting it, and of confining a weight which is to be laid on, to keep the bung from yielding to a small force within. A small hole should be bored in the top, which should be exactly stopped by a plug, for a purpose to be explained in the sequel. Let this cask, which may be supposed to contain about sixty gallons, after it has been secured on a convenient part of the deck, or slung up in the shrouds, be filled with the *lime water drawn off clear* from the sediment, so as to avoid any visible particles of lime floating

in it. Sufficient room should be left for the air vessel, and a free space of about half an inch between the surface of the water and the top of the cask.

Let a vessel be also prepared capable of containing two gallons, or one thirtieth of the capacity of the cask. Into this vessel introduce half a pound of *pure unburnt* limestone or chalk grossly powdered, (or marble) and two quarts of water: then pour gradually on these ingredients *three ounces* of strong *vitriolic acid*, commonly called oil of vitriol, and closing the mouth of the vessel with a tubulated stopper, let it down by means of strings, into the cask filled with lime water. The fixed air disengaged from the mild calcareous earth will bubble up through the lime water. When this has continued about a minute, the bung is to be fastened on, and a weight properly applied, so as to keep it in its place. In about an hour the bung may be removed, in order to see whether the discharge of air continues; if it has ceased or be considerably abated, three ounces more of vitriolic acid is to be added, and the air vessel returned to its former station in the cask. The time necessary for precipitating the lime from the water will be in proportion to the briskness of the effervescence; but in general a few

hours will suffice. Should the first parcel of calcareous earth be insufficient to precipitate all the lime from the water, a fresh quantity of ingredients should be substituted. When the water is become mild, the air vessel is to be removed, and if the calcareous earth continues to discharge air, let it be plunged into another cask of lime water, that there may be no needless expense of fixed air. The specific gravity of the lime is so much greater than that of water, it will soon fall to the bottom of the cask, when it is finished. As soon as the water has become clear, it must be drawn off by a cock for use, or if the cask be wanted to purify other quantities of water, it may be drawn off sooner into other vessels. The precipitated lime may be collected, and being now a carbonate of lime or chalk, and an impalpable powder, it may be used instead of prepared chalk, for the medicinal purposes to which that article is applied. Many other methods are recommended by different writers on sea diseases, I have already noticed Lind's. Dripping stones though a very simple and convenient contrivance will by no means furnish a sufficient quantity for a ship. There is one method of filtration, which I beg leave to propose, by which a sufficient quantity of pure water may be obtained for a ship's

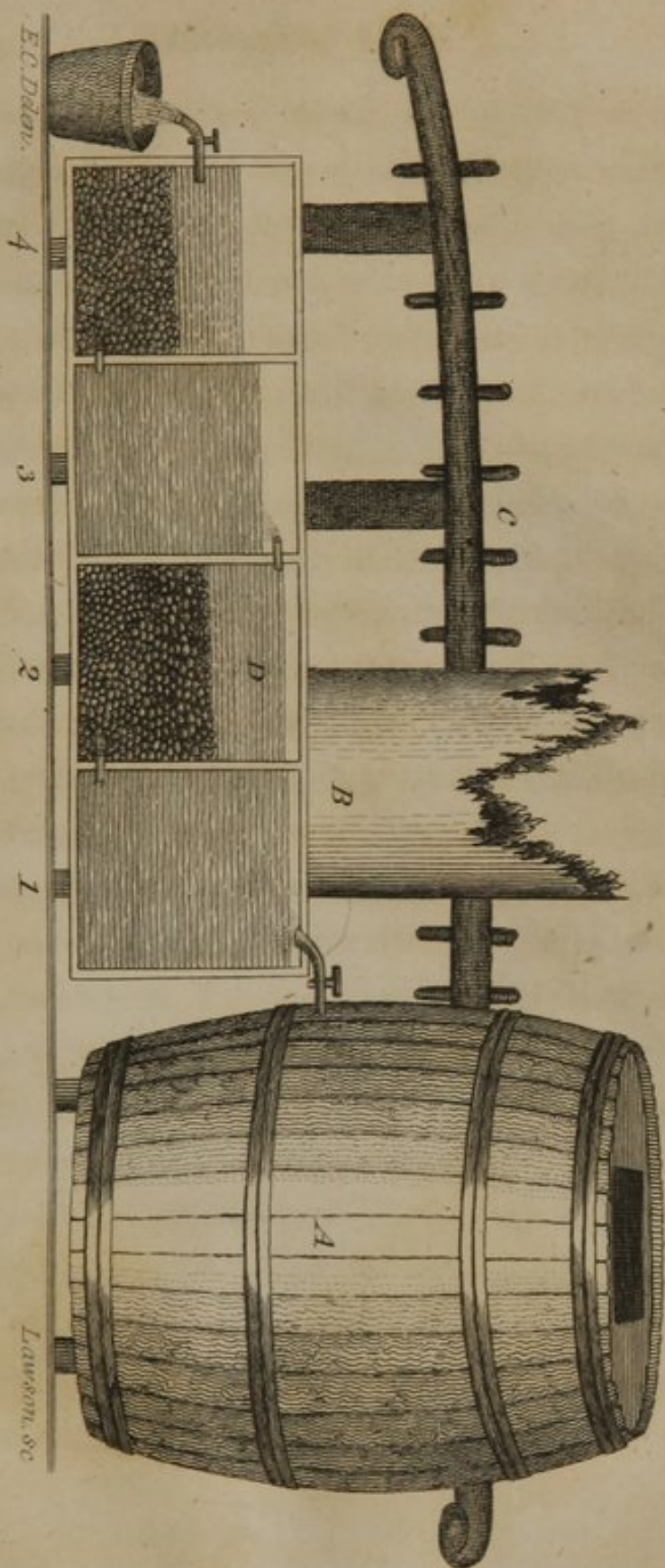
crew, without the trouble and expense of vitriolic acid in the process above described, though I have not the least doubt of its success.

Let a trough be constructed *water tight*, six or eight feet in length, two in breadth, and two and a half in height; divide it into *four* apartments of equal dimensions; in the second apartment, put layers of *gravel*, powdered *charcoal* and *clean sand* alternately, until it be two thirds full; and the fourth apartment half full. Let a number of holes be made in the first partition near the *bottom*; two or more holes near the *top* of the second partition; the same number near the *bottom* of the third partition; and put a cock in the end or side (which ever will be most out of the way) a few inches above the gravel. The first apartment should be kept filled with water, which will pass through the holes of the first partition, and rise through the gravel and charcoal in the second apartment; and discharge itself into the third apartment, through the holes of the second partition; from the third apartment, it will pass through the holes in the third partition and rise again through the gravel, sand and charcoal in the fourth apartment, from whence it may be drawn off for use. The fourth apartment will be kept

constantly full by filling the first. By this simple means, I conceive there will be a sufficient quantity of filtered water *for drinking*. A scuttle butt should stand on the larboard or starboard side, at the end of the fife rail, filled with water from the hold, and the trough may be made to extend from it to the opposite side, where a second scuttle butt is usually placed. Every man who draws water from the trough should be obliged to return the same quantity from the scuttle butt into the first apartment; by this means there will be a constant supply of water which has passed through *two filters*. Or a pipe might be constructed with a stop cock to convey the water from the scuttle butt* into the first apartment of the trough, which will form an artificial fountain; the cock should be stopt when more is filtered than necessity requires,

* A pipe may be made to pass directly from the lower part of the cask, or at the *height* of the trough; if in the latter, the pipe may be made with a *globe* at the end, the inferior part of which may be pierced with a number of small holes that the water may pass like rain into the trough, by which it will be more divided and exposed to the air, to free it from the disagreeable smell which it generally has, when brought from the hold. This plan will, in some measure, unite the benefit to be derived from Osbridge's machine. See the drawing.

Section of a Filtering trough for a Ship of War.

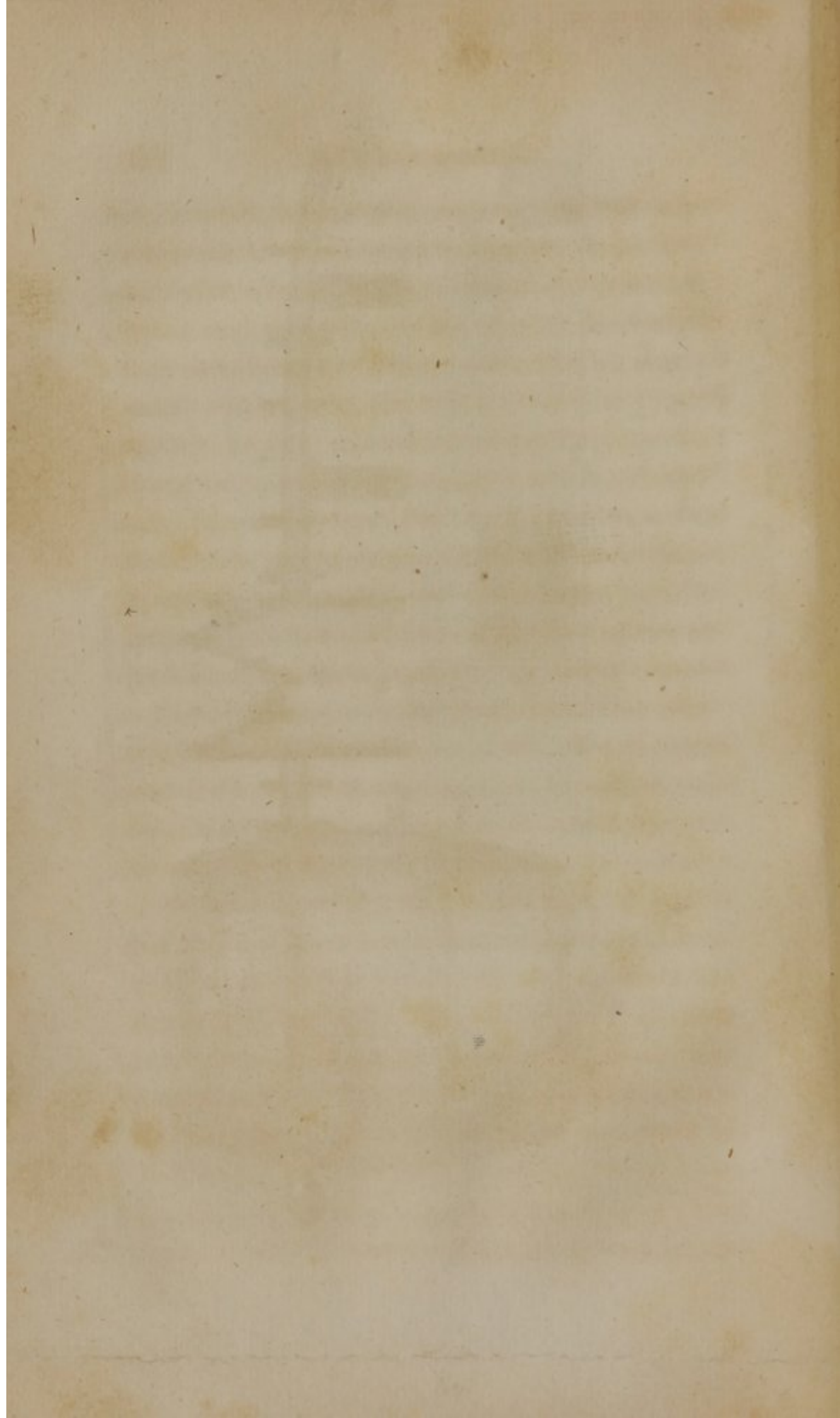


A Scuttle butt

B The Main-mast

C The Fire-trail

D The Filtering trough See page 100.



unless a stone jar be prepared to receive it. The trough must be covered to prevent the dust from falling into it. I trust, if a fair trial be made of this machine, with a proper quantity of clean *sand*, *gravel* and *charcoal*, that seamen will not be obliged to close their nostrils whilst they are drinking. The trough should be cleansed once or twice a month, the gravel and sand washed, and fresh charcoal added. As the muddy water of our rivers is a fruitful source of bowel complaints* on board our vessels of war; it should never be used without passing it through a filter or suffering the mud to subside.

Osbridge's machine is employed on board some of the British ships of war. This machine consists of a hand pump, which is inserted in a scuttle made at the top of a cask, and by its means, the water being raised a few feet falls through several sheets of tin, pierced like cullenders, and placed horizontally in a half cylinder of the same metal. The purpose of it is to reduce the water into numberless drops, and thus by its exposure to the open air, to deprive it of its offensive quality.

* I have seldom had less than eighty or ninety men on the sick list from this cause, on leaving the anchorage in the river Delaware or Potomac.

To close the subject of water, no ship should be permitted to go to sea without an apparatus for distillation. By the simple addition of a head and *worm* to the common boiler, water may be obtained free from salt; this process may even go on during the time the victuals are preparing; and not less than eight gallons of fresh water may be drawn off in an hour, while nothing more is needed than the simple process of distillation. Monsieur de Bourganville, in his voyage round the world, used very successfully a still which had been contrived in 1763, by Poissonier, so as to guard the sea water from being thrown over from the boiler into the pipe by the agitation of the ship. In this, one singularity was, that the furnace or fire box was situated in the middle of the boiler, so that the water surrounded it in contact. This still, however, was expensive and occupied much room. "Wood ashes mixed with sea water and distilled are said to afford an agreeable, transparent drink, not inferior to spring water;" but I rather think it must be agitated in the air to give it an agreeable taste.

In cases of necessity, such is the construction of the human body, that thirst may be alleviated, and the morbid consequences arising from a want of water obviated, by wetting the

skin or surface of the body with sea water, which is absorbed, and answers in some degree the common purpose of drink.

Seamen, in consequence of their salt diet, drink a great quantity of water, unless on an allowance, but it is not their only drink; grog is allowed twice a day; it is mixed and served out to them at stated periods. The practice, on board of some ships, of obliging them to drink their allowance at the tub is a good one, as it prevents them from hoarding it up for a drinking frolic; it ought, however, to be served out to them after they *have finished their dinner*, and at the usual hour in the afternoon. When in countries where limes or lemons and sugar can be procured cheap, it would be well to diminish the quantity of spirit, and issue sugar and limes in *lieu*, to make punch, which would counteract any tendency to scurvy that may be among the crew. The pernicious effects of spirituous liquors, when used to excess, have already been noticed under the head of the preservation of the health of troops; the objections there offered against their use ought to operate in favour of the use of *beer* on board ships of war; it might be issued, at least, during the first five or six weeks of a cruise. And the extract of malt and hops may be taken to sea to

brew beer occasionally for the whole crew. The antiscorbutic quality of this beverage is well known; it is a fact well established in the British navy, that the scurvy is found to make slow progress so long as the beer holds out. This shows the propriety of it as a drink in preference to the spirits and water which are usually given when the stock of malt liquor is expended. So much is this the case, that it has been observed, that such ships as indulge the seamen, when in port, more than others, with spirits from the shore, have on that very account a *longer list* of scorbutic patients and with more aggravated symptoms. In confirmation of this fact it may be observed, that the boats' crews of every ship are more sickly than the rest of the men, from their being so frequently on shore and indulging in this pernicious beverage.

The beer should however be of the best quality, otherwise large quantities will be condemned; if not well hopped, it becomes sour very soon; but this may be corrected by adding chalk or an alcali.

Spruce beer has been recommended as occasional drink; the essence is generally carried to sea, but I have never seen many admirers of it among sailors: to make it *properly*, it

would be more expensive than malt beer, unless molasses could be procured at a cheap rate. As the difficulty of procuring yeast has generally been the means of preventing the brewing of beer on board ships, I beg leave to recommend to those officers, who are disposed to encourage it, to order it to be prepared as in the preceding pages, when it is dried on the board it may be scraped off and bottled for use; wine lees will also answer the purpose. An infusion made from the extract of malt and hops, and the spruce added, with a small quantity of molasses and a ferment, will make a drink, which possesses highly antiscorbutic virtues.

Vinegar.

THE utility of vinegar to correct a salted diet is generally known. Dr. Trotter justly remarks that it is a useful article if *wisely distributed*; but the general practice, at present, is to issue it to the ship's company, in considerable portions to every mess; but the men having *no proper means* of keeping it, it is lost by accident or probably consumed in a day or two, and they have no more until the next serving. To remedy this the doctor, advises "a small cask of it to be slung up under the half deck,

and to prevent waste, in care of a sentinel. The men to have access to *it whenever they please*; this plan has been tried, and though the men had thus a constant use of it, there was never *any want* of vinegar in the ship."

DIET BILL IN THE BRITISH NAVY.

<i>Days of the Week.</i>	Biscuit	Beer.	Beef.	Pork.	Peas.	Oat-meal.	Butter.	Cheese
	lbs.	gals.	lbs.	lbs.	pint.	pint.	oz.	oz.
Sunday	1	1		1	$\frac{1}{2}$			
Monday	1	1				1	2	4
Tuesday	1	1	2					
Wednesday	1	1			$\frac{1}{2}$	1	2	4
Thursday	1	1		1	$\frac{1}{2}$			
Friday	1	1			$\frac{1}{2}$	1	2	4
Saturday	1	1	2					

A TABLE

Of the component parts of the ration allowed in the navy of the United States, on the days of the week respectively named, agreeably to an act of Congress, entitled, "An act, providing for a naval peace establishment and for other purposes."

<i>Days of the Week.</i>	Pounds of				Oz. of			Half pints of				
	Beef.	Pork.	Flour.	Suet.	Bread.	Cheese	Butter.	Peas.	Rice.	Molasses.	Vinegar.	Spirits.
Sunday	1 $\frac{1}{4}$		$\frac{1}{2}$	$\frac{1}{4}$	14							1
Monday		1			14			1				1
Tuesday	1				14	2						1
Wednesday		1			14				1			1
Thursday	1 $\frac{1}{4}$		$\frac{1}{2}$	$\frac{1}{4}$	14							1
Friday					14	4	2		1	1		1
Saturday		1			14			1			1	1

The whole of the above articles are calculated to average twenty cents per day. From three to three and a half biscuits will generally weigh fourteen ounces. I do not think this quantity per day sufficient for men who work hard. I imagine that a more frequent allowance of butter would be preferred to suet, (especially as it can now be preserved sweet in waxed bags) to eat with their puddings. A small quantity of molasses issued on the flour days would be judicious. Molasses mixed with the flour puddings makes them *light*; which is an object of consequence in the preservation of the health: the puddings, generally made by the men, are almost as hard as a thirty two pound shot; if they receive no nourishment from them, it is certain they cannot complain that they have not something in their *stomachs that they can feel*; and sometimes, among those whose digestive powers are weak, violent pains of colic are the consequence.

The ration of beef might be reduced to a pound, and pickled cucumbers or cabbage issued in lieu of the quarter pound. Good beer would occasionally be a serviceable change for spirit.

The following scheme of diet for the more effectual preservation of the health of seamen is proposed by an ingenious writer on the diseases of seamen.

DINNER.

<i>Days of the Week.</i>	Beef.	Pork.	Rice.	Portable Soup.	Flour.	Suet.	Plumbs.	Peas.	Butter.	Cheese.	Sour crout.
	lb.	lb.	oz	oz.	lb.	lb.	lb.	pt.	oz	oz	lb.
Sunday		1	4						2		
Monday				4				$\frac{1}{2}$	2	4	
Tuesday	2										$\frac{1}{2}$
Wednesday . . .					$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$		2	4	
Thursday		1	4						2		
Friday				4				$\frac{1}{2}$	2	4	
Saturday	2								2		$\frac{1}{2}$

Besides the usual allowance of bread and beer, they are to have a sufficient quantity of spice powder with their rice; celery dried and powdered, thyme and *onions* or eschalots with their peas; and mustard and vinegar to be given liberally with their beef.*

* As cleanliness is of the utmost consequence in the preservation of health, I have hinted, in the preceding pages, at the propriety of allowing soap to seamen; it has since occurred to me, that it might be furnished with economy, either by exchanging the fat, skimmed from the coppers, for soap; (which custom has made the cook's perquisite, and which amounts to *many barrels* in a year:) or by supplying every ship with a quantity of potash to

OF EXERCISE OR DISCIPLINE.

A SEA life, though in general a very laborious one, frequently affords many intervals of repose especially to landsmen; who, not being fully employed in navigating the ship, have more spare time than regular seamen, in which they indulge themselves in lazy habits, or perhaps sleep away their leisure moments in every obscure situation they find; hence it is of consequence to establish a regular plan of discipline that their time may be engrossed. Lazy habits may be prevented by *frequent musters* of the men, which will oblige them to make their appearance and keep themselves clean. As a proof how much activity at sea is conducive to health, it has been remarked that landsmen and marines are more subject to scurvy than real seamen, who are always more actively engaged than any other part of the crew. This attention to discipline ought to be more

make *soft soap* on board, which should be for the use of the crew; in fact as this fat is from the rations issued to the men, it more properly belongs to them than to the cook. I therefore think, that this plan of furnishing soap would be unobjectionable.

particularly attended to on board of ships, which contain a large proportion of landmen. Unaccustomed to a sea life they cannot be immediately reconciled to its duties; they become dejected, especially if they are disappointed in their expectations; many enter to "see the world," without having any idea of their situation on board, they become low spirited and neglect themselves.

Among this class of people, scurvy is very apt to break out; and exercise will afford one great means of preventing it. It has been very properly suggested by a number of respectable writers on the diseases of seamen, in consequence of this known effect of melancholy, and of a discontented temper, in producing scurvy and other diseases, that every means *consistent with moderation*, should be employed and encouraged to promote cheerfulness and gaiety.

This may be done by encouraging the men every afternoon, when the weather is good, to exercise on the forecastle either in dancing, fencing, or in the use of the broad sword. Every ship should be provided with one or two violins and a sufficient quantity of *spare strings* for a cruise. There will be no difficulty in procuring a "fiddler," *especially* among the

coloured men, in every American frigate, who can play most of the common dancing tunes: to add to the gaiety, the fife and drum or tamarine may make a part of the spirit-stirring music. It was a very common practice with commodore Barry, when the men broke off from their work in the afternoon, to order the boatswain's mate to pipe all hands to dance or mischief. It was a pleasing sight to see men unbend themselves and assume all the gaiety of youth by introducing such sports as they had been accustomed to in their boyish days. They would form themselves into parties on the forecastle and waist. On the one hand, the sable sailors tripping with fantastic toe "old Virginia;" on the other, characteristic of the country that gave them birth, "*shuffle the brogue*" was a favorite amusement; here the "storming the castle," or "setting up a tradesman;" and there, the "miller of Mansfield," performed in a style, which shows their natural disposition for drollery and low humour. In fact, most sailors appear to have a natural disposition for buffoonery. There is scarcely a ship, without a happy Ned or happy Jack to enliven the evening watch by some facetious story. When these amusements are encouraged by the commander they return to their duty with

cheerfulness and alacrity. The importance of exercise and amusement must be evident to every one, who will for a moment reflect on the uniformity of a sea life, where nothing but an unbounded waste of water is presented to the eye, often for months. Where dejection of spirits prevails, *there* will be found the harbinger of disease. It has been observed "that those ships make the best battle, whose crews have been remarkable for cheerfulness, and that a greater zeal and attachment have prevailed between the men and officers in them than in any others."

Seamen generally speaking in consequence of hardships, and vicissitudes of climate to which they are exposed, are generally short lived; and their countenances and appearance bear the marks of age, before they really attain it. "Their violent exertions or over fatigue are frequently the cause of introducing disease, particularly fevers of the low kind, attended with much dejection of spirits; and hence it should be the care of the commander *to prevent* with a religious attention, all unnecessary labour, and show as much tenderness in this respect as is consistent with the unavoidable duties of the service."

Men should never sleep on deck during

their watch, which is a custom too prevalent, although it is alway injurious to the health of the people, and more particularly so in warm climates, where the dews are more profuse than in colder latitudes. *Unnecessary* exposure of men is a common source of disease. "It has been observed (says doctor Trotter, late physician to the British fleet) that the men belonging to the boats are more frequently diseased than any other equal proportion of the ship's company. The reasons are obvious; they are more exposed to the weather. They frequently get wet going on shore, or become so there, and in that condition, *they often remain many hours, waiting upon the beach for some giddy and unthinking officer, who, amidst his own enjoyments, thinks too little on the sufferings of the boat's crew.* They often sell their clothes to buy *liquor*, but too often, they also part with them to buy food, on account of their being unnecessarily kept on shore, to *the loss of their regular meals* with the rest of the ship's company." These facts point out the necessity for a code of regulations on discipline; each commander issues his regulations respecting the internal discipline of his ship, but as they vary very much, it would be well to form *a general code*; a man would not then be at a loss to know

the discipline of a ship, on being removed from one ship to another.

Rough treatment of men is a predisposing cause of disease; they despond, and become inactive. Dr. Rouppe observes, that “if the *old* or *inexperienced* men are continually harassed and frightened by the severity of their officers, or if the *under officers* exercise too great an authority over them, beating them for the least occasion; or if they have too much liberty to live as they please, nothing can be more detrimental to their health, or more productive of disorders.” Good *treatment* and indulgence to seamen cannot be too strongly inculcated. “If they commit faults for which punishment is necessary it ought to be *exemplary*; an officer should never condescend to the duty of a boatswain’s mate. Every advantage will arise to the service from good treatment; it will induce men to enter the service, and to conduct themselves in their respective duties with alacrity and promptness. This indulgence is by no means incompatible with strict discipline, by which we understand a *uniform* and *regular attention*, on the part of officers, to see every *necessary duty* performed, without *severity* or *cruelty* in enforcing it. It is this steadiness and regularity which will tend both to

prevent the attack of sickness, and the commission of faults, so as to render punishment unnecessary. Hence, with a man of sense, strict discipline will always be accompanied with indulgence and humanity, and they will regularly go hand in hand with it."

"The effects of the enlivening passions have been strongly painted by many of the first commanders and navigators, upon their crews; even sickness has been suspended upon a cry of land, after having been long at sea; or, upon a shout of victory." As this is the case, every circumstance, however trifling it may appear that can contribute to render a sea life more comfortable, cannot be too strictly enforced, even though connected with its very pastimes or puerile sports, where these counteract a tendency to that inactivity which might prove a source of disease.

This important subject of the prevention of diseases at sea may be summed up in the following leading particulars:

1st. *In keeping the ship dry and properly ventilated.*

2dly. *In attending to the cleanliness of the crew in their persons and clothing.*

3dly. *In their avoiding cold, fatigue and intoxication.*

4thly. *In keeping them warm by fires in the winter season.*

5thly. *In preserving an exact and regular discipline, and in furnishing the crew with sound, wholesome provisions and water.*

If a contagious disease appear on board:

1st. *Separate the sick from the well and prevent all unnecessary communication with the sick berth.*

2dly. *Keep the ship clean, dry, and properly ventilated.*

3dly. *Let the men avoid cold, fatigue, and intoxication.*

4thly. *Dissipate moisture betwixt decks by means of fires.*

5thly. *Avoid depressing the spirits of the people by unnecessary severity.*

6thly. *Let the berth deck be frequently white-washed with lime.*

For particular information on the subject of contagion, and the means employed for eradicating it from ships of war, I must beg leave to refer my readers to doctor Lind's work, and particularly to doctor Trotter's *Nautica Medicina*, who has treated the subject at full length.

DIRECTOR OR SURGEON GENERAL.*

HIS rank in service places him at the head of the medical department of the army; it is therefore his duty to attend generally to the health of the troops; he should occasionally inspect all hospitals within the division† of the army to which he is attached; he should examine the diary of the regimental surgeons and should consult with them on all important cases, if his situation and circumstances will permit.

He should be informed monthly or oftener of all important *changes* that may have taken place, in the health of the army, by returns‡ from all the regimental and hospital surgeons; which should contain the diseases of the preceding month or week,|| with the probable cause of the increase of the sick; also the plan of cure adopted, which had been attended with

* Who should also be a physician.

† As north, south, or middle division, if in the United States.

‡ All letters on public business, and returns, should be free of postage.

|| Or at any other time, that the surgeon general or commander in chief may direct.

the most success. From these returns, he should make out a general return to the commander in chief, with such comments on the diseases of the army, and the probable causes of the increase thereof, as may have come within his knowledge; and should advise the adoption of such measures, as may have a tendency to *restore* and *preserve* the army effective. He should occasionally inspect the regimental hospitals, to enable him to make such regulations as may be deemed necessary to prevent too great an influx of patients into the general or permanent hospitals. The practice of sending men to hospitals with trifling diseases or injuries ought to be discountenanced, if it were only to prevent those lazy habits which soldiers acquire, if they remain long confined in them.

He should authorize and instruct the purveyor and apothecary to supply for the use of the regimental surgeons, such medicines and refreshments for the sick, as they may from time to time require, also large tents or marquees, with bed cases, utensils, &c. He should be empowered, on application being made from the hospital surgeons, to employ for a limited period, any additional number of assistants that the public service may require.

He should see that the army does not suffer for want of *proper* medical assistance. He should always be stationed in the vicinity of head quarters* to attend the commander in chief and his suite and the general and staff officers; he should have a small medicine chest in his possession for cases of emergency, otherwise his prescriptions may be put up, by any of the assistants in camp or in the hospital.

He should make himself acquainted with the most prevalent diseases of the country through which he marches, and attend generally to its medical topography. If there be any very unhealthy situations, and the service does not absolutely make it necessary for the troops to halt there, of which the commander in chief alone is the judge, he should communicate his opinion of the probable consequences, or advise such a position for the encampment, as will prevent as much as possible, the operation of the noxious cause on the health of the army.

In short medical skill, activity and a knowledge of the economy and regulations of the

* In some services, the physician or surgeon general makes a part of the family of the commander in chief.

medical department of the army, constitute the chief qualifications of a director or surgeon general.

I need not add, that, aided by the reports from the medical gentlemen of the army, he will be enabled to communicate much useful information on the medical topography and diseases of our country. In order to diffuse the information generally, the plan adopted by the French government in 1747,* may be attended with immense advantage; by exciting a desire for the cultivation of the natural history of our country; and by disseminating the observations which intelligent surgeons may, from time to time communicate, on the diseases of the army at different seasons and under various circumstances, a laudable spirit of inquiry will be excited among the younger part of the profession devoted to the service of their country.†

* See hospitals.

† Medical officers of an army generally rank as follows:

Surgeon general.

Surgeon to a hospital.

Apothecary to a general hospital.

Regimental surgeon.

Hospital mate.

Regimental mate.

Form I. GENERAL RETURN * of the Sick and Wounded belonging to the Centre Division of the Army of the United States.

No. of the Regiment.	In Quarters.			In Camp.			In Regimental Hospitals.			In Permanent Hospitals.		Total.	Prevailing Disease.
	Sick.	Convalescent.	Wounded.	Sick.	Convalescent.	Wounded.	Sick.	Convalescent.	Wounded.	Sick.	Convalescent.		
20				25		4	25		3	40		132	Dysentery.
19	4	2	1	12	6	2	14	6	1	20		81	Dysentery.
18	2	1		6	3		10	6	3	15		45	Diarrhoea.
10	1			4	2	1	4	1	1	6		29	Diarrhoea.
11				2	2		5	2	1	10		30	Dysentery.
12	1			10	6		11	4	6	12		48	Remittent Fever.
13	1			8	1		13	6	1	11		43	Remittent Fever.
14				9		6	5	5	2	25		61	Remittent Fever.
15	1			4		1	5	3		20		44	Diarrhoea.
16				10		4	15	10		15		35	Intermittent.
17	2			8		1	10			12		31	Intermittent.
9				6			8			10		28	Dysentery.
8				7			5			5		24	Diarrhoea.
7		1		3	1	1	5	2		10		25	Dysentery.
6	2	1	4	1			3	1		3			
Total	13	5	5	115	29	20	143	56	17	231		710	

General Quarters

July 15, 1809.

J. R. Surgeon General.

at
His Excellency
the Commander in Chief.

* This return is not necessary for the Commander in Chief to become acquainted with the number of *effective men* under his command: this information he will receive through another channel; therefore I propose a monthly or semi-monthly return, unless he should order it otherwise, when the army is in a very sickly state.

E. C.

DUTY OF THE PURVEYOR.

It is the duty of the purveyor to provide or cause to be provided all medicines, instruments, dressings, utensils, hospital tents, bed cases, bedding, stores, &c. that may be wanted for the sick of the army; which should be issued on the requisition of the hospital or regimental surgeons, countersigned by the surgeon or director general:* for which, he should take *duplicate* receipts. He is usually allowed as many clerks and storekeepers as occasion may require. He should be empowered to furnish the stewards of hospitals with money, from time to time, for the purchase of such necessities for the use of the sick, as the surgeons

* I do not approve of this plan, though I believe it is the usual one. The hospital and regimental surgeons should be authorized to draw such articles as they stand in need of, without the signature of the surgeon general. If surgeons are men of abilities and integrity, surely they would not wantonly risk their reputation by the expenditure of public property: besides they may stand in need of the articles indented for, when the surgeon general may be many miles distant from their posts. It certainly would be incorrect to permit the sick to suffer until the regimental or hospital surgeons obtain the signature of the director. Some general order should be issued on this head.

may order, and which cannot be procured from the public stores. An account thereof should be rendered to the purveyor every three months, or oftener if required, approved by the surgeon of the hospital. Every article should be debited and credited, as under the head of apothecary and steward.

APOTHECARY.

As it is not probable that an army will act out of the United States, and as the purveyor has the authority to purchase medicines, &c. on the requisition of the hospital and regimental surgeons, the apothecary and assistants may be dispensed with, unless the government should think proper to establish a national depot of medicines, instruments, &c. which doubtless would be a more economical plan, than the procuring of supplies from drug stores.

Indeed, I think it would be of immense importance to establish a chemical laboratory connected with the national depot, in which all chemical preparations should be manufactured, which would save from 1 to 300 per cent., and even more on some articles; besides, more confidence may be placed on the

purity of articles manufactured under the direction of an able theoretical and practical chemist. A man, who is not of this description, should not have the direction of such an *important establishment*. Again, in this laboratory, all the saltpetre purchased by government for the manufacture of gunpowder, might be refined. The only advantage attending the employment of private individuals to refine saltpetre is, that it may be refined at the risk of the person employed; but if government reimburse the losses which may be sustained by accident, it would be far more economical to have it refined in their own laboratory, and at their own risk, instead of becoming the assurers to the person employed.

All tinctures and ointments should be prepared in the apothecary's department. But as a national depot is not established, and as an army may be employed at a distance from the sea board, where medicines, &c. cannot be conveniently purchased, it will be necessary for an apothecary or purveyor to attend with a supply. If the former, he should, with his assistants, receive, prepare, and issue medicines, dressings and such other articles in his department, on the requisition of the hospital and regimental surgeons, as may be wanted.

He should take duplicate receipts for all the articles he issues. He will find it convenient to take one receipt in a book containing a copy of the requisition, the other, on the requisition itself; the latter to be deposited in the proper office as a voucher on the settlement of his account; it should be indorsed and numbered to prevent confusion among his papers. The book he should preserve for his own satisfaction and safety, in case of the loss of the indent or requisition, one or the other being generally necessary to pass his account. He should be provided with a book, in which he should enter every article he receives, and give credit for all articles issued, under their respective heads.

This book may be of the same form as the steward's book, No. I. in the sequel.

If it be a standing order not to deliver any article on the requisition of the hospital or regimental surgeons, without the signature of *the head* of the medical department, he should be particularly attentive to it, for, independent of risking a trial by a court martial for disobedience of orders, it may be an obstacle to the final settlement of his accounts.

REGIMENTAL SURGEON.

ON entering on the duties of his station, he should make out an estimate of the quantity of medicines, instruments, dressings and stores, he may require, according to the strength of the regiment. His medicine chests ought not to be so large and inconvenient as they generally are, especially in a country, where frequent supplies of medicines can be procured. He may, however, have a *store chest*, also a *small medicine chest* containing such articles as he usually prescribes, which will serve also, when he attends an *expedition*, where waggons are not allowed.

As a waggon is usually allowed for the use of the surgeon, I propose to have one constructed solely for his use, with a *store chest* fixed in the fore part of it *on springs*, to prevent the bottles from being broken by its motion over rough roads. I prefer *springs under the chest*, to a waggon with springs; because, I intend that it shall also be used as a dispensary, consequently the waggon ought to *be steady* whilst the surgeon's assistants are engaged in putting up the prescriptions; it may be station-

ed in camp in the rear of the surgeon. It should have a square top and be covered with painted canvas; there should be a glass window on each side to admit the light during wet weather. Two small boxes may be constructed, on the panel of the waggon without side, and covered with painted canvas, to contain *dressings* or *refreshments*. There should be convenient steps to the end of the waggon, that the surgeon or assistants may go in or out at pleasure. I beg leave to call this my travelling Dispensary or pharmaceutical travelling carriage.

This carriage may be used for transporting the small *moveable chest* of medicine and chest of instruments, also the surgeon's baggage. It may contain two camp stools for the convenience of the assistants when putting up the prescriptions, or the *small chests* may be used as seats. Objections may be made, that a common waggon will not be sufficiently large for the purposes I propose applying it to; but when it is considered how small a space is generally allotted to a surgeon of a small vessel, to transact his business in, surely a waggon 9 feet by 3 feet 6 inches, containing a fixed medicine chest, 3 feet 5 by 2 feet 3 inches, will be suf-

ficiently large to compound the medicines in, for the sick of one regiment.

One of the assistants might have a small case, not larger than a common *cartouch box*,* and of that form, in which several small vials might be carried, containing such articles as necessity may require to be administered for the relief of the sick, or injured soldiers, when in the line of march, without having recourse to the medicine chest; such as laudanum, vol: alkal: sp: lavend: &c. also adhesive plaster, lint, armed needles and a tenaculum: they may also have a few *rollers* and two or three field tourniquets. This would be very convenient on parade days, in case of accidents. The cartouch box may be buckled in front like a horseman's, or suspended over the shoulder; the former will be the most convenient manner of carrying it.

What I have said respecting medicines, under the head of naval surgeon will apply here, except that many of the articles may be omitted and the quantities of others diminished; as naval surgeons generally indent for a cruise

* I took this hint from doctor Sybert of Philadelphia, who proposes having a similar box, to contain *chemical tests* and other articles necessary for a *mineralogical excursion*.

of one or two years, and are not always in a situation to procure the articles they want. The chests should not be lumbered with unnecessary articles.* Instruments should be of the first quality, and the greatest care should be taken to keep them in *good order*. It ought to be remembered, that a uniform coat or cockade does not diminish the sensibility of a man, who leaves his private pursuits in life to engage in the service of his country; *that man* is deserving of our pity, who can exclaim, that this or that medicine or instrument, is "good enough for a soldier or sailor." It is recommended to regimental surgeons to have "*graduated bleeding basons*," but these I think unnecessary; the pulse is the best *index* of the quantity of blood to be drawn in all cases. Male and female catheters should be among the instruments; the latter may be necessary in attending on the soldiers' wives. A shower bath will be a very useful appendage to the regimental hospital.

It is the duty of the surgeon and his assistants to attend twice a day or oftener, to the sick of the regiment. It is also the surgeon's

* Seventy pounds per annum is allowed for a medicine chest in the British service. See Hamilton's *Regimental Surgeon*, vol. I.

duty, however disagreeable the task may be considered, to attend all corporal punishments inflicted by order of a court martial.

It is his duty to watch with attention and give his opinion to the provost martial, whether the sentence of the court can be *altogether* executed or not, without *endangering* the *life* of the individual. In this (in some services) the commanding officer has not the power *to control* him, if he thinks proper to assert his right of opinion and *authority*. When attending on this truly disagreeable duty, he should have with him, vol: alcali, some wine and vinegar,* &c.

* Fortunately chastisement is not generally so severe in our service. I have never witnessed this disagreeable part of a surgeon's duty, but have had two under my care which proved to be very troublesome cases.

I do not approve of those sentences which inflict from 500 to 1000 lashes, although it be inflicted at different periods; for before the back is well from the first chastisement, the second is inflicted, and so on, until the sentence is complied with; by this means, the public lose the services of the man for two or three months; besides the expense and trouble of attending to a person thus cut; the cruelty attached to the giving of 1000 lashes is shocking to humanity. It would be better far to sentence a man to suffer death.

By act of congress passed April 10th, 1806, art. 87. no person shall be sentenced to suffer death but by the con-

The surgeon and assistants are also obliged to attend on field days to give assistance in case of any accident happening. "Each regiment should have a house in the neighbourhood of an encampment, or one or more large *hospital tents*, or a marquee for the reception of the sick of the regiment, whose cases do not require them to be sent to the general hospital."

Tents are far preferable in the summer season to a crowded hospital. Dr. Lind informs us, that when the hospital fever was brought from England to Port Mahon, the house being found insufficient for so great a number of sick, *tents* were erected in the field for many of the men; these were supposed to be badly accommodated; but it was very observable that most of those who lay in the *cold tents* recovered; when the mortality in the house was so great that in some wards not one in three escaped*.

Besides, *tents* are more immediately under the inspection of the officers; and there will be less probability of excesses being committed

currence of two thirds of a general court martial, &c. nor shall more than fifty lashes be inflicted on any offender. This is humane and sufficiently exemplary, if the offender possess the least spark of shame.

* Lind on the Diseases of Seamen.

by the introduction of spirituous liquors. But if a house be procured for the purpose, *sentinels* must be placed at the door to prevent convalescents, venereals, &c. from leaving the house without permission from the surgeon; at the same time, to prevent improper communication; yet *they* too frequently find means to bribe the sentinels to wink at what their duty strictly forbids, in order to share in the spoil. Maligners or such, who from idleness, "*sham Abraham*," or "play the old soldier," (quaint expressions for those who are not in reality sick) ought never to be sent to a regimental hospital out of camp; no indulgence should be allowed this class of men; if the *imposition be discovered*, they should be punished by stopping their allowance of wine or beer, or by fixing a *clog* to the leg, as a mark of disgrace. This class of men are generally more troublesome and difficult to manage, than those who are in reality sick. If sentinels permit them to wander out of the house, or liquor to be brought in, it will be a long time before the imposition can be discovered, though the surgeon be very diligent. I have known men of this description to puncture their gums with a needle, and wipe off the blood with the skirt of their linen, in order to make the surgeon believe that they

had passed blood with their *urine*. Soldiers or sailors will seldom inform of each other, unless they should happen to quarrel, when perhaps the truth may come to light. But although men frequently feign diseases, it ought not to make the surgeon too precipitate in discharging them for duty; it is far better that he should be imposed upon by a few designing men, than that the lives of many be endangered in consequence of the invidious tales or innuendos of their messmates, who perhaps have been disappointed in not receiving a sup from their bottle. The general character of the man should be considered. I mention this, to put young surgeons on their guard.

A regimental hospital,* whether a tent or house, should be supplied with *cases* to be filled with straw, (paillases) bedding, utensils

* Proportion of hospital equipage for a regiment of cavalry of 85 men per troop.

1 large marquee, with poles, mallets and pins.

117 blankets.

57 coverlids.

120 sheets.

49 paillases.

55 bolster cases.

1 pair of panniers for the surgeon's medicines.

Vide Brigade Major's Assistant. London, 1806.

for cooking, and hospital stores; these should be procured from the purveyor.

Men should not be placed on the sick report, except when they are unqualified to do duty; and none should be received into the regimental hospital without the concurrence of the surgeon, who *alone* in the *absence* of the surgeon general, ought to be the judge. I have often thought it incorrect that the *sergeant* in his morning report should have the power of reporting men sick, and consequently of excusing them from duty for the day, before they have been examined by the surgeon; but I do not know how to remedy it, or come at the knowledge of the sick in camp, except through these reports, as it would be impossible for the surgeon to visit the whole regiment before the hour for making the report. He therefore will frequently find many reported sick who, perhaps, have only a slight headach or nausea, in consequence of a *debauch* the preceding night. To prevent *confusion* and to *ensure harmony* every officer should act in his proper sphere.

Unless soldiers' wives can be procured as nurses for the regimental hospital, orderly men should be appointed for this purpose; application should be made to the *commander of the regiment*, who will direct them to be furnished.

When orderly men are appointed, they should not be exchanged daily, as it takes some time to qualify them for this duty; it is generally disliked in consequence of the confinement it subjects them to; some additional allowance of pay *ought* to be made to them for this service. Particular directions should be given relative to their duty. It is the duty of the surgeon or his assistants to examine all recruits;* if the recruiting officer enter a man, contrary to the opinion of the surgeon, the latter should receive a certificate to exonerate him from any blame that may be attached to it. The surgeon should keep a regular day book of his practice, in which should be inserted the name, age and rank of the patient, the company to which he belongs, symptoms and changes in his disease, the method of treatment and the event; and when men are sent to the permanent hospital, he should be particular in entering the *date*; as the date of their admission there, ought to correspond with the date of their discharge from the regimental books; from this it *may appear*, whether rations are drawn for the same men in *camp* and at *the hospital*. He should send with them an account of the time and

* See particular directions, under the head of the health of soldiers.

manner of their being taken ill, and the mode of treatment which had been pursued.

He should report every two weeks, or oftener if required, the state of the troops under his charge, to the surgeon general; he should be particular in mentioning the number of sick and convalescents in camp or regimental hospital, also the number of sick belonging to his regiment in the general hospital, or officers in quarters; and if the regiment be sickly, he should give his opinion as to the probable cause of the sickness; a similar report should be given weekly to the commanding officer of the regiment. He should keep a register of the weather and its effect on the troops; also enter in his diary such topographical remarks as he may be enabled to make around the encampment, or when on a march.

His journal should occasionally be submitted to the inspection of the surgeon general; this would afford him an opportunity of discerning the merits of the different regimental surgeons, and will enable him to make a proper selection for promotion when vacancies occur.

Surgeons should examine the plants that may be used advantageously either as a medicine or diet in the neighbourhood of the en-

campment. For example *Actœa racemosa* or black snake root has been used with success in the putrid sore throat, also for the *itch*; the *Uva ursi* in nephritic complaints; *Prunus virginiana* or wild cherry; *Laurus sassafras* (common sassafras;) *Diospyros virginiana* (persimmon;) *Cornus florida* (common dogwood;) *Magnolia glauca** (beaver tree or swamp sassafras;) *Populus tremula* or aspin; *Aristolochia serpentaria*; *Gentiana centaurium* and many others that might be enumerated, have been successfully employed for the cure of intermittents. *Datura stramonium*† and *cicuta* may also be used with advantage in many diseases; in fact, a wide field is open for the army surgeon, who feels anxious to become acquainted with the indigenous plants of our country; *to assist* him in this important inquiry, I beg leave earnestly to solicit him to procure professor Barton's "Collections for an Essay towards a Materia Medica of the United States." A work which contains many use-

* Much information on the magnolia has been communicated in an inaugural dissertation, by doctor Thomas Price, formerly one of my assistants on board the United States.

† Many important remarks on the *datura stramonium*, have been communicated to the world by my deceased friend and colleague at the Pennsylvania Hospital, doctor Samuel Cooper.

ful remarks on this important subject, and which no surgeon or assistant should be without.

A surgeon who has received a regular medical education, and who possesses experience, ought to possess the confidence of his commanding officer; he can from time to time communicate much useful information; from his instructions, aided by the *orders* of the commanding officer, many diseases may be prevented. Wise regulations *strictly* enforced will be found efficacious even against unwholesome diet, climate and other vicissitudes of a soldier's life. I trust it need not be mentioned to men of this description, that tenderness to an unfortunate sick or wounded soldier *is a duty*. They must already have witnessed in their walks through life, the miseries and frailties attendant on man; they must from the nature of their profession have been conversant with them. Men who suffer in the cause of their country ought always to be treated with humanity. A disposition to sympathize is not only amiable, but it impresses the patient with a good opinion of his surgeon; he places *confidence* in his prescriptions, which is of great consequence towards a recovery. What can add more, says doctor Hamilton, to the distress

of a poor sufferer under sickness, than roughness of behaviour in him from whom relief was expected. He is already weakened and enervated by the affliction he is under. His situation too is generally less comfortable than he has experienced it in similar circumstances, before it was his lot to wear a cockade. He has now no friends to sympathize with him; no parental or fraternal anxiety to watch over him, or procure him those little delicacies that the situation of a sick man often requires; if it be only to quiet the mind, they are useful. I need not dwell on this part of our subject; let it be the surgeon's endeavour to make up for all these deprivations, which men sustain in the service of their country.

SURGEON'S ASSISTANTS.

WHEN two are allowed to a regiment, their duties should be divided, or performed in rotation when there are few patients to be attended to. One should put up the prescriptions of the surgeon, whilst the other is engaged in performing the operation of bloodletting, *dressing ulcers, &c.* They should be authorized by the surgeon to visit and prescribe for such cases as do not require his immediate atten-

tion; each mate should put up his own prescriptions. They should make an entry in the day book as recommended under the head of Regimental Surgeon. They should see that the orderly men do their duty, and that the sick are properly supplied with nourishment. They should keep an account of the expenditure of the hospital stores supplied for the use of the regiment. As the number of articles of hospital stores will be less than in a general or fixed hospital, the expenditure book may be more concise. Both assistants should not be absent from camp at the same time, and *neither* without permission from the surgeon: they should be *solely* subject to *his* orders.

FORM OF A REGIMENTAL PRESCRIPTION BOOK.

Regiment No. —.

No.	Names.	Age.	Rank.	Company.	Symptoms, Prescriptions and Remarks.
1	John Dobbins	23	Private	Captain W.	Camp, Harper's Ferry, July 1, 1809. Was attacked yesterday with pains in his head, back and limbs, with a slight chill and fever; his eyes are now red, pulse tense, skin dry and hot, bowels costive, pain continues in his head. R. Venæ sectio ad unc: sedecim: R. Calom: ppt. gr. X. Jalap gr. XV. statim sumend. Stop his allowance of spirits, and let him drink freely of molasses and water. When wrestling this morning, luxated his humerus, the parts around the head of the bone were tense. He was bled ad deliq. and the arm reduced. Thermometer this morning stands at 86°. We have had no rain for 10 days past.
2	James Kelly	28	Private	Captain K.	

Semi-monthly Report of the Sick and Wounded belonging to
the 20th Regiment, commanded by Col. T.

Where.	Sick.	Convalescent.	Wounded.	Total.	Prevailing Disease.	
In Quarters *	4	2		6	Dysentery.	* Capt. S. Lieut. K. &c.
In Camp	25	10	4	39	Dysentery.	
In Regimental Hospital	25	6	3	34	Remittents.	
In Permanent Hospital	40		13	53	Dysentery.	
	94	18	20	132		

July 15th, 1809.

J. C. Surgeon.

James R——. M. D.
Surgeon General.

SIR,

The cases of dysentery reported last month increase very rapidly; I do not know to what cause to attribute them, unless to the water and sour cider which the men procure in the vicinity of the camp, or to the cool nights, with great moisture in the atmosphere, succeeding the hot days. I have not been able to trace any of the cases in *camp* to contagion. The method of treatment adopted is that which is recommended by medical writers generally; in some cases, I have found that a large dose of calomel combined with opium and tart: emet: given at night, seldom failed to produce natural stools the following day, to the great relief of the patient; if the gums became sore, all dysenteric symptoms vanished. The thermometer for the last 15 days has not been higher than 88° or lower than 76°, except on one night, the 12th, when it fell to 65°. During an excursion in the vicinity of the camp, a few days since,

I found two specimens of emerald, and three others, which I take to be the carbonate of lead; specimens of each are at your service.

I also met with a *mineral water* in the vicinity of the camp which has a highly chalybeate and acid taste; its chemical properties ascertained by reagents, viz. litmus paper and tincture of galls show the presence of *iron* and *carbonic acid gas*, existing as a supercarbonate of iron; the proof of this I obtained by immersing litmus paper in the water, fresh from the spring; it immediately became reddened, indicating the presence of an acid, and as the paper became dry, it *regained* its *blue* colour, which show the acid to be carbonic acid gas or fixed air. However, to prove it to my satisfaction, I added a portion of lime water which immediately became turbid and a precipitate was formed of an aerated calx, or subcarbonate of lime, which was redissolved with considerable effervescence on adding muriatic acid. That iron was present, I infer from the black precipitate (gallate of iron) formed by the addition of the of tinct: galls. That other substances were not present appeared equally true from the application of other chemical tests. Therefore it is apparent that it is a chalybeate water, the iron of which is held in solution by a superabundance of *carbonic acid*.

I have the honor

to remain your humble servant.

J— C—.

Camp at — Virginia,
July 15th, 1809.

GENERAL REMARKS

ON

HOSPITALS

AND THEIR

INTERNAL ARRANGEMENT.

————— Lo! a goodly hospital ascends,
In which they bade each lenient aid be nigh,
That could the sick-bed smooth of that sad company.
It was a worthy edifying sight,
And gives to human kind peculiar grace,
To see kind hands attending day and night,
With tender ministry, from place to place:
Some prop the head; some, from the pallid face,
Wipe off the faint cold dew's weak nature sheds;
Some reach the healing draught; the whilst to chase
The fear supreme, around their softened beds,
Thompson's Castle of Indolence, Canto 2.

THE Greeks according to Homer, had surgeons and physicians* attached to their armies. Cyrus also appointed physicians to his

* Podalirius and Machaon, sons of Esculapius. The former on his return from the *siege* of Troy was cast by a storm on the coast of Caria, where being introduced to king Damætus, whose daughter had fallen from the top of a house, he *bled* her in *both arms*, after which she recovered. This appears to be the first instance of bloodletting on record. Vide Justamond.

army.† The wounded Romans were received into the houses of the nobility, and had physicians to attend them.‡ Justin mentions the same of the Spartans after their defeat at Salasia.¶

There were no military hospitals in France before the reign of Henry IV. who caused the first to be established at the siege of Amiens in 1597; where according to the account given by Sully, the sick and wounded were as well taken care of, as in their own dwellings; many persons of rank and fortune, adds this wise minister, preferred being carried to this hospital that they might be better treated and accommodated than at Paris.*

It was then to the great Henry, the model of good kings, says Dehorne, that we owe the first asylum established for sick and wounded soldiers! it was he who laid the foundation of these useful and pious institutions. Before his

† Xenophon de Institut: Cyri, lib. 1. et 8.

‡ See the account by Tacitus of 50,000 people, who were killed by the fall of the amphitheatre at Fidenæ. Vide lib. 4. Annal: § 63. and Livy lib. 2. cap. 47.

¶ "Patentibus omnes domibus saucios excipiebant, vulnera curabant, lapsos reficiebant." Vide lib. 28. cap. 4.

* *Economies royales, politiques et militaires*, chap. 74. Edit. Amst. in fol.

time, the sick soldiers were commonly divided among the civil hospitals, and were promiscuously mixed with the poor of every village.

It was reserved for Louis XIV. to give to these establishments a stability and extent commensurate with the grandeur of his military operations. It is to him we are indebted for the first permanent hospitals at the seat of war; he never fortified a place where he did not order the construction of an hospital.

He established them in all the towns of Flanders, which he conquered; he caused fortifications and military hospitals to keep pace with each other, the one insured his conquests, the other offered to his troops the most prompt assistance and encouragement against diseases and wounds. Louvois seconded the views of Louis XIV. in facilitating and multiplying according to necessity these respectable establishments. This celebrated minister knew that greatness consisted, not only in gaining battles and making conquests, but in the *glory of beneficence and humanity*; he conducted for his master these *new means* of enchaining the hearts of his troops.

All the garrison towns throughout the kingdom had well established hospitals; the surgeon majors of regiments had none to treat

in their barracks, except those who were slightly diseased.

The mode of treating the sick soldiers in their quarters was practised by the Austrians, Bavarians, Danes, Prussians and almost all the nations of the north.

These regimental hospitals or barracks have a sensible inconvenience, because in most of the caserns the sick soldiers are too near to those who are in health, which renders the communication of diseases more easy and frequent, and very often tends to spread those that are contagious.

It was ordained about the year 1747, that all discoveries in medicine, which the practice of the hospitals might furnish, should be immediately published, which gave origin to the work from which I now make these extracts, entitled "*Journal de Medicine Militaire.*" It was printed at the *public* expense and distributed *gratis* to the medical officers of hospitals and regiments. I have seen seven volumes of the work, which includes the year 1788; they contain much useful information on medical topography, practice of medicine, surgery, morbid anatomy and pharmacy. I think the plan worthy of imitation.

The English and Germans are likewise very

attentive to this necessary appendage of an army. Doctor Monro observes that there ought to be one hospital in the *rear* of an army, ready to receive the sick from camp, which is called the moveable or flying hospital, and one or more at some distance in towns, to receive such of the sick as can be moved from the flying hospital, when they are obliged to go from place to place, or when a greater number of sick is sent to them than can be taken care of. Each hospital, he says, should be provided with physicians, surgeons' mates, purveyor or commissaries and others, to attend and take care of the sick. Besides these, one or two physicians ought to accompany the army to attend the commander in chief and the general and staff officers in case of sickness; an apothecary provided with a small medicine chest ought to attend at head quarters to make up the prescriptions of the physicians. A number of surgeons with mates should attend the army, to be ready in case of action. These ought to be attached to the suite of the commanders of the different brigades or corps, and be quartered or encamped with them. Each surgeon should be provided with a waggon or horses loaded with proper surgical apparatus, as instruments, bandages, lint, and other

things necessary for taking care of the sick and wounded.

In the Hanoverian service the medical and surgical hospitals are perfectly distinct from each other, and *each* has its proper *director*.

The medical hospital is conducted by a physician of extensive knowledge in army medical practice, and in the general *economy* of military hospitals. His duty consists principally in regulating every part of the hospital, in attending to the practice of the medical men under him, and in prescribing for such cases as require his particular attention. He has a number of assistants, all of whom have studied physic so far as to be acquainted with the nature and treatment of the diseases in general. Their duty extends no further than the practice of physic; and each assistant keeps a regular journal of the cases under his immediate care. By this means the physician may at all times see the practice of the different medical men in the hospitals; and whenever his assistance becomes necessary, by having in some measure a history of the progress of the disease and the previous treatment, he will be able to determine on the future practice.

To each hospital there is an apothecary, with a sufficient number of assistants qualified

for the department, whose duty consists entirely in preparing the medicines for the sick. The medical assistants send their *case books*, containing the prescriptions to the apothecary's shop; the medicines are prepared and delivered to the orderly men with as *much accuracy* as if they were sent from the shop of a regular apothecary.

To each hospital there is also a purveyor, not a *medical man*, but one conversant with business, whose duty consists principally in providing every thing necessary for the sick, agreeably to the directions of the physician. So long as the purveyor performs his duty, he *retains* his office; but if the sick should suffer from any neglect or mismanagement in his department, *he is dismissed*.

The physician assembles his assistants frequently, for the purpose of discussing the medical business of the hospital.* Every man communicates the particular circumstances which he observed, either in the appearance of the disease or in the effects of the different

* A practical school, for the instruction of the young surgeons of the French army of Egypt, was organized at the principal hospital at Kaire. Relation historique et chirurgicale de l'expédition de l'armée d'Orient, en Egypt et en Syrie.

remedies. The bad cases are generally considered. A spirit of observation and inquiry prevails, which tends to improve the practice of physic.

The *surgical department* has been conducted by the celebrated professor Richter of the University of Gottengen. In the hospital directed by him, which is the general hospital for surgical cases, the principal operations are performed by himself. He has a number of assistant surgeons, well informed in their profession, whose duty is confined to the practice of surgery; and when any difficulties occur in the treatment of any case, the director attends to it particularly himself. In other respects, the economy is the same as in the medical hospital. The wine, provisions and every necessary for the sick are delivered out with the greatest regularity; and care is taken to provide such orderly men, as will pay proper attention to the sick. Thus we observe in every department, men *peculiarly* qualified for their respective situations. The principal *surgeon* a man eminently distinguished by his professional abilities. The *physician* to his professional skill adds a perfect knowledge of the economy of military hospitals. The *medical assistants* never interfere beyond the practice of physic. The

assistant surgeons always confine themselves to their own province. The *apothecary* and his *assistants* never act in any department but their own. And the *purveyor* is always a man capable of performing the active duty, which his situation requires. In fine, the whole forms such a *regular system*, that every man in the hospital knows the nature and extent of his own duty, which he performs with ease to himself and advantage to the sick; one department never interferes with another, and the result is order and regularity, such as we might expect in any hospital conducted as it should be.*

I believe that it is common in the British service to have an inspector of hospitals. In a large army in actual service there must necessarily be many hospitals; it is therefore impossible for an inspector to attend *personally* to all of them; he must employ *deputies*; but surely an hospital surgeon, who is acquainted with the economy and arrangements of hospitals will be, by far, a better judge of the requisite necessities than a *deputy* inspector, who perhaps is not a physician; at least if he be not,

* See Sinnott on the abuses of the medical department of the British army.

he is not capable of filling so important a situation. "Besides it is made the duty of an inspector to visit the hospitals, receive *regular returns* from all of them, and give directions to the head-purveyor respecting those articles *he may* think necessary." Here again, I contend that the hospital surgeon is the proper person to direct what *he may* think proper for the use of the sick, and should make his return to the surgeon general. Again, the inspector "has to receive orders from head quarters respecting the removal of the sick and *give directions* accordingly to the *medical men* and purveyors." But surely all orders to the medical men should go through the head of the department, viz. the surgeon general, and to him from the commander in chief. The quarter master general would of course be instructed to supply wag-gons and horses for the removal of the sick and wounded to and from the hospitals, and for transporting medicines and hospital stores; applications for this purpose, I conceive, ought to be made to him. This plan I do not approve of; it renders the duty of the hospital department complex and creates confusion; besides many valuable lives may be lost while pursuing this routine of duty. The surgeon who has charge of the hospital, should have the power

of transacting all business pertaining to it, and of issuing his orders to the hospital steward, and all under him, for which he should be responsible.

As the expense of hospitals will depend, in great measure, on the manner of conducting them, it would be a great saving to the government and consequently to the nation, to adopt a plan that will be economical and adequate to their beneficent design. Should the United States be unfortunately engaged in a war, it will be necessary from the great extent of our continent, to establish hospitals connected with the *different divisions* of the army, each of which may be regulated in the following manner. To each *hospital*, a *surgeon* should be appointed, who should be responsible for the general economy of the house. He should have under him a number of *mates* or *assistants*, according to the number of patients; also a *steward* with a deputy to act as *ward master*.

Hospital surgeons should be empowered to suspend officers under them for neglect of duty, and to confine persons in inferior situations, for negligence, drunkenness, or ill behaviour. If an hospital assistant, he should report the case immediately to the director or surgeon general.

In order to preserve peace in the hospital, his command over the men should be as absolute, as though they were under their respective officers. To quell riotous behaviour, some severity is at times absolutely necessary, however repugnant it may be to the feelings of the surgeon. Punishment in a solitary cell, or by fixing a clog to the leg, will in most cases answer the purpose, except the offender be destitute of every feeling, which a *soldier* or *sailor* ought to possess. To avoid improper conduct, convalescents should not be detained longer in the hospital than is absolutely necessary.

Hospital assistants may be divided into grades, as in the French service. As apothecaries are not provided for in the American service, they should be men, who have been accustomed to put up prescriptions, and who have resided three or more years with some respectable practitioner, and from whom testimonials of their abilities have been produced, on their receiving the appointment; or they should be examined by order of government. A preference should be given to those who have attended one or two courses of lectures, and who have been accustomed to dress wounds, ulcers, &c. The establishment would be render-

ed more complete if one of the grades of assistants, be an apothecary. There are many young men who would embark for a short period in this capacity.

The *steward* should be supplied with the requisite articles for the use of the hospital; he should also be empowered to *purchase* such articles, by the *direction* of the surgeon, as may be necessary for the sick, which the public stores do not afford. He should receive from the surgeon or assistants, daily, a list of the men on full diet, that he may regulate the *quantity* of provisions to be drawn or purchased for the succeeding day; he should also be furnished with a list of those men who are to receive wine, porter, &c. with the *quantity* annexed to each name; these lists or orders should be produced *as vouchers* for the settlement of his *monthly* account of expenditures, which should be signed by the surgeon.

As the great object of an hospital is the recovery of those who may be sent to it, I think the practice of establishing diet bills is extremely incorrect; it serves only to facilitate the business of the *cook* and *nurses*, which ought not to be put in competition with the recovery of a single man. My residence at the Pennsylvania Hospital long since taught me the proprie-

ty of accommodating the diet of every individual to the state of his indisposition; this cannot be done, when diet bills are established and suspended in the wards. But for the sake of regularity, let those, who are on the point of being discharged, or who are in *such a state* of convalescence as to be able to consume a full ration with impunity, be formed into a mess, in a *room* by *themselves*. The stomach of a sick man revolts at the sight of a large joint of meat, the appetite and state of the disease in this class of patients should be consulted, and the surgeon in his prescriptions should order any little delicacy that may be acceptable, that the hospital affords; and surely if it be supplied with every thing that our country abounds with, the surgeon can find no difficulty in making a proper selection; hence the propriety of permitting the steward to make purchases. At first view, many will suppose this plan extravagant, but I will venture to assert, that the subsistence of *each* patient will seldom *average* more than the value of a ration per day; I mean in any part of the United States. Where is the use of drawing a full allowance of beef or pork for a man who cannot eat an ounce? Is it not better to expend the value of it in a *squab pigeon* or some *other deli-*

cacy? A *matron* should also be attached to the hospital, who should superintend the nurses and servants, and be charged with the general cleanliness of the house. There should be *sober, honest, humane* and *cleanly* nurses allowed according to the number of patients, who should be hired by the steward with the approbation of the surgeon. They should receive their pay monthly and the amount charged in the steward's account; the same plan should be adopted with all others employed in the hospital, except those who have been drafted from the army; these of course will receive their pay from the paymaster of the regiment to which they belong. This class should all receive a full ration.

A guard should be allowed each military hospital; to a naval hospital a porter, unless there be *marines* in the vicinity to furnish a guard. They should prevent all patients from going out without a written or printed ticket, signed by the surgeon; they should prevent spirituous liquors from being taken into the house, and all improper communication with the inhabitants, in the neighbourhood of the hospital.

A hospital thus regulated will consist of the following persons, viz.

A surgeon, who should also be a physician.

Surgeon's assistants, who may be divided as in the French service into *grades* or *classes*, as 1st; 2d, 3d, &c.

A steward.

Deputy steward to act as *ward master*.

Matron.

Nurses, cook, servants and laundresses.

In making choice of an hospital to contain a great number of men, it will be necessary to procure a large commodious building, if situated on an eminence the better, but distant from *marshy exhalations*, heaps of dung, or vegetable or animal substances, in a state of decomposition; it should be in the neighbourhood of *good water*. Open fire places should be preferred; if it be a large public building, the apartments may be warmed by stoves, but great care should be taken to ventilate them frequently. In summer, for moveable or flying hospitals, large barns and the largest airy houses should be chosen. If the privies attached to the buildings be not deep, a layer of earth should be thrown in every morning, and when nearly full, a new fosse should be dug, and the old one filled up; or if there be a *running* stream of water near, a necessary may be built over it. At fixed hospitals, lime should be

thrown into the privy every day during the hot weather.

The wards should be kept as *sweet* and *clean* as possible by frequent *white washing* with lime, and by scouring the wood work and benches frequently with *ley* or *potash* and water, or with lime water. The steam from vinegar may be made to pass through the different parts of the house occasionally by dropping a hot shot into vinegar, or by pouring vinegar on a heated shovel; fumigation by nitre, gunpowder, &c. has been recommended, but the *greatest dependence* should be placed on *cleanliness* and a *frequent renewal* of the air in every apartment; for this purpose different ventilators have been proposed. In wards that are too close, says doctor Monro, it has been found that one or two holes about eight or ten inches square, cut in the ceiling, and a tube made of wood fitted to them, and carried up into the chimney of the ward above, is one of the best contrivances for procuring a free circulation of air. A hole cut above the door of a ward, or in the upper part of the windows, and a chamber ventilator fixed therein is also recommended. When the atmosphere is calm, or the current of air too weak to facilitate the escape of the portion within side, it has been proposed

by Maret, a physician of Dijon, to suspend in the window the most favourably situated, a chaffingdish of coals, which by rarefying the air at that point may determine thither a current possessing a sufficient rapidity to traverse the ward, and carry off with it a part of the infected air. Openings may also be made through the wall near the floor of the wards, to permit the air to enter; where chaffingdishes with lighted coals may also be placed to rarefy the air within, and produce a current of fresh air from without; these openings may be closed in cold weather by doors fitted to them, and opened occasionally.

It is unnecessary to remark that in crowded hospitals, the exhalations from the lungs and bodies of men in fevers, the emanation from wounds, gangrenous parts and carious bones, besides the vapours arising from the beds and *other sources*, show the necessity for the frequent renewal of the air. The air thus impregnated frequently produces melancholy effects. We see ulcers, which wore a healthy aspect, become spongy and gleety; amputated stumps deluged with matter; and fevers, originally intermittent or remittent, assuming all the symptoms of typhus gravior. This alone ought to point out the necessity of making a timely se-

paration of these cases, and of adopting every means in our power of preventing this dreadful catastrophe. If the construction of the building chosen for a fixed hospital will allow a windsail to pass through the roof, I would recommend the use of it; it conveys a large column of air; it ought to be constructed with two or more legs or branches, for the purpose of conveying fresh air into the different wards; the current should be directed along the floor to displace that which is contaminated by the exhalations from the sick.

The smoke from the lamps should be conveyed out of the wards by means of a tin conductor. Holes may be bored *in the walls*, especially in the angles of the wards, and corresponding holes from the *floor* to the ceiling, which causes a current of air to pass through them and removes the stagnant air.

I have long supposed that the production of an hyperoxygenated atmosphere, in wards where typhus gravior prevails, would be attended with beneficial consequences, under an idea that there is a deficiency of oxygene in these apartments; but late eudiometrical experiments prove, that there is very little or no change in the *component parts* of the air in the wards of hospitals, therefore it must be the exhalations

or excretions of the sick, that we are to consider as the vehicles of contagion; these impregnate the atmosphere with a *noxious matter*, which has not been discovered by *chemical tests*, by those who are fully competent to the task. The celebrated baron Humbolt and Gay Lussac instituted a series of experiments to ascertain the component parts of the atmosphere in different places; they prove that, in general, it does not vary in its composition; they therefore say that we "must seek for the cause of the differences which some have *imagined* they had discovered in it, in the local circumstances under which it was analyzed. Volcanoes upon high mountains, particular fermentations, water issuing from a marsh or a lake, might perhaps in some degree impair the purity of the air in contact with them, either by depriving it of oxygene, or by exhaling into it non-respirable elastic fluids. But how trifling must not this diminution of the proportion of the oxygene be, in so large a mass of continually agitated air, when we consider that in places, where a great number of individuals is collected, or in those where there seems to exist a *focus of infection*, the air nevertheless experiences but very slight variations? We have analyzed two portions of air one of which

was collected in the pit of the Theatre Francais, immediately before the curtain was raised for performing the after piece, three hours and a half after a great number of spectators had assembled; and the other which was collected three minutes after the entertainment had ended, in the most elevated part of the house. These two portions *scarcely* rendered lime water turbid; the atmospheric air indicating 0.210 of oxygene; the air of the pit indicated only 0.202 and that of the highest part of the house 0.204.

Analysis of the Atmospheric air.	Of the air of the pit.	Of the air of the highest part of the building.
200 Atmosph. air.	200 Atmosph. air.	200 Atmosph. air.
200 Hydrogene.	200 Hydrogene.	200 Hydrogene.
126 Air absorbed.	123.5 absorbed.	122.5 Absorbed.
21 Oxygene.	20.2 Oxygene.	20.4 Oxygene.

For further experiments on the air, see appendix.

M. Seguin has also analyzed the air of hospital wards, which he had kept *closely shut* up for the space of *twelve hours*, and found it to be *almost* as pure as the atmospheric air, although it had an *insupportably infectious smell*.

If therefore, even under circumstances the most favourable to the absorption of the oxygene, the air does not lose *one hundredth* part of it, we cannot thereby account for the sense

of anxiety, which we feel in close and crowded apartments, or the maladies which are peculiar to the vicinity of lakes and marshes or to certain countries. Under some circumstances they will be produced by emanations, which elude all our eudiometrical means and which act in a peculiar manner upon the human body. Thus a bubble of sulphurated hydrogen gas, of oxygenated muriatic acid, a putrid exhalation, even a flower may fill an immense space with their odour, and astonish our imagination by their extreme subtilty, even when we are ready to sink under their action. The pestilential miasmata may be equally subtil without being the less deleterious, and equally elude all our means of analysis.

Fortunately, if we cannot seize these atomic substances and determine their nature, we may at least, after the labours of M. Guyton which have been productive of such benefit to mankind, destroy their action. But under other circumstances, maladies may arise from the humidity of the air, from its temperature, from its electric state, or in general from the state of the atmosphere with respect to the peculiar state of the individual affected; and in these cases, which may be very frequent, the malady may make great ravages, without its being pos-

sible to arrest its progress; it would therefore be illusory to attribute all to a single cause, when the state of the human health depends upon the concurrence of all the circumstances under which men are placed.*

There are various opinions entertained respecting the purification of the air, and on the mode of destroying the contagion in hospitals by the methods recommended by M. Guyton and doctor Carmichael Smith. In France and Italy, I have heard the former spoken of in the highest terms. But many scientific gentlemen in America and England contend, that the nitrous gas of doctor Smith is no other than the *matter of contagion*, or the *pestilential fluid*. Professor Mitchell of New-York, in a letter to doctor Trotter, says, that this practice (nitrous fumigation) appears to him to be one of the most preposterous and ill contrived that could ever enter the head of man."† Whilst men of the first respectability,‡ in point of talents as chemists and philosophers in France, have demonstrated by experiments, that the fumigation by mineral acids will destroy or

* Repertory of Arts, Manufactures, &c. vol. 8.

† Trotter's Nautica Medicina.

‡ Baron Humbolt, Gay Lussac, Chaptall, Lassone, Cornette, Lavoisier, Fourcroy, Odier and others.

neutralize the deleterious animal miasmata, and have advocated and recommended the practice.

“De tous les procédés, un des plus *sûrs*, des plus simples, des moins dispendieux, et celui qui exposeroit le moins aux accidens du feu sur les vaisseaux, c’est celui du savant chimiste Guyton-Morveau, membre de l’Institut national de France, qui consiste à repandre les vapeurs de l’acide muriatique, ou de l’acide sulfurique combiné avec le muriate de soude. Une méthode très-avantageuse pour en faire usage, est celle qui a été mise en pratique dans un hôpital militaire très-vaste par Chausier.”*

As I have never had an opportunity of witnessing the effects of Morveau’s or Smith’s plan of destroying infection, I cannot say any thing on this subject, except that experiments must decide the point; and proceed to give some account of the manner of conducting the process, reserving for the appendix a particular description of the apparatus. The vitriolic acid is poured gradatim upon the muriate of soda, in a “vessel adapted to the purpose, which is

* Nouvelle Hygiène Militaire. Par Revolat, M. D. Université de Montpellier, &c. &c.

carried through the different wards, and the gaseous acid is diffused equally, the quantity of vapour may be furnished at pleasure, the manner of using it does not occasion any inconvenience to the sick. The dose ought to be increased or diminished in proportion to the space to be purified.

“Thirty decagrammes, which correspond to nine ounces six drams, of common salt, and twenty four decagrammes, or seven ounces seven drams of sulphuric acid will suffice for a ward containing twenty beds, spacious and elevated. For a chamber of less size or whose surface is from twenty five to thirty metres* square, not more than ten decagrammes of salt and eight of acid are required. In very large apartments, we must distribute small apparatus in many places, each containing four or five decagrammes of salt and two thirds in weight, of the sulphuric acid.

“The addition of a small quantity of the black oxyd of *manganese* to the muriatic acid, will give the *oxygenated muriatic acid gas* and increase the efficacy of the preservative. The proportions considered most convenient by Guyton Morveau, are for a ward of ten beds,

* Metre is equal to 39.371 English inches.

ten decagrammes of salt, two decagrammes of the black oxyd of manganese reduced to a powder and triturated with the salt, four decagrammes of water and six decagrammes of sulphuric acid.”*

But let us resumè the subject on the internal arrangement of hospitals. When the bed clothes or body linen have been exposed to the exhalations of the sick; particularly those that have been used by men in infectious diseases, they should not be thrown in a heap, in a wash house, which is too often the case; for by this means, the noxious effluvia are as it were multiplied, and will with more certainty infect others; this has been remarked by doctors Lind, Trotter and many others, who have had a great deal of practice in naval and military hospitals. Hence the propriety of putting the clothing and bedding, as soon as they are removed from the wards, into a vat or large tub of *ley* or *potash* dissolved in water, to cleanse them; hot water alone is generally used in foreign hospitals. Dr. Trotter is of opinion that *heat* is the most powerful corrector of contagion. It will therefore be proper to expose woollens, &c. to the heat of ovens.

* Nouvelle Hygiène Militaire.

The *wards* of an hospital should never be crowded; two, three,* or more patients should not be placed in the *same* bunk; there would be more humanity in placing them in an open field, where they would have some chance to recover. Six feet, by seven or eight should at least be allowed each man according to the height of the ceiling. Every hospital should be supplied with cases for beds and bolsters, also with sheets, blankets and pillow cases, and for the sake of neatness in permanent hospitals, each bed should have a bedspread; they would not cost more than a dollar a piece. The bed cases should be made of coarse linen, but woven close to prevent the points of the *chopped straw*, with which they are generally filled, from irritating the skin of the patients; they should be emptied at least once a month, and the straw renewed. Fixed hospitals should have bedsteads or cradles, but in *flying* hospitals, ("hôpitaux ambulans of the French") and regimental hospitals, the bedding must be laid on the floor.

As permanent hospitals are generally crowded with the worst cases of disease, they should

* I have seen three miserable objects, ill of fever, in one bed!

be supplied with a quantity of shirts to change those who are ill, whose situation requires a frequent change of bed and body linen; after having been used, they should be washed and returned into the store; each should be marked as hospital property. It would also be proper to have a few shirts in the regimental hospitals. The wards ought to be supplied with *night stools* and *tin urinals*; the former should always have some pure water or charcoal in them. The sick should be properly distributed in the wards; men with wounds, ulcers, fevers, itch, &c. should not be placed in the same apartments.

Every man on his arrival at the hospital should be washed in a warm bath to cleanse his skin, and a clean shirt should be put on before he is conducted to his bed, unless the state of his disease prohibit it. For this purpose, I propose to have a *portable shoe bath* for regimental hospitals; it would be a convenient appendage to hospital furniture, not only for using the warm or cold bath to cleanse the patients, but as a remedy. I propose having it made, in the form of the common tin *shoe bath*, of *strong canvas*. In the upper part of it there should be loop holes to pass a hoop through, to keep the mouth distended, when it is used;

there may be handles at each end. The external surface should be painted, and when dry, it may be folded up and put into the baggage waggon. It may also be made of *leather*.

As soon as a patient dies, he should be removed out of the ward; the bed clothes, &c. sent to the wash house, and his effects taken care of by the ward master.

All convalescents should be mustered every Thursday and Sunday morning, to see that they are clean; every person who takes off his *clean clothes* to *save* them for *another* muster, should be punished by confinement to the house, or by a stoppage of his allowance of wine or beer.

An officer should be appointed on convalescent duty, who should be instructed to visit the hospital weekly or oftener, to receive such men as are fit to be discharged.

“ When a flying hospital is to attend an army, a quantity of bedding and of all utensils for forming an hospital ought to be put up in waggons, together with provisions of different kinds, such as oatmeal, rice, chocolate, tea, sugar, tapioca, wine, &c. a butcher with a stock of live cattle, and a baker with a proper quantity of flour for making bread ought constantly to attend; a number of empty waggons should

always be in readiness to transport the sick, when the hospital moves, or when a party is to be sent to the fixed hospitals."

I have often considered how much the sick and wounded must suffer by transportation in *common waggons*, from a camp or field of battle to the hospitals; to remedy this evil, I propose that a number of frames be made of the length and breadth of the common sized waggons which attend the army; to the *side pieces* of these frames, strong canvas should be nailed, as a sacking bottom; the end pieces should be constructed so as to be taken off at pleasure, and rolled up with the two side pieces, and put into a baggage waggon when they are not wanted for use; to the two side pieces, should be permanently attached, or ready to attach, four hooks with springs; these hooks and springs should be strong enough to suspend the weight of several men, and should be sufficiently open to fix them on the side of the waggon; by this means the sick or wounded would ride perfectly at ease, as though in a cot. One waggon would carry a sufficient number of these cots to load forty or fifty waggons with sick and wounded men.

"Dr. Monro advises a small quantity of medicines, some wine, rice and portable soup,

also utensils and bedding for a small regimental hospital, which he says should be carried about with the army in case of an action for the use of the sick and wounded, until the surgeons have time to receive assistance from the flying hospital; some of the bedding should be carried on horse back to be at hand when any of the surgeons are sent with detachments that are going upon an attack. To prevent crowding the general hospital when in winter quarters, every regiment ought to have an hospital; a large private house should be fitted up for the purpose; the worst cases may be sent to the general hospital."

To conclude the subject of hospitals, I must again remark, that cleanliness, on account of its decided influence on their salubrity, requires particular attention from those who direct their internal arrangement; regulations on this head should be *strictly* enforced. The whole may be summed up in the following.

1st. The wards should be kept free from every thing that will generate *noxious* or *disagreeable* effluvia.

2dly. The sick should not be crowded together and should be frequently cleansed.

3dly. The utensils for the use of the patients should be kept perfectly clean.

4thly. Woollen clothing and blankets should be frequently exposed to the air; if they have been employed in wards where infectious diseases have prevailed, they should be heated in an oven or fumigated either by the fumes of burning sulphur, of nitric or muriatic acid, or buried in the earth for a few days.

5thly. The linen clothing, sheets, etc. should be put into a vat of ley, before they are washed.

6thly. The walls should be white washed *with lime* and the wood work and bedsteads scrubbed with ley frequently.

7thly. In the summer season, ventilation should be frequently recommended, also in the winter, if the patients will not suffer from the cold air; in the winter, there should be fires in the *chimney places* to excite a current of air, the number of these should be in proportion to the size of the wards; or Salmon's stove with *aspirators* may be used with advantage.

8thly. Lime should be thrown into the necessaries occasionally; and strict *discipline* observed among the nurses and convalescents.

HOSPITAL SURGEON.

ON entering on the duties of his appointment, he should make out and deliver to the proper officer (purveyor of the army or navy agent) proper estimates of medicine, instruments, hospital stores, bedding, utensils and such other articles, as he may think necessary for the use of the hospital, which the purveyor or agent will order to be furnished. In order to facilitate business, these estimates should be made out under their respective heads, that the purveyor or agent may not be obliged to dissect the indent, before he issues his order to the apothecary, tinman, grocer, etc. to furnish them. Medicines and instruments should be placed under the care of his assistants; hospital stores and furniture in charge of the steward; these persons should be responsible to the war or navy department for all losses sustained, unless by accident or an enemy.

As the hospital is instituted for the sole purpose of contributing to the relief of the sick and wounded, the person appointed to this important trust should visit it twice a day or oftener, as necessity may require, to prescribe and attend generally to all cases committed

to his care. No hospital stores should be issued by the steward without a written order from the surgeon, with the quantities annexed; a daily list should also be given of such men, as are to be furnished with a full ration. He should direct the steward to procure such articles, as *he may* think proper for the sick, which the hospital stores do not furnish, and regulate generally, the quantity of provisions and other articles to be daily issued. He should examine and sign the steward's monthly account of purchases under his order, and the expenditure thereof. Also the general expenditure of stores.

He should keep a book, in which he should record the names of the patients admitted into the hospital, the regiment they came from, the name of the commander of the regiment and company, disease, date of admission, of discharge or death; and if discharged, to whom delivered.

He should abstract from the ward books, a list of the patients under his care, the general method of treatment and event, together with such observations as he may consider of consequence; in this book he should keep a general account of the weather, and such topographical remarks as his duty will permit him to

make; a copy of which should be deposited in the war or navy departments, whichever he may act under. He should be, at *all times*, prepared to make a return of the situation of the hospital to the director or surgeon general. It has been usual to direct a book to be kept, to enter the expenditure of medicines; this I will venture to say is almost impossible without a clerk for the express purpose; especially when it is considered that they are issued in half grains, grains, scruples and drams. But for the satisfaction of the surgeon, that he may know the quantities on hand, they may be weighed every six or twelve months; which, deducted from the original supply, will leave the quantity expended. In this case the *integrity* of the surgeon and his assistants must be confided in; the same will apply to regiments and ships of war. If there be any well founded suspicion, the sentence of a court martial should place them, in that disgrace, in which they ought ever to remain.

When men are recovered, they should be discharged weekly or twice a week, and delivered to the sergeant of the guard or to the officer on convalescent duty.

He should file the *statements of cases* sent with the patients from the different regiments.

To conclude, hospital surgeons or physicians should minister to the sick, with due impressions of the importance of their office; reflecting that the ease, the health, and the lives of those committed to their charge depend on their skill, attention, and fidelity. They should study also, in their deportment, so to unite *tenderness* with *steadiness*, and *condescension* with *authority*, as to inspire the minds of their patients with gratitude, respect, and confidence.

FORM OF THE SURGEON'S HOSPITAL BOOK.

List of Patients admitted into the United States Hospital at —.

No. admitted.	Names.	No. of Regt.	Commander of the Regiment.	Company.	Disease.	Date of Admission.	Date of Discharge or Desertion.	Death.	No. remaining.	To whom delivered.
1	James Simmons.	16	Col. T.	Capt. F.	Hepatitis.	1808. July 10.	1808. Sept. 16.		1	Sergt. Thornton, Capt.
2	T. F.	10	Col. K.	Capt. C.	Diarrhoea.	—	Aug. 4.	1808. July 12.	2	F. Company.
3	S.	10	—	—	Typhus.	—	—		3	
4	G. C.	10	—	—	Veneral.	—	—		4	
5	K.	10	—	—	Dysentery.	—	—		5	
6	W. B.	9	Col. C.	Capt. B.	Dysentery.	—	—		9	
7	E. I.	9	—	—	Dysentery.	—	—		9	
8	K. W.	9	—	—	Cholera.	—	July 16.		9	
9	I. C.	9	—	—	Diarrhoea.	—	—		9	
10	F. W.	7	Col. E.	Capt. O. B.	Cholera.	—	—	1808. July 15.	9	
11	L. F.	6	Col. O.	Capt. W.	Remittg. Fever.	—	—		10	
12	I. R.	6	—	—	—	—	—		14	
13	T. E.	6	—	—	—	—	Deserted, Aug. 20.		15	

The number of deaths and discharges deducted every evening from the number in the first column will leave the number to be supplied with provisions the following day. Thus, there was one death on the 12th day of July, but as it is presumed that the patient lived during part of that day, provisions and Hospital stores were issued for him; consequently his name should not be deducted from the number of patients in the Hospital until the day following, when there would have remained but 8, had not a patient been admitted on the 13th of July, the number consequently remained the same as the day before, and so on for any number of patients.

HOSPITAL ASSISTANTS

SHOULD attend at the dispensary daily at the hour appointed by the surgeon, to go round the different wards with him. Each assistant should have a ward or a number of patients allotted to his care, and should record in a book kept for that purpose, the name, age and rank of every patient, the regiment to which he belongs, date of his admission, and the length of time he was ill before he was sent to the hospital, the symptoms of his disease, surgeon's prescriptions, the changes, &c. which may take place. Assistants should be authorized to prescribe for all patients that may be brought to the hospital during the absence of the surgeon; to *designate* their *prescriptions*, they should be written with red ink; but in all cases of consequence, the surgeon should be sent for, as he is the responsible person. The assistants should make up all prescriptions, *dress* the wounds and ulcers* of those who are com-

* This is a *duty* which should be punctually attended to; I have seen patients with ulcers, in hospitals for months, where dressings are given out to the patients themselves. There is more benefit derived from the *manner* of dressing ulcers and *applying bandages*, than in the usual unguents.

mitted to their care, and execute whatever orders they may receive from the surgeon. They should visit, at unstated times, the different wards, to see that each man takes his medicines as prescribed, and that they be supplied with the nourishment as directed; also to detect all deviations from the *discipline* of the hospital. They should pay strict attention to the cleanliness of the different wards, and if foul, report them to *the matron*.

All instruments and medicines should be under the special care of the hospital assistants.

One or more of the assistants should reside in the hospital. One should attend constantly to receive the patients; this, to preserve harmony, may be in rotation, but none should be absent without special permission from the surgeon.

THE STEWARD

SHOULD be a man of strict integrity and sobriety; he should take charge of, and be responsible for, all stores and hospital furniture, furnished on the surgeon's requisition for the establishment of the hospital. He should purchase such articles for the hospital as the sur-

geon may require for the use of the sick, which the public stores do not supply. He should keep a regular account of the number of patients and persons employed in the hospital, who are daily victualled, and the quantity of hospital stores he issues; for this purpose he should keep *two books*. In one, he should open an account for *every article* of hospital stores that may be committed to his care; he should debit each article with the quantity received. The other book should be ruled with a number of columns. In the first column, he should enter the day of the month; in the second, the number of persons who are *employed* in the hospital, who receive daily a full ration; in the third the number of sick; and each of the other columns should be headed with the *different* articles of hospital stores, reserving one column marked dollars and cents, for the amount expended each day for the fruit and vegetables which may have been purchased for the sick.

Opposite to the days of the month, the quantity of the different articles issued, should be carried out under their respective heads. At the *end* of every month, he should *add up* each column, and *transfer* the amount expended to the *credit* side of B. No. 1, or ledger, where

the articles are entered.* By these means, we may know what is the daily amount of the subsistence of the hospital; and by adding up the *credit* side of the ledger or B. 1., and deducting the amount from the debit side, we may ascertain the quantity of stores on hand. When these books are prepared there is very little difficulty afterwards. The number of sick in the third column *must of course correspond* with the surgeon's book of admission and discharge; consequently his book will be a check on the steward's. The steward, like a purser in the navy, should be allowed a certain per cent. for loss sustained by leakage and by serving out articles in small quantities.

The quantity of provisions, necessary to be drawn each day from the commissary's department, should be regulated by the surgeon, as it is unnecessary to draw beef, &c. for men who cannot eat it.

If a hospital be situated in a town, I think it would be better for the steward to purchase *every article* that may be wanted. Those, who are employed in the hospital, as nurses and servants, should *be obliged* to draw their ration to prevent them from purloining from

* See the form.

the sick; they should be formed into *one mess*, or live in common on the rations of the house. If the surgeon's assistants do not mess in the house, or draw their rations, they should receive a *due bill* from the steward monthly; but it would be preferable, and cheaper, for them to reside in the hospital and draw their rations.

The steward should preserve order in the house; he should suffer no *gaming* or riotous behaviour; if in the night, he should be authorized to confine in an apartment, reserved for the purpose, all disorderly nurses or convalescents, and should report them to the surgeon the following day, that he may adopt such measures, as he may think necessary. If this disorderly conduct happen in the day, he should report it immediately to the surgeon.

THE WARD MASTER OR DEPUTY STEWARD.

THE ward master under the direction of the steward, should receive all the clothing belonging to the men brought to the hospital, and see that it be *immediately* cleansed. He should also take charge of their arms and accoutrements, and deposit them in a room set apart for that purpose, which should be so arranged, that

he may be able to put his hand on any article that may be wanted, when the men are discharged. He should keep a book, wherein he should register the name of the soldier, the regiment and company to which he belongs; the number* of his musket, bayonet, and other accoutrements, that the same may be delivered to him, when he is discharged, or in case of death, to the person authorized to receive them. On their delivery to either, he should take receipts, otherwise he may still be held responsible. If the arms and accoutrements are not brought to the hospital, he should make an entry thereof. He should occasionally walk through the wards of the hospital to see that no improper conduct takes place among the patients or nurses, and if any, to report the same to the surgeon. He should call a *roll* every morning in the different wards to see that the men are in the house; the same should be done in the evening, when the doors are closed; all absentees should be reported to the surgeon or his assistants. He should also be empowered to order every person out of the wards, who does not belong to them, when the

* The arms and accoutrements of each man ought to be all of the *same number*; this, in camp, would prevent confusion.

doors are to be closed. He should walk round the wards every evening, at the hour appointed, to see that all *lights* are extinguished except those which are absolutely necessary for the use of the sick, and that the fires are safely covered up in the cook's apartment.

On the death of a patient he should take an inventory of his effects and deliver them to the steward.

FORM OF A BOOK TO BE KEPT BY THE WARD MASTER.

Date.	Name.	Regiment.	Company.	No. of the Musket.	Bayonet and Belt.	Cartouch Box and Belt.	Knapsack.	Canteen.	When delivered and to whom.
1808. July 1. 1.	John Eatfire. T. Standfast, &c.	Col. B. * ditto.	Capt. T. † Capt. F.	506 430	506 430	506 430	506 430	506 430	1808. July 25. John Eatfire. 7. Sergt. Kigler, by order.

* Or the number of the Regiment.

† I have observed, that for the sake of regularity, it would be well to have all the accoutrements numbered the same as the musket.

THE MATRON

SHOULD be a discreet, humane woman; the *wife* of the steward should be preferred for this situation. She should go round the wards of the hospital frequently, to see that the nurses keep their wards, the patients, and bedding clean; that they behave themselves soberly and regularly, and are attentive to the sick. She should examine the diet of the patients to see that it is good and well dressed. She should report all irregularities. She should attend *generally* to the cleanliness of the house and bedding, and should superintend and direct the servants employed in the hospital, and see that there is no embezzlement of public property. The bed linen and hospital shirts should be kept in her possession.

THE NURSES

SHOULD be attentive, sober, discreet and humane women.

They should pay great attention to the sick, that they may not be left to their own feeble efforts to rise from their beds, but when very low, they should be furnished with a *bed-pan* or *urinal*.

They should be attentive to give the medicine prescribed regularly to those who are confined to bed, and see that all others take their medicine as directed. They should be particularly attentive to those who are confined to their beds, that they have nourishment, that they lie comfortably, that the face and hands of every patient be washed, that the mouth, lips and tongue be moistened and cleansed from fur, &c.; these and many other apparently trifling duties are necessary, which the surgeon or his assistants will of course direct. Attention should likewise be paid in the night, that she may be able to report to the surgeon, whether the patient's sleep was sound and refreshing, &c. Much depends on good nursing for the recovery of patients. The nurse should always have it in her power to say, that she discharged her *duty conscientiously*. Nurses should be formed into classes to take their tour of night duty.

I have said nothing respecting *orderly men* in hospitals; they are generally so *disorderly* that I would always avoid having them, if nurses can be procured. But if the sick must be intrusted to their care, they should be *instructed* to pay as much attention as a nurse.

THE COOK

SHOULD be careful that the meat, soups and all other articles for the use of the sick be properly prepared. That the kitchen utensils be kept clean and properly arranged. He should always have a large kettle of hot water over the fire in readiness for use. He should *bake fresh bread* daily for the use of the hospital, when the same is not furnished by a baker. He should not suffer the patients to interfere with his duty, but should be particularly attentive to the orders of the steward and matron.

The following regulations were established at the naval hospital in Syracuse. I found them sufficient for my purpose. There was no matron, steward, or ward master attached to it.

Regulations of the Hospital.

1. Every patient on entering the hospital shall be washed, his linen shifted and hair combed.

2. No dirty clothing or bedding shall be brought into any of the wards; but shall be deposited in the washhouse to be cleansed.

3. The hands and face of every patient

shall be washed, and the hair combed every morning; the feet shall also be occasionally washed.

4. Every patient shall be shaved three times a week, viz. on Sunday, Tuesday and Friday; and shall change his linen as often as may be thought necessary.

5. No person shall spit on the floors or walls of the hospital; but must endeavour to keep the house as clean as possible. No smoking of *tobacco* shall be allowed *in the wards*.

6. No spirituous liquors shall be brought into the hospital on *any pretence* whatever. Every person who may be found intoxicated *shall* be punished.

7. No patient shall leave the hospital until he be regularly discharged; or go out without permission, nor remain out after sunset, without *special permission*. The doors of the hospital must be closed at sunset, and no patient suffered to go out after that period. The doors shall be opened at sunrise.

8. All lights shall be extinguished in the wards at 9 o'clock, during the winter, and ten in the summer, except those which are absolutely necessary for the sick.

9. No women shall be suffered to enter the hospital without permission.

10. No patient shall, without permission from the surgeon or his assistants, go into the *kitchen* or nurses' apartments.

11. All convalescents shall breakfast, dine and sup together at regular hours, viz. at 8, 1 and 7 o'clock, during the summer, and at 8, 1 and five in the winter.* No patient shall carry his victuals to his bed; the nurses shall attend those with proper nourishment, who are confined to their beds.

12. Every patient who shall break any of the established regulations of the hospital, or shall behave in a *disorderly, riotous* manner shall be confined and reported to the commander in chief of the squadron, or during his absence to the senior officer in port.†

13. The nurses are to give due attendance to the patients, and keep those who are confined to their beds as neat and clean as possible; to give the medicines as directed or see it given, also such nourishment as may be prescribed. They are to report all irregularities to the surgeon or his assistants. The wards

* This regulation may be dispensed with when the situation of the convalescent requires him to eat a little and often.

† If the situation of the patient will permit, exemplary punishment for riotous behaviour should be adopted.

are to be swept and the beds made up every morning before 10 o'clock, during the winter, and at 8 in the summer. The bed linen shall be changed *every week* or oftener if it be necessary.

14. No nastiness of any kind shall be thrown out of the windows; chamber pots and pans must be emptied as soon as possible after they have been used, and washed before they are brought back to the wards.

15. It is expected that the nurses will keep themselves *clean* and *decently dressed*; they are not to leave the hospital without permission from the surgeon.

Porter.

16. He is not to permit any women to enter the hospital without permission, or suffer any one to bring liquors of any kind for the use of the patients or nurses; he is to be particularly attentive that no articles belonging to the hospital are carried away; he is not to permit strangers to saunter about the hospital gate or yard.

E. CUTBUSH, Surgeon.

Syracuse,
Dec. 22d, 1804.

PRELIMINARY OBSERVATIONS.

NAVAL MEDICAL DEPARTMENT.

THE regulations of government, in the medical department of the navy, ought to be such as to make the rank of surgeons *respectable*, and the *emoluments liberal*, that “the situation may be anxiously sought after, instead of being applied for, as a matter of necessity;” the abilities then of naval surgeons would correspond with the munificence of government, and none should be appointed, who are not fully competent to the task they undertake. It is proposed by doctor Turnbull, “to form naval hospitals into medical schools for the formation of naval surgeons alone, or that no appointments should be made in the navy until the candidates have finished a certain course of studies there.”

When a squadron is ordered to sea, in addition to the medical appointments to the respective ships, a fleet surgeon,* or superintending physician, forms a part of the establishment.

DUTIES OF THE FLEET SURGEON.†

THE fleet surgeon or physician generally embarks on board the hospital ship, or with the commander in chief of the squadron, according to the regulations of the service.

To achieve a glorious action, much depends on the health of a fleet. It is therefore the duty of the fleet surgeon, *before the squadron leaves the port*, to visit the respective ships, examine

* In the Russian service his pay is 1600 dollars per annum, and table.

† In the English service, *he must have served* as surgeon at least five years; his daily pay on his first appointment is one guinea, his half pay, half a guinea. Having served three years as a physician to a fleet or hospital, his full pay is one guinea and a half per day; his half pay 15s. per day. Having served in this capacity more than ten years, his pay is *two guineas* per day, his half pay, one guinea per day; when a residence is not provided for him ashore he is allowed *one guinea per week, lodging money*. The widows of physicians and surgeons are allowed a pension at the discretion of the lords commissioners of the admiralty.

the sick lists, and advise the removal of such cases to an hospital ashore, if there be not a probability of a speedy recovery on board, or in the hospital ship. I propose an hospital ashore, because there generally will be a *sufficient supply* for the hospital ship, after the squadron leaves the port. He should report the state of each ship to the commander in chief. He should also receive returns occasionally from the surgeons of the squadron, and should correspond with them on all cases of importance, especially on the appearance of any epidemic or contagious disease; from these returns, he should prepare a statement of the health of the fleet, for the commander in chief, and advise such measures, as he may think proper for the good of the service. He should likewise consult with the surgeons of the fleet in all cases of difficulty and danger. He should superintend *generally* the treatment of the diseases on board the hospital ship. He should keep a regular journal of his medical and surgical practice, and record all the various changes, that climate or other circumstances, either at sea or in port, may produce. He should make such remarks on the harbours, soil and water, as may tend to the benefit of the present or future operations of the squadron.

He should keep a regular meteorological journal.

An abstract of the most interesting part of his journals should be deposited in the navy department at the expiration of every cruise.

216 *Medical Department of the Navy.*

Abstract of Returns from the Surgeons of the United States
squadron under the command of _____ at _____

Ships' Names.	Complement of men.	Sick and wounded on board this month.	Sent to the Hospital in the course of last month.	Died on board last month.	Remaining Sick.	Prevailing Disease.
United States,	650	187	19	3	35	Influenza.
New Hampshire,	650	120	15	6	40	Influenza.
Massachusetts,	650	100	10	8	35	Influenza.
Rhode Island,	600	94	20	10	20	Dysentery.
Connecticut,	600	30		1	10	Intermittent.
Vermont,	600	80			12	Intermittent.
New York,	600	70			15	Intermittent.
New Jersey,	600	100	25	4	18	Dysentery.
Pennsylvania,	600	90		1	16	Intermittent.
Delaware,	550	60				Influenza.
Maryland,	550	45			5	Intermittent.
Virginia,	550	100	14	4	20	Remittent Fever.
Kentucky,	560	90		3	25	Intermittent.
North Carolina,	560	68			40	Influenza.
South Carolina,	500	95			35	Influenza.
Georgia,	500	100	20	4	50	Diarrhœa.
Tennessee,	510	120	25	10	52	Dysentery.
Ohio,	510	125	28	9	60	Dysentery.
Mississippi,	400	60			40	Intermittent.
Indiana,	380	40			20	Intermittent.
Orleans,	350	100	15	4	25	Dysentery.
Constitution,	417	70	15		30	Dysentery.
Congress,	380	90			40	Intermittent.
Constellation,	340	200			40	Influenza.
President,	400	150			30	Influenza.
Vesuvius,	80	10			4	Intermittent.
Vengeance,	60	6			2	Remittent Fever.
Spitfire,	40	4			6	Intermittent.
Etna,	50	8			2	Intermittent.
Total,						

October 31st, 1816.

L— M—. M. D.
Fleet Surgeon.

Admiral —

FORM OF THE STEWARD'S BOOK*. No. I.

Account of Provisions and Hospital Stores, received and expended at the United States Hospital established at — under the direction of J — K —, M. D. by C — T —, Steward.

Folio 1

1808 July	1	<i>Fresh Beef</i> † To H. L. con commissary	lb.	oz.	1808 July	31	<i>Contra</i> By amount issued this month as per B. No. 2.	<i>Cr.</i>		
	2	To C. C. purch folio 4								
1808 July	1	<i>Bread</i> † To H. L. Baker, 1	lb.	oz.	1808 July	31	<i>Contra</i> By quantity issued as per B. No. 2.	<i>Cr.</i>		
	2	Ditto								
	3	Ditto								
1808 July		<i>Flour</i> <i>Dr.</i> To H. L. contractor or commissary, or navy agent, for 10 bbls.	lb.	oz.	1808 July	31	<i>Contra</i> By quantity issued this month, vide B. 2.	<i>Cr.</i>	lb.	oz.
			1960							
1808 July		<i>Sugar, brown</i> <i>Dr.</i> To J. E. purveyor of the army, or navy agent, for	lb.	oz.	1808 July	31	<i>Contra</i> By quantity expended as per B. No. 2.	<i>Cr.</i>		
			500	8						
1808 July	31	<i>Milk</i> † To Kitty Gentle, being the amount supplied the Hospital this month	qts.	pts.	1808 July	31	<i>Contra</i> By quantity issued since the first instant, as per B. No. 2.	<i>Cr.</i>	qts.	pts.

Folio 2

1808 July	1	<i>White Wine</i> <i>Dr.</i> To J. E. purveyor of the army, or navy agent, for 3 qr. casks	gals.	qts.	pts.	1808 July		<i>ra</i> ided this month, as B. No. 2.	<i>Cr.</i>		
			90								
1808 July	1	<i>Porter</i> <i>Dr.</i> To J. E. purveyor of the army, or navy agent, for 6 doz.	No. bott.			1808 July		<i>ra</i> nded this month, vide 2.	<i>Cr.</i>		
			72								
1808 July	1	<i>Cash</i> <i>Dr.</i> To the purveyor or navy agent, or the officer or- dered to supply it	dolls.	cts.		1808 July	31	<i>Contra</i> By fruit and vegetables purchased this month for the sick, as per order of the surgeon	<i>Cr.</i>	dolls.	cts.
			100								
1808 July	1	<i>Candles</i> <i>Dr.</i> To the purveyor, or navy agent, for 1 box	lb.			1808 July	31	<i>Contra</i> Expended this month, as per B. 2.	<i>Cr.</i>	lb.	
Sept.	6	Ditto	100								
1808 July Sept.	1 6	<i>Spermaceti Oil</i> <i>Dr.</i> To the purveyor for 1 bbl. Ditto	gals.	qts.		1808 July	31	<i>Contra</i> Expended this month, as per B. 2.	<i>Cr.</i>	gals.	qts.
			31 30	2							

* This book may have an index to it like a ledger.

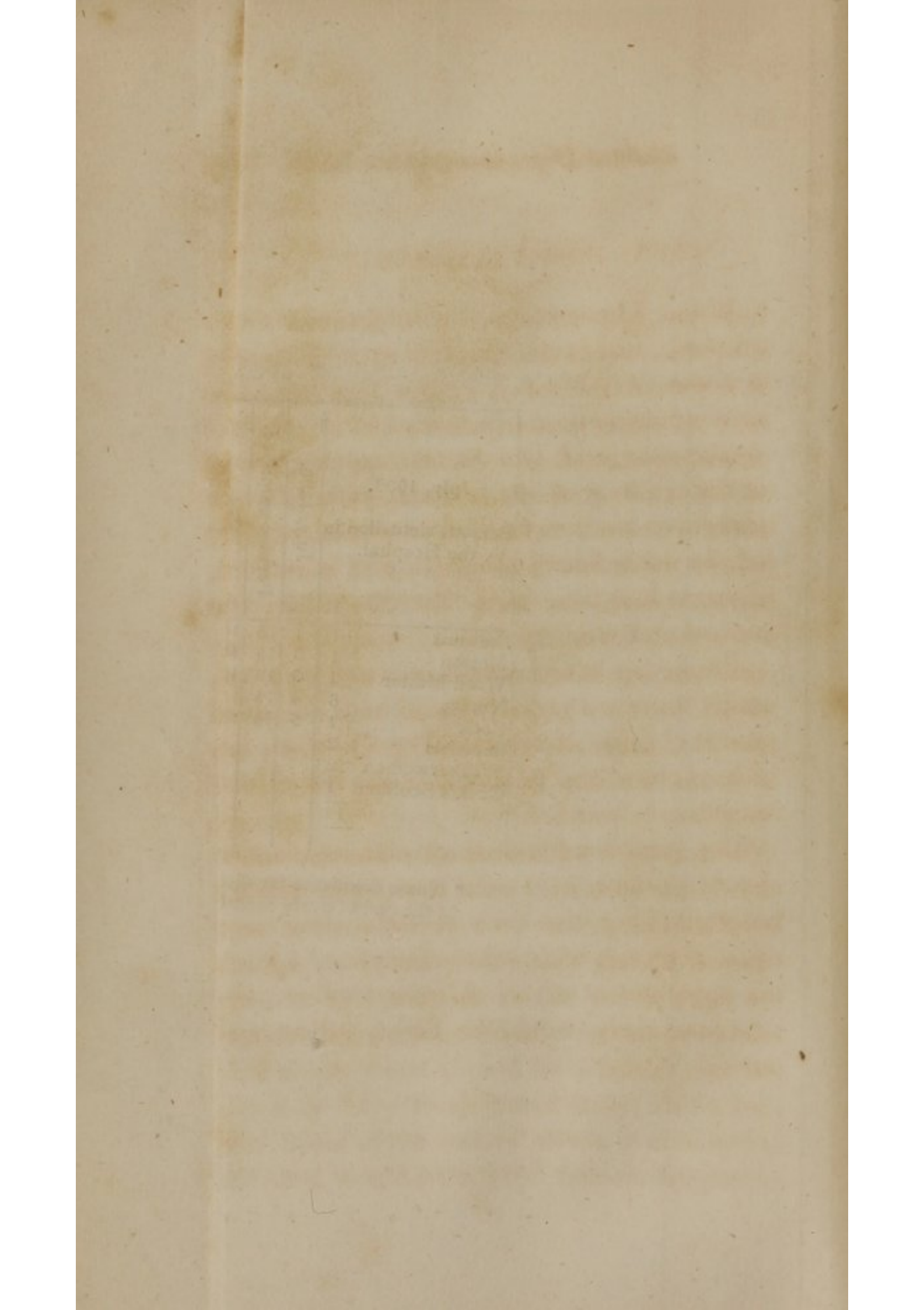
† If meat, bread, flour, milk or vegetables be supplied by the month, a due-bill should be given daily for the amount received, and a monthly order for payment, and the due-bills cancelled; unless the steward has an order to make purchases; in that case he should take duplicate receipts as vouchers, and enter the amount in his cash account. His vouchers should be numbered, and in rendering his account there should be a column referring to the number on the voucher, to prevent confusion. Pay not a *sous* without an order and voucher.

Daily Account of Provisions : Medical Stores expended at the United States Naval (or Military) Hospital, under the direction of —, M. D. at —

* Nurse dismissed for disorderly behaviour.
At the end of every month, the amount of the articles expended in each column is to be carried to the credit side of Book No. 1.

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NAVAL HOSPITALS, SURGEONS, &c.

WHAT I have said on the subject of military hospitals, surgeons, etc. will apply generally to those of the navy, except that the ward master having no muskets and accoutrements to take charge of, should take under his care all the clothing of the seamen, who may be brought to the hospital, and see that *every article* be immediately cleansed, and when dry, returned into their bags. Each bag should be marked and numbered with the owner's name, and hung up in regular order in a store room, which the ward master should have under his special charge. If the bedding of the seamen be brought to the hospital, it should also be immediately purified.

The same routine of duty and regulations should likewise be established, as in military hospitals. For the sake of conducting large naval hospitals with strict discipline, I think the appointment of an *old naval officer*, as a superintendent, would be highly advantageous.

HOSPITAL SHIP.

AN hospital ship should be large, dry and commodious, fitted up for the express purpose with cradles, bunks or cots; they *should not be crowded*. They should be supplied with mattresses, pillows, sheets, blankets, bedspreads, and all other articles necessary for the sick. Independent of the comfort attending these supplies, a sailor is pleased with this attention when he is sick, and performs his duty, when well, with more alacrity and cheerfulness; it is also a great excitement to heroic actions, when he knows that he will be taken care of; hence the great utility of those asylums in Great Britain for the reception of sick and disabled seamen.

An hospital ship should be supplied with bathing tubs; every man should be washed as soon as he is brought on board, and his linen changed; a quantity of which should be supplied for this purpose at the public expense. Besides the persons usually employed in hospital ships, there should be a baker, that the sick may have fresh bread daily; also a barber. Some of the sailors' wives, if attached to the ship, would make good nurses, far prefer-

able to orderly men. The utmost degree of cleanliness should be observed in all parts of the ship, particularly in and about the sick berths, which should be frequently white washed with lime. That no excuses may be made that the shirts, bed linen, etc. cannot be washed with sea water, a quantity of *potash* should make a part of the stores; a small quantity of it will make the sea water soft, and will cleanse the linen and other articles better than when soap is used. A small quantity of fresh water, distilled from the sea, may be allowed for rinsing the clothing. To obtain fresh water, a still head may be fitted to the largest boiler, with a pipe running through a hogshead, to answer the purpose of a refrigerator. The water thus obtained is not palatable, if drunk immediately from the still, but by being passed frequently through a drip stone or cullender, the air uniting with the water, gives it a brisk taste.

The ports, where the sick are, should have framed sashes fitted to them, made of bunting, to prevent too much cold air or moisture from entering the sick berths. The general regulations, under the head of "hospitals," and "regulations for preserving the health of seamen," will apply to hospital ships. They should be supplied with live stock and every article

necessary to render the situation of the sick as comfortable as in hospitals ashore. Three medical assistants are usually allowed to an hospital ship, but this must depend on her size and the number of the sick; therefore the fleet surgeon should recommend to the commander in chief, in cases of necessity on foreign stations, the appointment of as many as he may think requisite. Their duty will be the same as in hospitals. The purser or his steward should take charge of all supplies for the sick, and be accountable for their expenditure.

Monthly return of the sick and wounded received on board the Hygeia Hospital Ship, from the U. S. squadron under the command of _____.

From what Ship.	Remaining last month.	Admitted this.	Total.	Prevailing Diseases or Injuries.	Discharged.	Death.	Remaining.		
							Sick.	Conval.	Total.
United States,	30	10	40	Dysentery	18	2	12	8	20
New Hampshire,	20	10	30	Typhus	20	1	5	4	9
Kentucky,	15	9	24	Dysentery	15		7	2	9
Virginia,	15	10	25	Diarrhœa	16		6	3	9
Connecticut,	5	10	15	Venereals	12		3		3
Georgia,		12	12	Venereals	9			3	3
Tennessee,		8	8	Surgical Cases	4			4	4
&c.									

September 30, 1816.

J—— K——, Surgeon.

FORM OF A BOOK FOR AN HOSPITAL OR HOSPITAL SHIP.

General List of Patients received on board the Hygeia Hospital Ship, commencing July 16th, 1816.

No.	Names.	Rank.	Name of the Ship.	Commander.	When Received.	Disease.	Time of Discharge.	To what Ship sent.	Death.
1	J. Cook	S.	United States	Adm.—	1816, July 16	Dysentery	1816, Aug. 20	Vermont	
2	J. K.	L.	New-York	Capt.—	16	Syphilis	Sept. 1	Georgia	
3	T. M.	O. S.	Ohio	Capt.—	17	Remittent Fever	Aug. 25	Ohio	
4	T. M. 2	M.	Ohio		17	Remittent Fever	29	Ohio	
5	G. W.	S.	Virginia	Capt.—	17	Fracture	Sept. 25	New-Jersey	
6	R. S.	M.	Delaware	Capt.—	18	Fractured scull	Oct. 30	Kentucky	
7	W. H.	Mid.	Congress	Capt.—	18	Dysentery	Sept. 1	Congress	
8	S. A.	O. S.	Indiana	Capt.—	18	Typhus		Congress	
9	A. S.	M.	Tennessee	Capt.—	18	G. S. wound	Sept. 4	Tennessee	
10	O. J.	L.*	Rhode-Island	Capt.—	18	Diarrhoea	Aug. 12	President	
&c.									

If men are discharged from an hospital ship attending the squadron, they, of course, will be returned to the ship to which they belong, unless ordered otherwise. But if they have been sent ashore to an hospital, it will be better not to wait the arrival of the ship from which they were sent; but when fit to discharge, they ought to be put on board any of the squadron that may come into port; as seamen, when well, become troublesome; therefore the sooner we get clear of them the better. Instructions on this head should be received from the commander in chief of the squadron.

C.

* S. stands for seaman, L. for landsman, O. S. for ordinary seaman, M. for marine, Mid. for midshipman, Lieut. for lieutenant, B. for boy, Bn. for boatswain, B. M. boatswain's mate, &c.

Form of a Book for an Hospital or Hospital Ship, to show the Names, Diseases and Discharge of Men, &c. for each ship. Two or more pages may be allotted for every Ship.

United States.

No.	Names of the Men.	Admitted.	Discharged.	To what Ship sent.	Disease.	Death.	Receipt for the Man.
1	J. Cook, S.	1816, July 16	1816, Aug. 20	Vermont	Dysentery		Received J. R. Lieut.
2	W. C. M.	20	16	New-Hampshire	Diarrhoea		Received T. M. Lieut.
3	W. J. Mid.	21	14	Virginia	Diarrhoea		
4	J. K. O.S.	24	10	Vermont	Dysentery		Received J. A. Mid.
5	A. N. S.	25	30	New-York	Veneral		Received T. M. Mid.
6	W. P. B.	25	Sept. 15	Pennsylvania	Veneral		Received A. B. Lieut.

DUTIES OF A NAVAL SURGEON,

WITH SOME BRIEF OBSERVATIONS ON GUN-SHOT WOUNDS.

ON his appointment to a ship of war, his first duty is to *indent* for the necessary articles he may stand in need of. To *aid* him in this duty, I have added an estimate of the quantities of medicines, etc. which I have found, from experience, sufficient for a cruise of twelve months; from which, he may make choice of such articles as he may think proper, or add others; the choice of medicines depending very much on the mode of *practice* he pursues. The quantities may be regulated according to the number of men.

I would, however, advise him to avoid filling his medicine and store chests with unnecessary articles.

He will find it very convenient, and equally, if not more useful, to prescribe his medicines in the form of powders, pills, boluses, decoctions or infusions. He should avoid the use of tinctures as much as possible, if he had gallons, they would be expended in a little time; the spirit of which they are composed is a great inducement for sailors to be too *free*

in their *doses*, it may however, be proper to have a small quantity of the tinctures in common use, should necessity require them; these *should be made on board*; also elixir vitriol: elixir paregoric, linim: saponac: etc. The more *simple* his practice is, the better; I mean as it respects compounds. The farrago of articles, which too frequently enter prescriptions, ought to be dispensed with. He should avoid carrying a large quantity of ointments with him, as they are apt to become rancid; he had better have them made on board ship, their *purity* may then be depended on; even mercurial ointment might be made on board.

In order to expedite business, he should direct his mates (assistants) to have a quantity of such pills made up, as he is accustomed to prescribe, and which will not spoil by keeping. Before *he proceeds* to sea, he should have a sufficient quantity of bandages, of different kinds, and ligatures prepared. The bandages should be folded or rolled up and marked, and so arranged in the drawers of his medicine chest, that he or his assistants may find them without delay.

He should have a small dressing box containing all his common dressings, which should be carried to the gun-deck, when he prescribes,

at a regular hour every morning; for example, after the gun-deck has been cleansed, which in all well regulated ships is finished by eight o'clock. He should then send the *loblolly boy* fore and aft the gun and berth decks with a small bell, to give notice to those who are slightly indisposed, to venereal patients and those with ulcers to attend him at the main-mast, where he should have his table and prescription book.

After examining and prescribing for this class of patients, he should visit and prescribe for those who are confined to the *sick berth*, and give such directions respecting their cleanliness as he may think proper. He should likewise be particular in inquiring, whether they are properly attended to by the orderly men, and supplied with the nourishment directed; if necessity require it, the sick berth should be visited twice a day or oftener.

It is customary on board of some ships to stop the grog of *every* man who is on the sick list; but of this the surgeon should be the *sole* judge, as in some cases a *sudden* stoppage of the allowance of spirit, which men have been accustomed to receive, may be attended with ill effects.

When the surgeon has finished the routine

of duty above described, he should make out *two* returns of the sick, one for the *commander*, the other for the *binnacle*; to the latter, the officer of the deck refers when a man omits to answer to his name, when the watch is mustered; the surgeon should therefore be particular in entering the names of those who are to be *excused from duty*; if the name is not found there, the delinquent is liable to punishment. Therefore all who have been taken sick between the hours of prescribing should also be entered.

To prevent the trouble of making out a long list of names every morning, (having had an hundred at a time on the sick list) I have generally used a small alphabetical book for the *binnacle*, which was renewed monthly; when a man is discharged fit for duty his name must be erased.

The surgeon should direct a number of spermaceti candles to be divided in halves and the wicks slightly touched with spirits of turpentine, that they may be quickly lighted when he has occasion for them. Patent lamps would perhaps be preferable to candles.

Preparations for an Engagement.

WHEN the drums beat to quarters on the approach of a strange sail, the surgeon should take his station in the cockpit with his mates and loblolly boy. The purser and chaplain are generally stationed there.

The table to receive the wounded, if there be much sea, should be lashed to the deck. As the cockpit is covered with gratings and tarpaulins, and of course very warm, it will be proper to postpone lighting all the candles or lamps until the engagement commences. I have often thought, that fans might be advantageously attached to the beams, on both sides of the cockpit, and worked by a treddle to agitate the air; they would add much to the comfort of those who are obliged to remain below, and would not be expensive. The loblolly boy should have plenty of water procured, that it may not be necessary to send for it during the hurry of business. No ostentatious display of instruments should be made; all the necessary apparatus may be conveniently arranged in a tray on the top of the medicine chest and covered with a piece of green baize; or, if the medicine chest have a double lid, the instru-

ments and dressings may be conveniently arranged therein, viz. Pocket dressing instruments, amputating, trepanning and dissecting cases; spare tenaculums, armed needles, tourniquets,* ligatures, bandages, among which should be plenty of single and double-headed flannel and muslin rollers, crucial bandages, compresses of linen; lint, old linen, adhesive plaster spread on leather, retractors, sponges, pledgets of carded tow spread with simple cerate, thread, tape, pins and splints.†

A small match tub with sand in it should be procured, to receive the blood during any operation, to prevent the deck of the cockpit from being blooded. There should be plenty of vinegar at hand, and water *to drink*. To prevent confusion, each person should be instructed in the duty he is to perform. Depend not on styptics in arterial hemorrhagy. In consequence of the *extreme heat* of the cockpit, it will be necessary to take up a number of small ramifica-

* Tourniquets should be given to different officers on deck instructed to use them, and especially to the officers stationed in the *tops*, to prevent dangerous hemorrhages from wounds, before the men can be sent to the cockpit.

† Dessault's, improved by doctor *Physick*, are to be preferred.

tions of arteries, that will not contract; the *ligature** is the best and most certain styptic.

The wounded may be removed to the gun room or berth deck, provided it will not interfere with those who are passing cartridges to the main hatchway.†

Men who are *slightly* wounded, should not be permitted to remain below, but should be sent to their quarters after being dressed, unless it be necessary to detain some of them to attend on those, who are dangerously wounded. They should be frequently visited by the assistants, to see that there is no hemorrhage of consequence from their wounds; they should be instructed to tighten the tourniquet, should an hemorrhage come on.

If the vessel of war be small and without a cockpit, a place should be cleared for the accommodation of the surgeon and his patients; a chest must answer for his table to receive the wounded; if she be very small, I have no

* We are indebted to Ambrose Parey for the use of ligatures for stopping arterial hemorrhage. Some say that Albucasis is entitled to the honour of this discovery, as the following words may be found in his works. "*Ligetur arteria cum filo ligatione forte.*"

† I allude to the general arrangements on board frigates.

other advice to give, than, that the surgeon, although painful his situation, *must manage as well as circumstances will permit.*

I presume it is unnecessary to remind the surgeon, that he should endeavour to inspire his patient with confidence and treat him with kindness. "When we are obliged to arm our hands with steel, shall we likewise steel our hearts and on our brows wear terrors? certainly not."

The surgeon's assistants or a trusty person should be stationed with the patients after important operations. As to the time for the performing of operations of consequence, there are various opinions with which the surgeon is doubtless acquainted; but his judgment and the danger of the case must determine his mode of procedure.

After an engagement, the wounded should be examined; if there be any hemorrhage of consequence, the dressings should be removed and the part examined.

Much attention is necessary in the after treatment; if there be much fever and the pulse full, it should be reduced by *low diet* and *general* or *local* venesection, repeated *as often* as circumstances make it necessary, but with pru-

dence. On arriving in port, the wounded should be landed.

Whilst on this subject, though it does not come within the original plan of this treatise, I beg leave to make a few cursory remarks on gun shot wounds, for the benefit of those, who have not had an opportunity of examining them; the treatment of which merits serious attention.

In gun shot wounds, there is a laceration of the parts; the blood is extravasated, where the ball struck, which disfigures the lips of the wound; it will therefore be black round the edges; this livid part becomes gangrenous and sloughs off in a few days; at this period the surgeon should be very attentive lest dangerous hemorrhage ensue.

Sometimes a piece of cloth, a ball or other foreign matter may be lodged at the bottom of the wound, which ought to be removed immediately, provided it can be done with convenience and without injuring the patient; but the practice of probing and introducing long forceps, for this purpose, is generally disapproved of by all modern surgeons, who have been engaged in the service of the army or navy. When suppuration comes on, the pieces of cloth may be readily removed, if the wound

passes through a limb, by means of a seton; this I have used with success by gently drawing it through the wound; the small pieces of cloth adhered to it and sometimes small fragments of bone.

It has been usual for men to express great uneasiness in not being able to extract a ball; this is unnecessary; there are innumerable instances on record of balls having remained buried in the muscles and other parts for years, without any material injury to the constitution; the wounds have healed kindly. Indeed, I have had several cases under my own care, where the wound healed without difficulty, although I was unable to extract the ball; then why harass a patient with a long pair of bullet forceps without any prospect of success? But if the ball or any foreign matter be near the surface, it ought to be cut upon and removed. The index finger is the best probe.

The trembling, coldness, change of countenance and small pulse, which are noticed by writers, are not always signs of danger; these alarming symptoms may be generally removed by opiates.

The narrowness of the orifice and the bruised appearances are the chief peculiarities of a wound from a musket or pistol ball. When the

parts are tense and inflamed the orifice should be dilated and venesection practised freely according to the state of the patient and climate; a low regimen should be adopted. No application is necessary to the apertures except a small pledget spread very thin with *simple cerate*, and an emollient poultice to the limb or parts where the wound was received. I have in one instance used the inner bark of the elm, bruised and made into a poultice; it makes a very soft mucilaginous one; but when it becomes dry, the edges adhere very tenaciously and produce pain on its removal. I do not think that it possesses any virtues different from the linseed meal poultice, which is made with more facility, although much benefit has been ascribed to it.

When suppuration comes on and the eschar separates, the poultices should be omitted; the orifices of the wound should be dressed with simple cerate and the fungous flesh occasionally removed by nitrate of mercury (lunar caustic.) *Compression* along the course of the wound, by means of a compress and bandage applied moderately tight, will expedite the cure.

A beating or throbbing sensation in a wound-

ed limb is generally considered the harbinger of hemorrhage.

It is impossible to lay down rules for the treatment of wounds which are not to be deviated from; much depends on the ingenuity and decision of the surgeon.

Although I have noticed the general appearance of wounds from musket or pistol balls, yet these are not so dreadful in their effects, as those from cannon shot and splinters; which are by far the most common on board ships of war. The danger is to be estimated from the extent of the wound, the part where it is received, and the constitution of the patient.

“In flesh wounds or where there is only a loss of muscular substance, the wound must be well cleaned with a sponge moistened with water; the hemorrhage stopped; if issuing from the mouth of a large vessel, the tourniquet must be applied and properly managed, until the vessel is taken up, which is to be done by means of the tenaculum or forceps, taking care not to include any of the cellular membrane with which it is surrounded. If it cannot be secured in this manner, a needle must be passed round it, including as little of the surrounding parts as possible. Should the bleeding flow from every point of the wound, you may sus-

pect that your patient is of a scorbutic diathesis. In this case you are to cover the wound with lint, and by graduated tow compresses and rollers secure it; taking care not to remove the dressings until it begins to suppurate. In such cases the inflammation will be purely local, and a *generous regimen* may be resorted to immediately; for in these cases, where there is a great loss of substance, the discharge is always profuse; and if your patient's strength is not kept up by strong soups, jellies and such things as will restore lost stamina, he will sink into a low nervous fever and die. Here I must caution you against giving the *bark in substance*; for those who have been so profuse in their encomiums on this drug, in this state, have much to answer for. If the surgeon is not blinded by prejudice, he will discover his patient losing his appetite, and becoming more and more debilitated every hour, whilst he is pouring in large libations of this *ne plus ultra* medicine. Believe me more is to be done by diet. In these cases, make up your mind never to give it except in decoction; a little of the tincture may be added, and the mixture acidulated with acid: vitriol. Such medicines, given in moderation, will assist the digestive powers; but the bark in substance clogs up the stom-

ach, checks the secretion of the gastric juice, and totally unhinges it, rendering all its efforts to convert the food into chyle useless and abortive.

“ In flesh wounds bleeding is seldom necessary and is generally productive of the worst evils; for it often happens that men in action are quite exhausted, from loss of blood, before the surgeon can attend to them; a well directed broadside makes so much havoc, that a third of the wounded die from want of medical assistance. Allowing that a man should lose very little blood before his wounds were secured, if they were extensive the discharge from them during the cure would reduce him too much, even admitting that every thing comfortable and nourishing was at his command, which is not always the case; so you perceive, how absolutely requisite it will be for you to guard against bleeding, or any other evacuation that may tend to debilitate your patient; for local inflammation will generally yield to local applications, such as emollient poultices and fomentations; and in these applications great judgment is requisite to know the precise point when to discontinue them. It frequently happens that the skin takes on a diseased action, assuming an erysipelatous ap-

pearance, at the time the wound is discharging very profusely; in such a case, cold applications to the surrounding inflammation will be proper, namely, a weak solution of cerusa acetata, renewing rags dipped in it as often as they grow warm. By these means the temperature of the part will be reduced, and the patient relieved from considerable pain, the natural concomitant of inflammation.

“ The best diet, when the strength is sinking under profuse gleetings, is animal food, in the shape of jellies.

“ As the stomach should be distressed as little as possible by the process of digestion, if sufficient nutriment cannot be conveyed into the system in this manner, it may be thrown into the intestines per anum, with a few drops of laudanum. Many a valuable life has been saved in this manner. When the granulations have arrived at the point when bleeding and fungous flesh make their appearance, the pressure of the roller and compresses should be increased, which will greatly facilitate the healing process and enable you to cicatrize the wound, without having recourse to escharotics, so frequently used by the surgeons of the old school.

“ With respect to wounds of the hands, feet

and limbs, accompanied with fracture and splintered bones, it is highly requisite for you to be possessed of intrepidity, tempered with coolness; for what you decide upon, must be exerted without delay; and you will be careful never to amputate without circumstances render it absolutely necessary; every surgeon, possessed of anatomical knowledge, can quickly determine. If you find the nerves and tendons injured, the muscles much lacerated, and spicula driven into the limb, with or without hemorrhage, in such a case amputate immediately; and here permit me to remark, your fore finger will make the best probe, for you must use it to ascertain with precision the extent of the injury.

“ In wounds of less magnitude, when there is a probability of saving the limb, by using your fore finger and thumb, you will be enabled to pick away every particle of bone; for the smallest atom, if felt, must not be left behind; and you must recollect that this is your only time for cleansing the wound from every foreign body; to leave any thing unfinished now, and attempt it when inflammation and tension have taken place, would be extremely cruel, and subject your patient to inexpressible torture. It will be frequently necessary for

you to use a knife in detaching splinters; and if you cannot disengage them without enlarging the wound, do it boldly; it is better that you should risk dividing an artery, than to lose your patient by trismus, which is often occasioned through the irritation of splinters.

“Wounds of this description often mortify; you may say, if there is any likelihood of such an occurrence, it will be most prudent always to amputate. Such reasoning is erroneous; it is a common thing for stumps to become sphacelous: an evil originating sometimes from crowding the wounded together, and frequently from a cachectic state of the body, independent of external causes; therefore, when this occurs, little judgment will determine, whether a small or large surface is most likely to terminate favorably; and in this dilemma, it affords me infinite pleasure to be enabled to direct you to the choice of a medicine which merits the highest encomiums, namely, *nitre*, finely pulverized, sprinkled all over the part, completely covering it at every dressing, which will as surely stop its progress as mercury will that of the lues venerea; and if the fœtor is ever so disagreeable it will in the space of twelve hours, entirely subdue it. You must not neglect to wash the part with vinegar and decoct:

cinchonæ, administering the latter internally with port wine, supporting the strength with strong jellies as directed above.

“When a limb is carried away by a shot, or splinter, you must go through the regular plan of amputation, performing your operation at a distance from the wound to leave integuments for covering the face of the stump. If the limb is too much shortened to admit of amputation, the flap operation of the hip or shoulder must be performed.

“Wounds of the thorax and abdomen require a very different treatment, the antiphlogistic regimen must be strictly observed; you are to use the lancet freely, according to the urgency of the symptoms. Though these wounds often prove fatal, you are never to despair of success; many instances of recovery from balls perforating the lungs can be adduced, some of which I have witnessed myself. I have often thought that the tinct: digitalis, a medicine which stands high in my estimation, might in some measure supersede the necessity of bleeding so profusely; if given in sufficient quantities, it will check the impetus of the blood, by lessening arterial action, and thereby give the ruptured vessels and lungs an opportunity of

healing, without impoverishing the body so much as is generally done.

“Wounds of the joints are always dangerous, and when the capsular ligament is perforated, and the heads of the bones fractured or otherwise injured, the safest plan will be to amputate. The loss of a limb must ever be considered a great deprivation; and when the injury received does not appear very extensive, the intreaties of the patient prevail on the surgeon to attempt a cure; the latter sympathizes with him, and from a supposition that there is a chance of a favorable issue, he remains passive, but seldom has the happiness of bringing him off, even with an anchylosed joint. Bleeding has been carried to great lengths in such cases; and I believe great mischief has been done by erring on what may be considered the safe side; for local inflammation will be more readily subdued by means of leeches, and the cold saturnine lotion. How often do we perceive marks of inflammation, when the pulse is weak and feeble, when the flesh is wasted and strength exhausted?”*

* The foregoing remarks are from the pen of R. Cum-
ing, M. D. a gentleman who has been thirteen years a sur-
geon in the British service and whose opportunities for
the formation of a correct judgment on this interesting

With respect to the symptoms of tetanus which frequently come on in hot climates after wounds and operations, I know of no remedies on which we can place so much dependence for their removal as calomel and opium.

Doctor James Clark in his treatise on West India diseases, informs us, that being unable to cure the symptomatic tetanus, he endeavoured to prevent it; and for this purpose, after wounds and punctures, he gave two or three grains of calomel twice a day until a gentle salivation came on; and he pursued the same plan after operations. Out of fifteen patients, after amputation, that were treated in this way, only *one* died. In those who had been punctured, the success was greater; two only having been lost out of a great number since this mode of practice was begun. Some mix laudanum with their dressings. In *three cases* which came under my care, the tetanic symptoms rose to an alarming height, but were treated with success by calomel and opium,

branch of surgery have been numerous. I therefore have transcribed them with pleasure from the Medical and Physical Journal. The works of John Bell on wounds, ulcers, &c. ought to form a part of the library of every naval surgeon.

E. C.

“ Symptoms of tetanus have been suspended by the application of the actual cautery.*

Wine, porter and the cold bath for the cure of tetanus have also many votaries.

A naval surgeon should keep a regular journal of all cases under his care, and record the changes of the weather, and their influence on the crew. The form of his journal may be the same as the one under the head of hospital ship. When any sick are sent to the hospital or hospital ship, he should send with them a statement of their cases, the treatment which has been pursued, and the changes in consequence thereof. If the ship to which he is attached belong to a squadron to which a *fleet surgeon* is appointed, he should occasionally, or at stated times, inform him by *returns* of the health of the crew (see form) and of all important changes therein, with his opinion as to the probable cause of the diseases on board. He should likewise correspond with him on all cases of consequence.

At the expiration of the cruise, he should make out *an abstract* of his journal for the navy department.

* Relation Historique et Chirurgicale de l'expédition de l'armée d'Orient par Larrey.

As surgeons in the service of the United States are made responsible for the expenditure of hospital stores,* it will be necessary to have a regular account kept of the receipts and expenditures thereof, which is to be deposited with the accountant of the navy department at the end of every cruise. On delivering the balance of medicines, hospital stores, &c. into the public stores, a receipt should be taken for every item.

* This in my opinion is not a good regulation; the best, the most correct and economical plan would be, to place all the articles of hospital stores in charge of the purser, as in other services, to be served out on the order of the surgeon, *in lieu of salt provisions*; but under the present arrangement, the salt provisions are issued *for each mess*; there may be one or two belonging to a mess, who are on the sick list, and who consequently receive hospital stores; their messmates it is true are benefited by receiving the ration. If the surgeon be held responsible for losses, he ought to have an apartment appropriated solely for their safe keeping, without exposing them to the marauders employed in the spirit room, who think it *no harm* to make free with the "*doctor's stores*." A master's mate it is true attends to see that nothing is *taken out* of the spirit room, but he cannot tell how much *wine* or *brandy* may be sucked through a quill or straw, by four or six lusty holders while at work there. The poor rats, however, are generally charged with the theft.

SURGEON'S ASSISTANTS

SHOULD put up the prescriptions, bleed, dress wounds and ulcers, and see that the sick be properly attended, and supplied with nourishment. They should, (during the existence of the present regulation) keep a daily account of the expenditure of hospital stores, and at the expiration of every month, an account of the gross amount expended should be sent to the surgeon.

In order to preserve harmony the duties may be performed in rotation.

The assistants should be particularly careful to make the *loblolly boy* keep the cockpit clean, and every article belonging to it in the surgeon's department. They ought occasionally to prescribe for the sick; but all important changes should be reported to the surgeon.

Form of a Surgeon's Monthly Return.

Diseases.	Remaining sick last month.	Taken ill this month.	Sent to the Hospital, or Hospital Ship.	Discharged for duty.	Dead.	Remaining Sick.
Fever	3	23	5	18	1	2
Dysentery	4	20	4	16		4
Influenza	10	90		94		6
Rheumatism	1	2		2		1
Venereal complaints	12	6		16		2
Ulcers	6			6		
Wounded men		40	10	8	2	20
Slight injuries		6		6		
Total	36	187	19	166	3	35

REMARKS.

Since we left our anchorage in the vicinity of the marshes at Syracuse harbour, we have had no new cases of Fever, but on the 8th inst. the Influenza appeared on board, and is now spreading rapidly. It is attended with highly inflammatory symptoms, and requires the free use of the lancet.

I have the honour to remain yours,

S. M. Surgeon,

October 31st, 1816.

of the United States.

L. M. Esquire,
Fleet Surgeon.

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Estimate of the quantity of Medicines and other articles necessary for a ship of war of 400 men, for 12 months.

	lb. oz.		lb. oz.
Calomel: ppt:	2 0	Cret: ppt:	3 0
Pulv: Jalap:	1 8	Rad: Scillæ	0 6
Pulv: Ipecac:	1 0	Elixir Paregor:	1 0
Sal Nitr:	3 8	Sp: Nitr: dulc:	3 0
Tartar: Emetic:	0 4	Sp: Sal: Ammon: vol:	3 0
Sal Glaub:	40 0	Sp: Lavend: Comp:	1 0
Cremor Tartar:	6 0	Sp: Terebinth:	1 0
Cantharides pulvr:	2 0	Tinctur: Thebaic:	2 0
Gum: Opium	1 0	Tinct: Huxham: Cort:	2 0
Pulv: Cort: Peruv: flav:	30 0	Tinct: Myrrh	2 0
Sol: Miner: Fowler:	0 8	Tinct: Guiac: simpl:	2 0
Pulv: Rad: Gentian:	4 0	Tart: Vitriol:	0 8
Rad: Serpent: Virg:	3 0	Vitriol: Alb:	3 0
Rad: Senek:	2 0	Sacch: Saturn:	6 0
Sal Ammon: vol:	0 8	Extr: Saturn:	2 0
Sal Ammon: crude	4 0	Vitriol: Cœrul:	0 8
Æther vitriolic:	0 6	Gum: Kino:	1 0
Liquor Anodyn: Hoff:	1 0	Gum: Aloes	0 4
Rad: Colomb:	2 0	Gutt: Gambog:	0 1
Gum: Camphor:	1 8	Gum: Guiac:	1 0
Extr: Gentian:	0 8	Gum: Ammon:	0 8
Elixir Vitriol:	1 0	Gum: Assafœtid:	0 8
Confectio Aromat:	0 8	Gum: Myrrh:	1 0
Conserv: Rosar:	2 0	Extr: Glycyrrh:	6 0
Pulv: Rhæi:	0 8	Emplast: Adhæsiv: opt:	2 0
Pulv: Gallæ	2 0	Flor: Chamæm:	6 0
Pulv: Gum: Arab:	3 0	Flor: Benzoin:	0 2
Pulv: Fol: Digitalis	0 2	Flor: Sulph:	4 0
Pulv: Cinnamon:	0 8	Lunar: Caustic:	0 2
Sal Martis:	0 4	Merc: precip: rub:	2 0
Sal Absynth:	1 8	Cera flav: vel alba	12 0
Alumen	3 0	Ol: Olivar: 18 bottles	
Borax	1 0	Lapis Calaminar:	1 0
Cort: Aurant:	2 0	Lapis Septicus	0 2

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	lb. oz.		lb. oz.
Argent: viv:	7 0	Zingiber	1 0
Adeps: Suill: non rancid:	6 0	Acidum Nitrosum dil:	0 8
Merc: corr: subl:	0 4	——— Vitriol:	1 0
Mag: alb:	1 8	Extract: Cicutæ:	0 8
Ol: Ricini, 6 bottles		Ol: Sem: lini	4 0
Ol: Anisi	0 2	Sapo Castil:	6 0
Ol: Menth:	0 3	Arsenic: alb: non pulv:	0 1
Ol: Succini	0 4	Pix Burgund:	2 0
Ung: Merc: fort:	12 0	Nux Moschat:	0 4
Ung: vel Emplast: Epi-		Mel Commun: Cong.	
ispast:	6 0	Pulv: Semen lini $\frac{1}{2}$ bbl.	
Ung: Basilic:	12 0	Emp: Merc: c. Gum:	2 0
Cerat: Commun:	6 0	Sem: Sinapis	2 0
Bals: Copaiva	1 0	Arrow root	4 0
Lupuli	2 0		

It is intended that additional quantities of Elixir Paregor: &c. also ointments and Sapon: Linim: shall be made on board. Fowler's solution, unless made by a person on whom you can depend, should also be made on board. The acid: nitros: and vitriol: should be carefully put up in bottles fitted in tin cases and surrounded with wax, to prevent them from being broken.

INSTRUMENTS, &c.

Amputation instruments,	1 Scarificator and 6 cups,
Trepanning do.	3 Elastic catheters,
Dissecting do.	2 Silver do.
2 Cases pocket dressing do.	2 Elastic Bougies,
24 Curved needles in a case,	24 Common do.
1 pair of bullet forceps,	1 Set of teeth instruments,
1 Seton needle,	2 Flat trochars,
1 Long probe,	18 Thumb lancets,
2 Probangs,	2 Spring lancets,*

* I have never seen any of the imported that I would use; the *generality* of those are *made for sale*, not for use. I have had one, made by Mr. Schively of Philadelphia, in common use since 1794; the spring is still good.

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12 Spare phlems,	6 Towels for the cockpit
3 Sets of splints,*	4 Pillows for fractures,
18 Tourniquets,	6 Trusses.
18 Penis Syringes,	1 Piece of red binding
2 Clyster do.	1lb. of sponge
2 Pewter Urinals,	2 Bolus knives,
18lbs. Lint,	1 Fire spatula,
100 Common needles,	1 Set of scales and weights,
4oz. Strong fine thread,	1 Marble Slab,
8 Sheep skins,	2 Wedgewood mortars, large
1 Pair of common scissars,	and small,
2 Papers of pins,	1 Marble ditto,
4 Pieces of tape,	Vials, 1 gross assorted,
4 Yards of oilcloth,	Corks, $1\frac{1}{2}$ ditto,
30lbs. of <i>clean</i> linen rags.	Gally pots, 4 nests,
25 yds. of muslin for bandages,†	Graduated measure,
12 yds. of flannel do.	Funnel,
12lbs. of carded tow	12 Papers of pill boxes.

HOSPITAL STORES, &c.

Brandy,	gal. 32	Lemon juice,	gal. 15
White wine,	64	Portable soup,	lb. 12
Port wine in bottles, 6 doz.		Pepper,	1
Brown sugar,	lb. 400	Allspice,	2
Chocolate,	100	Cloves,	1
Young hyson tea,	15	Tamarinds,	24
Barley,	150	Spermaceti candles,	12
Sago,	25	Spermaceti oil,	gal. 6
Oatmeal, kiln dried,	20	Mustard in bottles,	No. 48
Molasses,	gal. 32	Sweet oil,	12
Vinegar,	64	Indian corn meal,	lb. 392

* These may be made on board ship by the carpenters. Desault's, improved by Dr. Physick, are to be preferred.

† If the bandages are thrown away after being used, *thrice* this quantity will scarcely be sufficient; they should be washed and returned to the cockpit.

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Eggs,*	No. 240	Feed for do. 2 bbls. of corn,	
Sheep,	2	Essence of spruce,	pots 25
Fowls,†	24	Porter, 6 dozen bottles,	72

The articles in the above list, of the most consequence, will be sufficient, unless there should be an uncommon number of sick. Each article may be increased or diminished according to the *station* the ship may be ordered to. In most of the Mediterranean ports, especially the Italian, tea is sold by the apothecaries in small quantities as a medicine; consequently, it is very dear; indeed, I have not seen it at any of the groceries, except at Malta, and this has only been common since the English have had possession of that island. Wine, on the contrary, being cheap, a small quantity only should be taken from America. Oatmeal, sago, and barley, being perishable articles, should be put up in small tea-chests lined with lead.

HOSPITAL UTENSILS, &c.

1 doz. Tin pint cups,	2 Funnels,
4 Camp kettles,	2 Bed pans. These articles
1 Tea kettle,	should be marked H. U. or
2 Large teapots,	C. otherwise there will be
2 doz. Tablespoons,	few remaining at the end of
2 do. Teaspoons,	three months. Most sailors
24 Medicine cups. (crockery	have tin pots and spoons,
ware made in America)	and they have no objection
3 Demijohns,	to increase their number.
3 Tin canisters,	A few pair of sheets may like-
Scales and weights,	wise be taken for the use of
Tin measures, qt. pt. half pt.	the sick.

* The best means of preserving eggs that I am acquainted with is the following. Take of lime slacked, half a bushel; reduce it to the consistence of cream by adding water; common salt, two pounds; cream of tartar, half a pound; mix them together, and pour the mixture over the eggs, previously packed in a cask. The above quantity of ingredients will be sufficient for 100 dozen: they will keep good for twelve months; care however should be taken to procure them *fresh*.

† Live stock may be occasionally purchased at the different ports, in addition to the above quantities.

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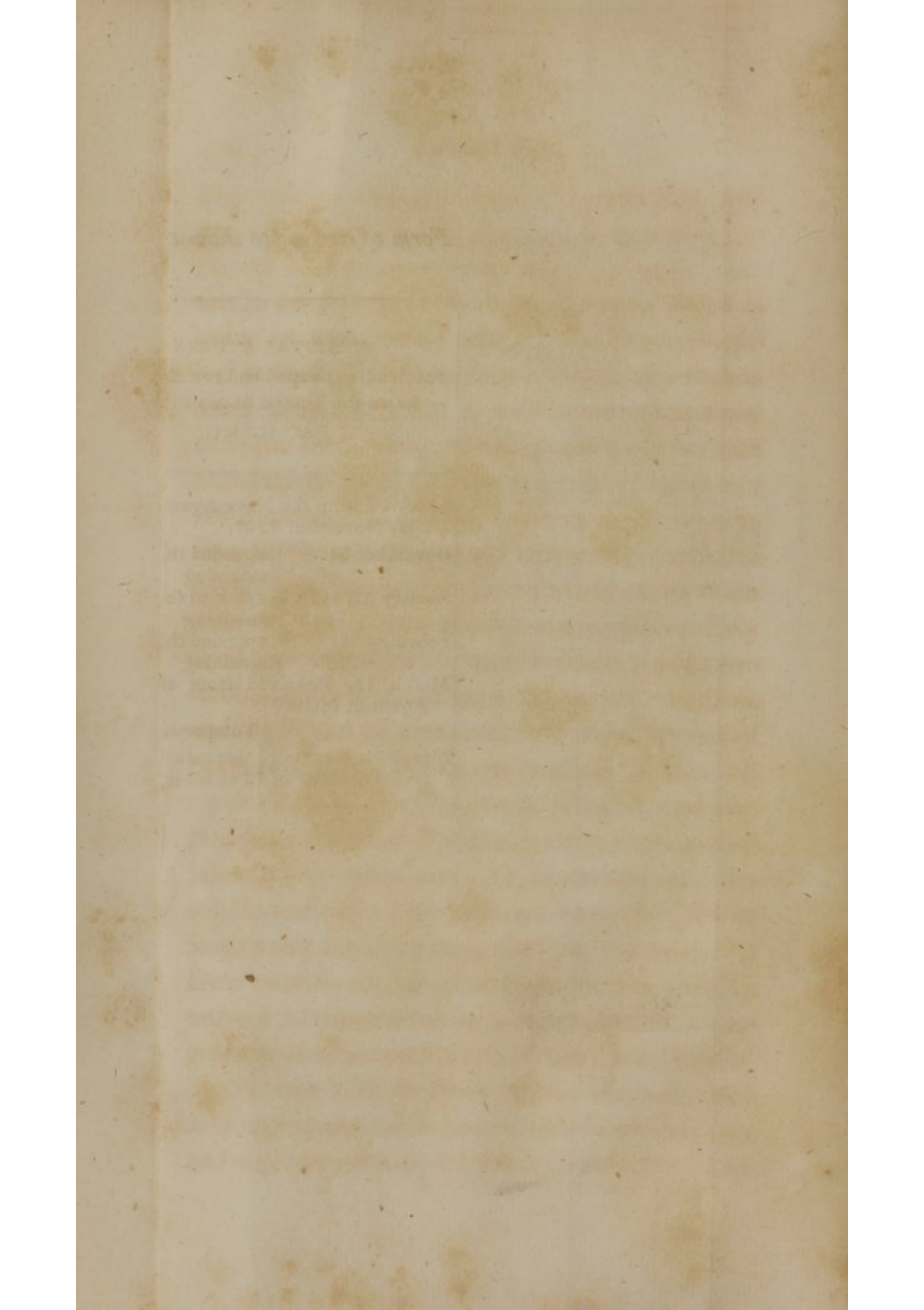
COCKPIT FURNITURE.

- | | |
|---------------------|-------------------------------|
| 1 Large table, | 2 Glass reflecting lamps, |
| 3 Chairs, | 4 Tin (pint) bleeding basons, |
| 8 Tin sconces, | 1 Bell. |
| 2 Pair of Snuffers, | |

STATIONARY.

- | | |
|--------------------------------------|------------------------------|
| 1 Inkstand, | 6 Ink powders, |
| 1 Day book, four quires fol. | 1 Ream of wrapping paper, |
| 2 Common case books, | 4 Quires of filtering paper. |
| $\frac{1}{2}$ Ream of writing paper, | 12 Small <i>alphabets</i> . |
| 100 Quills, | |

Particular care should be taken of every article put on board for the use of the medical department; that the medicines, &c. may not be spoiled by getting wet: the balance of articles remaining at the end of the cruise, as I have said elsewhere, should be returned into the public stores, and duplicate receipts taken, one for the navy department, the other to be retained by the surgeon.



CONCLUSION.

FROM what has been said on the duties of the officers of the medical department of the army and navy, it appears that a person, who has not been accustomed to public service, will have many difficulties to encounter. Let us suppose him at the head of any one department, ignorant of his own duty, or that of those, who are under him, whom it is his business to direct, and unacquainted with the general economy of the medical department; he will be subject to various perplexities. He may be an excellent physician or surgeon, but without a general knowledge of military or naval duty, it will be impossible to conduct his business with method and regularity.

Permit me to offer a few remarks to those, who are just entering on the busy scene of life, which the army or navy presents. Let me inform them, that they ought to consider their time as belonging solely to the public; and, ought therefore to employ it entirely for the benefit of those who are consigned to their care. Let me advise them to read with attention, *Gregory's Duties of a Physician*; *Doctor Rush's Lecture on the Virtues and Vices of*

Physicians, and *Hamilton's* Regimental Surgeon; they all contain good advice, which deserves to be treasured up and religiously practised; the latter, from much experience in the army, guards young men against the fascinating power of the convivial board, and makes many useful remarks respecting their conduct, which is also highly worthy the attention of the naval surgeon.

Observations and physical experiments should blend their light to dissipate obscurity from medicine. Dr. Morgan of this city, in an address to the trustees of the college, long since remarked, that, "we live on a wide extended continent, of which but the smallest portion, even of the inhabited part, has yet been explored. The *woods*, the *mountains*, the *rivers*, and the *bowels* of the earth afford ample scope for the researches of the ingenious. How many plants are there, natives of this soil, possessed of peculiar virtues? How many fossils to enrich the cabinets of the curious? How many natural substances, objects of new trade and commerce to supply materials for various arts, as well as to enlarge the bounds of medicine." Therefore, let the army surgeon, who traverses this immense extent of country, and the naval surgeon, who is wafted by the

gale to distant climes, unite their endeavours to promote the science of medicine, and the cultivation of the arts and manufactures of our country.

An army surgeon when he arrives at a town (or encampment) should observe its situation, the winds to which it is exposed, and the soil which surrounds it, whether humid or dry, fertile or steril, elevated or low. He should also examine the waters in its neighbourhood; for this purpose, he should be furnished with a complete case of chemical tests. He should likewise have a pocket compass and thermometer. He should examine the *mineral* productions, which the surface of the earth presents, particularly after heavy rains, when perhaps he may be enabled to find some rare specimens for his cabinet. He should be particular in noting their locality. Such productions of nature as may be useful to the arts and manufactures of our country should command his particular attention. He should inquire of the inhabitants, whether any ores have been found in the vicinity, procure specimens for analysis, and note the situation. He should likewise examine the course and component parts of mountains, whether primary or secondary; he should likewise make himself ac-

quainted with the diseases peculiar to the country through which he passes, and note the time of their appearance; he should become acquainted with the most respectable physicians of every village or town, where he may be stationed; and, in short, he should endeavour to obtain information from every source.

I sincerely regret that mineralogy is so little attended to in the United States. It is impossible to become acquainted with the immense riches the bowels of our earth contain, without a competent knowledge of this interesting branch of science. In France and Germany, it is pursued with enthusiasm; but, in the United States, for want of the public attention being excited, it has very few votaries. The trustees of the college of New-York have set an example to her sister states worthy of imitation; impressed with a just idea of the importance of diffusing a knowledge of this branch of science, they appointed a professor of mineralogy,* who delivers annually a course of lectures on this interesting subject; by which a taste for this science is now making a rapid progress throughout that state.

The army surgeon should likewise make himself acquainted with the botanical produc-

* Dr. Bruce.

tions in the vicinity of an encampment or garrison.

Our country is highly indebted to the labours of doctor Barton, professor of botany, &c. in the University of Pennsylvania, for that spirit of inquiry, which has been excited throughout the United States, in this important branch of science; by which many valuable indigenous plants have been added to the *Materia Medica*.†

The naval surgeon from the nature of his situation has not an opportunity of making inland excursions, consequently his remarks will necessarily be very limited on medical topography; but the frequent voyages he makes to different climes, will afford him ample scope for the exercise of his genius on physical geography. He may likewise be useful to his country by visiting the *manufactories* established in foreign countries; and by communicating the mode of conducting the various operations therein, he will render an essential benefit to his countrymen.

† Vid. Collections for an Essay towards a *Materia Medica* of the United States, by Benjamin S. Barton, M. D. Professor of *Materia Medica*, &c. Also his *Elements of Botany*.

APPENDIX.

ON THE MEANS OF DISINFECTING THE AIR,

AND THE
PERMANENT AND PORTABLE APPARATUS FOR
DISINFECTION.

Translated from the Italian.

THE method of disinfecting the air, invented by citizen Guyton-Morveau, may be regarded as one of the most brilliant discoveries of modern chemistry. When we reflect on the mortality occasioned on the surface of our globe by contagious diseases, we cannot enlarge too much on the inestimable advantages of the discovery of this illustrious philosopher. We have already spoken in our annals of the ministerial instructions* for preventing the effects of in-

* The *National Institute*, persuaded of the great advantages of fumigation, have recently determined to invite the government; first, to order that the acid fumigation be adopted in all the wards of the civil and military hospitals; 2dly, to engage the professors of clinical medicine, to give every year to their pupils, a practical lecture on the means of disinfection.

fectious air; it remains for us to describe the apparatus which may be adopted, because it is a sacred duty to propagate the use and knowledge of it, by all possible means. Here follow proofs of Guyton-Morveau's claim to the discovery, in opposition to doctor Carmichael Smyth, who had received 5,000*l.* from the British parliament.

Permanent Apparatus

For disinfecting hospitals and halls of audience or assemblies.

With pain, I here adopt the word *apparatus*, which will serve perhaps to excite the fears of many persons; when, in reality, we mean only to treat of a vessel, which is to be opened when required; and which ought rather to be called the *perfumatory vessel of health*: but the name is of little importance. In the account of the numerous experiments which I made in one of the hottest seasons, on a considerable volume of air infected by corrupted pus, I announced that I had the precaution to keep frequently in my laboratory, a very large vessel containing the mixture already noticed for producing extemporaneously the oxygenated muriatic acid gas. This vessel having come to hand two years afterwards, I was surprised on opening

it, by the great quantity of gas which it furnished. Nothing further was necessary to convince me that this mixture, closed in sufficient quantities in larger vessels, might not retain all the disinfecting fumes, and thus fulfil the object completely, without fear, without inconvenience, without expense, and without the necessity of renewing the preparation, unless after considerable length of time, or in cases where there was a frequent occasion for the use of the gas.

It is intended that the capacity of the vessel should be proportioned to the extent of the space to be purified, and the aperture sufficiently large, to give an instantaneous exit to the volume of gas, which may be required; that is to say, such a quantity, as may spread throughout the space without incommoding those too much, who are near. It is necessary, finally, that the gas be confined in a manner that it shall not escape, and that there should not be any sensible loss; in a word, that the vapour shall not be dispersed, except when it is required; that it may be quickly discontinued and that it may remain some months complete, without any doubt of its presence. We may readily obtain all these requisites, for the lar-

gest rooms of hospitals, by the means which I am to describe.

Take one of those vessels of very thick white glass which are found in the shops, from 11 to 12 centimetri (4 1-3 inches) in height, and of ten centimetri (3 2-3 inches) in diameter, of the capacity of 7 decilitri, or 700 centimetri cubes, about 35 cubic inches.* Level† the mouth to receive a cover formed of glass. The bottom of the vessel is cemented on a board, which holds it steady, and slides horizontally in the groove of the two upright side pieces. The upright pieces support a cross piece, through which passes a screw, which serves to raise or depress the cover by means of a small nut inserted in a kind of box to which the cover is cemented.

A view of the figure will explain the form and dimensions of all the parts of this light apparatus, which should be made of wood without iron or any other metal, the construction of which does not require more than ordinary jointing, and but a small expense.

Explanation of fig. 1 and 2.

a, A small plane, on which is fixed the two

* Any glass vessel will answer for common purposes.

† Smooth it with emery on a plane of stone or iron.

Fig. 1.

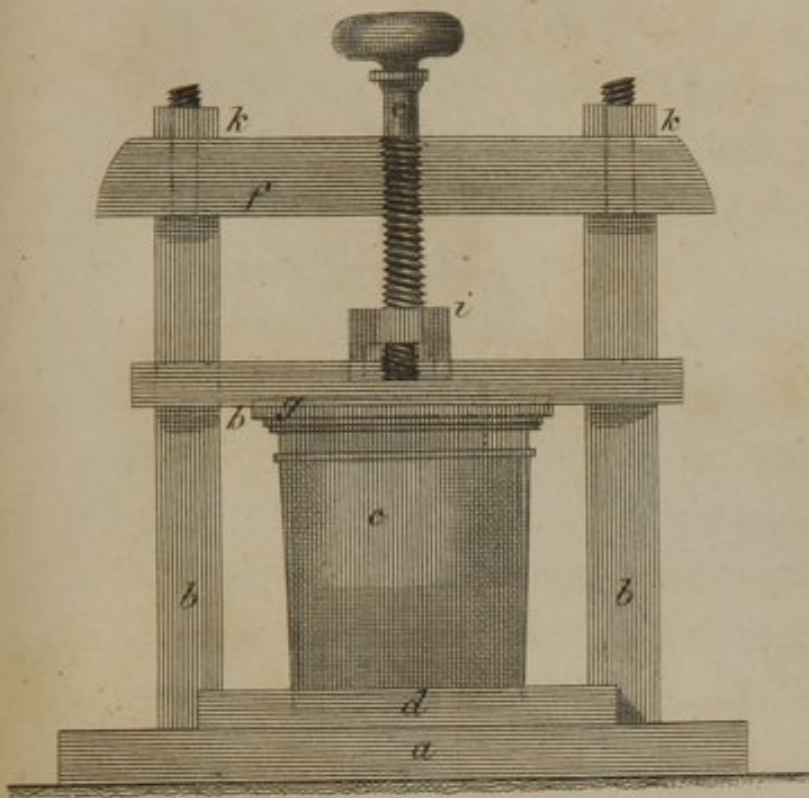


Fig. 3.

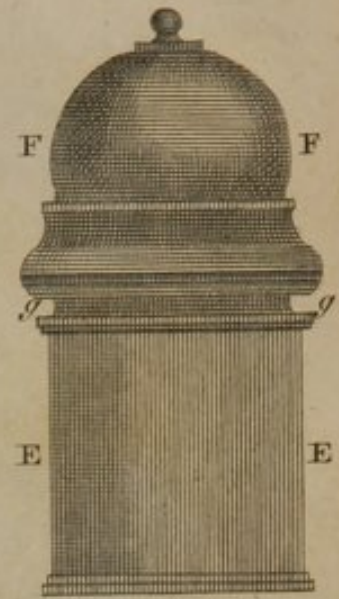


Fig. 2.

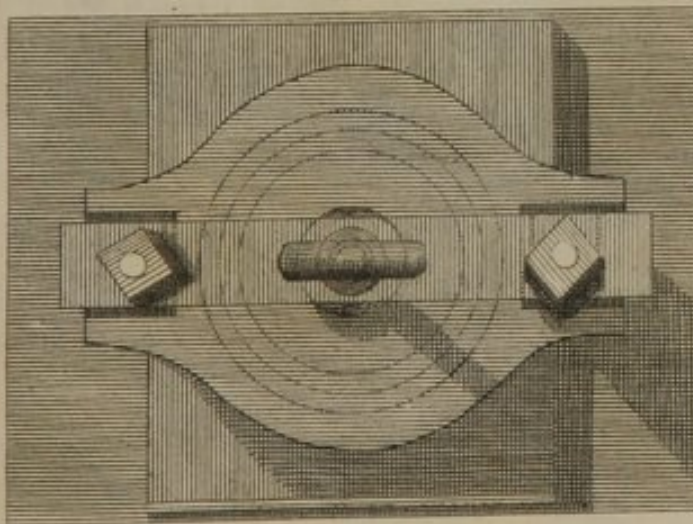
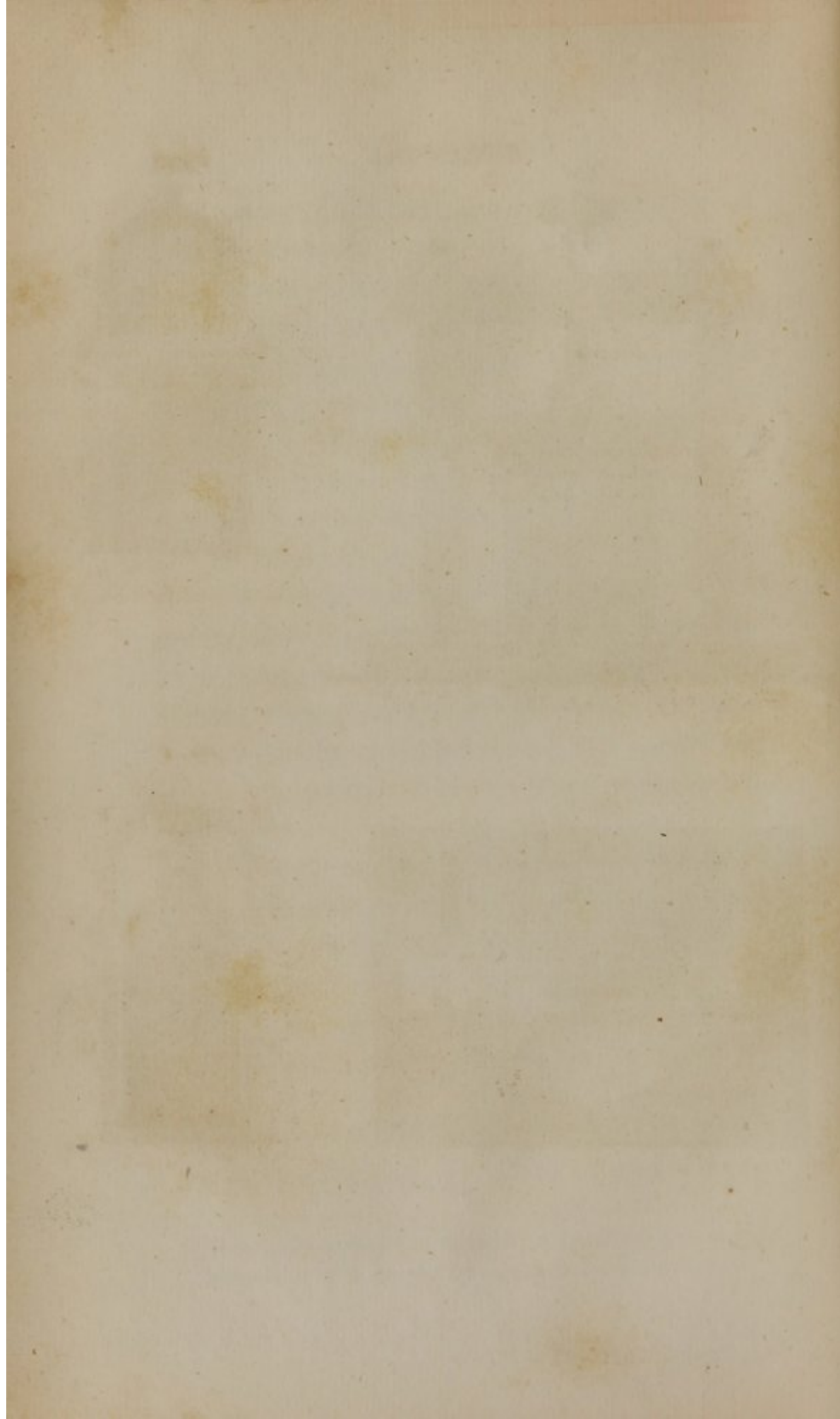


Fig. 4.



Lawson sc.



upright pieces *bb*, united to the superior transverse piece *f*, by means of two screws, *kk*.

c, Vessel of glass cemented upon a small moveable board *d*, which is placed in a groove in the two upright pieces.

e, A screw of wood in its nut *i*, which passes through the superior transverse piece *f*, and which is attached to the moveable transverse piece *g*, and which embraces the two side pieces in the form of the letter H; *h*, a plate of glass, which serves to cover the vessel, cemented on the inferior face of the moveable table.

In the vessel thus fitted, being always supposed of the capacity of 7 decilitri (35 cubic inches) pour in one decilitro (5 cubic inches) of nitric acid, at the usual grade of concentration; one decilitro (5 cubic inches) of muriatic acid; add to these 40 gramme (scruples 3 1-3) of the black oxyd of manganese powdered, and when it acts, lower the cover and preserve it for use. These proportions are given for the purpose of leaving the vessel two thirds empty.

Description of a disinfecting vial for the use of physicians and persons employed in hospitals, which may be carried in the pocket, extracted from the "Farmacopea Ferrarese."

Put into a glass vial, with a ground stopper, which will hold about one ounce of water,

Oxyd of manganese grossly powdered three scruples: Nitric acid nine scruples: Muriatic acid eight scruples.

Close the vial; it will *be two thirds empty*, which is necessary to preserve the gas without breaking it. This method is preferable to all others; and in case the muriatic acid cannot be readily procured, make it as follows:

P. Oxyd of manganese grossly powdered, three scruples. Dry muriate of soda, seven scruples. Nitric acid, ten scruples.

Put the oxyd of manganese mixed with the muriate of soda into the vial; afterwards add the nitric acid and close the mouth. According to both receipts, oxygenated muriatic acid gas is obtained, which may be preserved for a long time; the odour will be very powerful every time the bottle is opened. This is one of the most useful inventions for destroying contagious effluvia, and for purifying the air of infected places, in which, if there be sick persons, the bottle may be closed quickly,

when they feel incommoded by it. It may also serve for those who are obliged from necessity to visit infected places. For the purpose of carrying the bottle with safety, it may be inclosed in a wooden case, with the top screwed on, that the stopper of the bottle may be lightly compressed and kept in its place.

Well regulated hospitals ought to have this apparatus always in readiness for purifying the air of the wards, when it may be thought necessary.

Two glass bottles which will hold eighteen ounces of water, with large mouths and ground stoppers, prepared according to the method above described, increasing the dose of the ingredients in proportion to the size of the bottle, two thirds of each remaining empty, may serve for purifying the air of a large hall.

To prevent the expansive force of the gas from raising the stopper, it is necessary to place over it, a concave piece of lead; and to close the bottle in a case of wood; which has on the top, a transverse moveable piece of wood, that will be firm against the stopper, without compressing it too much, otherwise the bottle will be broken. If it be not convenient to use the muriatic and the nitric acids, necessary for the apparatus; the following composition, a-

dopted for the purifying of stables infected by epizootia, may serve.

Take a vessel of glass, porcelain or baked earth, and put into it two ounces of common salt, well dried and mixed, with one ounce of powdered black manganese, called also soap of glass; upon this, pour two ounces of the oil of vitriol, and place the whole upon a frying-pan or earthen vessel filled with sand or ashes, and place this on a brasier of kindled coals. This dose is sufficient for a room of eight or ten braccia (60 feet) in length and six or eight in breadth, and the height in proportion. For greater or smaller rooms the respective doses may be increased or diminished.*

Description of fig. 3 and 4. the disinfecting vial for the pocket.

Fig. 3. The box closed.

Fig. 4. A section of the box to show the position of the bottle.

A, The disinfecting bottle inclosed in its

* The oxygenated muriatic acid gas has also been successfully used in rooms where silk worms are raised, for the cure of some diseases to which they are subject. See a paper by Signore Paroletti of the academy of Turin, &c. Translated from the Italian, by E. C., Barton's Med: & Phys: Journal, vol. 3d.

case EE, and closed by the screw cover FF; B, the part occupied by the mixture, leaving the bottle two thirds empty. C, the stopper, ground with emery, prevented from rising by the cover of the box FF, and which compresses it, by means of a cork or piece of leather *dd*; fixed at the bottom of the cover, which may be made to compress the stopple C by means of the screw *gg*. At the bottom of the case *hh*, a circular piece of cork or leather may be glued for the bottle to rest conveniently on.

“ The Spanish government elected two celebrated professors of Madrid, Messrs. Queralto and Serrais, to try the effect of *nitrous vapours* in the alarming epidemic of Andalusia. These gentlemen having accepted the dangerous commission, repaired to Sevilla, where the malignant fever had carried off more than 12,000 persons, and where the daily increasing mortality entirely overbalanced all medical assistance. On the day of their arrival in the city of Sevilla, Mr. Serrais was attacked by the fever, and two days after, he fell a sacrifice to his zeal and the offices of humanity. Mr. Queralto, more fortunate than his colleague, luckily recovered from an attack of the epidemic, and immediately took the proper measures for em-

ploying the nitrous fumigation in one of the largest hospitals of the town, which was crowded with a great number of patients. In order to put the use of the fumigations to a fair trial, they were at first used only in one quarter of the city, and no other change was made in the mode of treatment which had hitherto been employed. The success, however, exceeded the most sanguine expectations, as the progress of the contagion was not only stopt from the very day the nitrous fumigations were adopted, but no patient was afterwards attacked by the fever in any part of the hospital. The fumigations proved also an excellent medicine to the patients; for all who lay in the wards, where the fumigations were continued day and night, found instant relief, and most of them recovered within a few days; instead of twelve persons dying daily in the hospital, as was usual before the application of the nitrous vapours, the number decreased soon after to only one in a day.

“The fumigation became general. In the space of three weeks the city of Sevilla, and in less than two months, the whole of Andalusia was freed from the devastation of this dreadful epidemic. Mr. Cavanellas, surgeon to St. Luke’s hospital of Sevilla, having exposed the clothes

of a person who, had died with all the symptoms of the highest contagion, to the action of the nitrous vapours, put them upon his skin for one day and a night, without experiencing the least contagious effect. It was generally found, that the nitrous fumes mixed with the air of the atmosphere, occasioned *no trouble to the person breathing*, which is not the case with the simple muriatic gas, and much less with the oxygenated gas, both of which attack the organs of respiration violently.

“Dr. Smyth’s method has been altered by Mr. Queralto, this gentleman effecting the decomposition of the *nitre* in *the cold*, and not employing any heat, as has been done in England; and by which, oxygenated azotic gas is frequently disengaged instead of nitric fumes; because any surplus of heat is capable of separating the affinity which unites the oxygene with the azote. Sig. Gimbernath of Madrid, remarks that, in translating Smyth’s work, he added to the translation, a direction for obtaining the nitrous acid pure and in *white fumes*, and for preventing the generation of the oxydated azotic gas or the *orange coloured* fumes; this he considers a very essential point in the operation, as the fumes of the *pure nitrous acid*

only, may be breathed without any trouble or danger.”*

The French council of health sent several of its members to the hospitals of St. Cyr, St. Dennis, and Gos Caillou, to institute a series of experiments on the muriatic acid gas. “The result of these experiments incontestibly proved, that the mode proposed to free from infection, the wards of hospitals by the muriatic acid gas, may be executed without inconvenience, and with the utmost advantage, as well in inhabited, as in empty wards, observing however, to disengage in the *former*, a smaller quantity of gas.” They conclude by reporting, that, “the powerful considerations of humanity and of what we owe to our suffering fellow creatures, the faculty ought to unite, what their own interest demands. Living in a manner in the very focus of morbid emanations, they incur the risk of becoming daily, by a neglect of the precautions that have been prescribed, the victims of the scourge, the preservative and the remedy for which are the objects of these instructions.”

* On the effect of nitrous vapours in preventing contagion, and arresting the progress of contagious fevers. By Gimbernath, of Madrid.

Signed, Daignan, Bayen, Parmentier, Hego, Heurteloup, Lassis, Pelletier, Thery, Chevalier, Dubois.

BIRON, Secretary.

“Variolous and vaccine virus exposed but for a moment to the vapour of oxygenated muriatic acid lose their contagious properties; and the latter, rubbed with one eighth of a grain of oxyd of iron (*rubigo ferri*) will rarely communicate the disease:* what then may we not expect from this active and elegant preparation?”†

“Fumigating the apartments of the wounded, wherever there are a number collected together, with nitrous vapours, according to doctor Carmichael Smyth’s plan, is of infinite service in correcting fœtor, and subduing contagion.”‡

Among the *mechanical means* recommended for preventing or correcting the bad qualities of the air of hospital wards, one “which has been recently proposed to the French council

* This points out the necessity of guarding against the use of a lancet for vaccination, whose point is rusted; perhaps to this cause many failures to produce the disease may be attributed. E. C.

† Brothwaite on Scarlet Fever. *Med: Jour:* vol. 4.

‡ Cuming, on gun-shot wounds. *Med: Journal*, vol. 4.

of health, and which has met with its fullest approbation, consists in applying to the funnels of the stoves at this time employed in the hospitals, the *aspirators* or suckers, invented by Salmon, surgeon to the military hospital of Nancy. These aspirators are cones of canvas,* fourteen inches long, forming a kind of trumpet, the large aperture of which has a diameter of ten inches, and which terminate by another aperture of three quarters of an inch. This latter extremity is introduced into the funnel of the stove about an inch and a half, and is there solidly fixed. In proportion as the heat within the stove is augmented, the extremities of the aspirators, which are within the funnel, receive additional warmth, and attract in the same degree the atmospherical air of the ward, which is constantly disposed to place itself in equilibrium with the warmer current of air, circulating within the funnel. This attraction is made with great celerity, and in proportion to the mass of air that has acquired a mephitic quality, it renews the air which has not contributed to combustion, and renders the stoves, by which that element has hitherto been vitiated, capable of maintaining

* Why not of metal? C.

its salubrity. To facilitate its effects, vessels filled with pure water ought to be placed on the stoves, more especially on those heated with coals.”*

Table representing the analysis of Atmospheric Air referred to at page 180.

	Days when the air was collected.	Temperature expressed in Degrees of the centigrade Thermometer.	State of the Atmosphere.	Absorption proceeding from the inflammation of 200 of air and 200 of Hydrogene.	Quantity of Oxygen contained in 100 parts of air.
Brumaire.	26	7.3	Sky overcast; wind E.	126.0	21.0
	27	4.5	Sky overcast; wind E. S. E.	126.0	21.0
	28	4.7	Light rains; very high wind S. W.	126.0	21.0
	29	10.0	Light rain; wind S.	126.0	21.0
	30	12.5	Sky overcast; wind S. W.	126.5	21.1
				126.8	21.2
Frimaire.	1	6.7	Sky cloudy; slight rain; wind S. W.	126.0	21.0
	2	1.5	Cloudy sky; wind W.	126.0	21.0
	3	8.5	Rain, and S.	126.0	21.0
	4	10.6	Sky overcast; wind S. W.	126.3	21.0
	5	3.3	Cloudy sky; wind E.	126.5	21.1
	6	1.6	White frost; wind N.	126.2	21.0
	7	1.3	Snow; wind N.	126.5	21.1
	10	4.1	Fog; wind N. N. E.	126.0	21.0
	12	2.3	Cloudy sky; mists; wind E.	126.5	21.0
	14	4.2	Rain; wind S.	136.5	20.9
	16	3.1	Thick fog.	126.0	21.0
	22	9.6	Rain; wind S. S. W.	126.0	21.0
	28	2.2	Sky overcast; wind N. F.	126.0	21.0
Nivose.	2	1.0	Hoar frost, thick fog; wind S. E.	126.0	21.0

* Medical Journal.

The atmospheric air which we have analyzed, (say Messrs. Humboldt and Gay Lussac) was collected over the middle of the Seine in cold, temperate and rainy weather, and during the prevalence of different winds. In order to obtain a greater parity between the circumstances, and better to appreciate the differences in the nature of the air, if there were any, we analyzed on the same day the different portions of air which we had collected in different weathers, and which we had preserved in glass vessels well closed and inverted over the water. For brevity's sake we have comprised in the above table, the absorptions produced by the inflammation of 200 parts of air and 200 parts of hydrogen gas, and have at the same time indicated the correspondent quantities of oxygene. It will appear that our experiments prove, in the first place, that there are no variations exceeding a thousandth part in the quantity of the oxygene of the air, though that which we analyzed, having been collected during the prevalence of different winds, came from regions very remote from each other; and in the second place, that the proportion of the volume of the oxygene to the other gases which exist in the air, is as 21 to 79. The first result, that the air does not vary in its composition, is ri-

gorously exact, because it is independent of the proportion of the hydrogene and oxygene gas which constitutes water; but the second result, that the air contains 21 hundredths of oxygene, can also deviate but very little from the real truth; for if we suppose that the quantity of hydrogene required for saturating 100 parts of oxygene were larger or smaller by five parts than that which we have assigned (and which we have reason to believe is correct within a much less difference,) the error with respect to the proportion of oxygene which we have found in the air, would not amount, as we have already observed, to more than three thousandth parts of the air analyzed.*

Concurring experiments have also been made with the greatest care in every part of Europe, from which, the conclusion is, that neither climate nor temperature, nor distance above the surface of the earth produces the smallest variation in the relative quantities of these gases which compose so large a proportion of the whole atmosphere.†

* Repertory of Arts, vol. 8, 2d series.

† Aikin's Chemical and Mineralogical Dictionary.

ANALYSIS
OF
MINERAL WATERS.

HAVING mentioned, in the preceding pages, the propriety of examining the mineral waters in the vicinity of camps or garrisons, I beg leave to present a succinct account of the substances generally found in natural waters, and the tests in common use to detect them, which I have extracted from Aikin's Dictionary of Chemistry and Mineralogy.

As the army surgeons and assistants cannot be incumbered with voluminous works, I trust the following pages will be useful to those who have not been in the habit of examining mineral waters practically.

Every natural water which flows on the earth, or is found beneath its surface, holds some foreign matter in solution, which, if it does not sensibly impart some peculiarity in taste, smell, and physical properties, may at least be detected by chemical means; and when

the quantity or nature of this foreign ingredient is such as to give obvious sensible or medicinal properties, it is usually called a mineral water. The salt waters of the ocean and of some large inland lakes are however excluded from this definition, though in every point of view they are full as interesting as the smaller and comparatively rare springs, which have the appellation of *mineral*.

The substances hitherto found in natural waters are the following:

1. *Oxygen gas*, in small quantity, was first detected by Scheele. It is contained in almost every spring water, but never exceeds about one hundredth of its bulk, and generally less. It exists in very loose combination, and gives no sensible properties to the water. It is incompatible with sulphuretted hydrogen and with sulphat of iron, and therefore cannot be present when these are.

2. *Azotic gas*, in small quantity and in loose combination exists in some waters, such as that of Bunton; and at the same time a large quantity of it usually rises in its gaseous form along with the water, and passes through it in large bubbles. This also gives no obvious sensible properties.

3. *Common air* is contained in small quan-

tity in all natural waters, from which the last portions are with great difficulty separated. This also produces no sensible change in the water.

4. *Carbonic acid.* Almost all natural waters contain a portion of this gaseous acid, but which varies extremely from one hundredth or less of the bulk of the water, to an equal bulk. When the quantity is about one tenth, and uncombined with any other base, it gives an agreeable pungency to the taste and a sparkling appearance.

Carbonic acid is found, either totally unaccompanied with any other substance with which it has any affinity, or totally united with an alkaline, earthy, or metallic basis; or more commonly partly combined, and partly in excess (that is to say, more than sufficient to saturate the base) and by its excess rendering the base soluble, or, if this excess is still greater, imparting to the water the same pungency as if it were entirely unaccompanied by any other body. The only carbonats hitherto found in mineral waters are the carbonats of soda, magnesia, lime, and iron. Of these, the two former are soluble in water, without any such excess of acid as to render the water acedulous, but not the two latter.

5. *Sulphuretted hydrogen*. A considerable number of waters contain a very notable quantity of this gas, which gives its peculiar fœtid smell, and nauseous, somewhat sweetish taste. In general the sulphuretted hydrogen is uncombined with any base; but there are some waters, particularly some of the hot springs, which, along with this substance, contain soda, with which it doubtless combines; and this compound often contains an excess of sulphur, which it deposits in a small quantity. Sulphuretted hydrogen is incompatible with no other gas but oxygen.

6. *Sulphureous acid* is found in some springs, though rarely, and hitherto has been only met with in the neighbourhood of volcanoes.

7. *Sulphuric acid* is a very common ingredient in waters, but never uncombined; and it gives a sensible acidulousness, only when the salt of which it forms a constituent part naturally exists with excess of acid, such as alum and sulphat of iron. The other combinations of this acid, and in which it is fully neutralized, are sulphats of soda, lime, and magnesia. It has only been found united with potash, when they both form constituents of alum.

8. *Muriatic acid* has only been found combined and in complete saturation. The muriates

of soda, magnesia, and lime, are very frequent; the muriates of alumine, iron, manganese, and potash are rarely found, and the latter is even doubtful.

9. *Boracic acid* has been found uncombined in a lake in Tuscany.

10. *Nitric acid*, united with potash and probably with other bases, is found in those springs that come in contact with the native nitre with which Hungary and some other countries abound.

11. *Soda* is the alkali of by far the most frequent occurrence in mineral waters. It is sometimes uncombined or only united to carbonic acid, so as to give a sensible alkalescency to the taste, and to chemical tests, and causes the water to lather by agitation. These alkaline waters are generally hot. Soda is also found united with sulphuretted hydrogen, with sulphuric acid, as glauber's salt, and with muriatic acid, as common salt. Both these salts are very frequent in waters, and the latter often in very large quantity.

12. *Potash* has been extracted, it is said, from mineral waters; and as late researches have shown it to be contained in some minerals, it may probably be found in waters.

13. *Ammonia* has been detected by Mr. Cavendish in a spring near London.

14. *Lime* is never found uncombined in water; but is contained in small quantity in almost every natural water, united with sulphuric acid as selenite; and is scarcely less frequent, dissolved in water by means of carbonic acid. Muriat of lime is also not uncommon.

15. *Magnesia* is found in the same combinations as lime, but not quite so frequently.

16. *Alumine* is not unfrequent in mineral waters. Often it is merely suspended in extremely fine division; but it has also been detected in union with the sulphuric and muriatic acids.

17. *Silex*. This earth was first detected by doctor Black, in the water of the celebrated boiling springs of Iceland. As these waters contain an excess of soda, and as silex is rendered soluble in water by means of alkali, it was rationally conjectured that this, together with the great heat to which the water is exposed, caused the solution. The same earth has however been since detected by doctor Gibbs, in Bath water, which is not alkaline.

18. *Iron* is a frequent ingredient in mineral springs, in small quantity, but sufficient to

give a very sensible chalybeate taste and smell. It is generally held in solution by the carbonic acid, and is then always accompanied by carbonate of lime, and often of magnesia; but sometimes it is in the form of a sulphat.

All the chalybeate waters deposit oxyd of iron by exposure to air; so that the track of these springs on the soil is marked by a line of reddish yellow ochre.

19. *Copper* is only found as a sulphat, and in the neighbourhood of copper pyrites, from the decomposition of which it originates. It is strongly marked by the cupreous taste.

20. *Manganese* dissolved in the muriatic acid has been found.

21. Besides these ingredients there is often found dissolved in water a small quantity of a black matter, not crystallizable, soluble in alcohol, destructible by fire, which gives a black tinge to sulphuric acid, and is obviously carbonaceous. Its quantity is always too small for minute examination; but it is usually considered as a kind of *bitumen*. This appears different from the soluble part of decayed vegetable matter which water sometimes meets with and holds in solution; and is equally distinct from the mucilage which is generated in

water when nearly stagnant, from the growth of the confervæ and other aquatic vegetables.

We proceed to the best mode of examining a mineral water, in which some differences exist among chemists. The physical properties of the water should be first noticed. These are the degree of clearness or limpidity, sparkling or bubbling when poured into a glass, the taste, smell, specific gravity and temperature. It is useful also to mark the strata of soil from which it springs; the copiousness of the spring, and whether this is affected by a dry or wet season; whether any vegetables, fishes, or animalcula are found in it; and whether it incrusts the substances over which it flows; or deposits any sediment.

The next step is the application of *tests* of different kinds, which is of the utmost importance, as by these the nature and number of all the foreign ingredients, (with one or two exceptions) may be discovered, and even some opinion may be formed of their relative quantity; and these facts are the guide by which the future analysis is conducted. Several precautions however are required in the application of tests to avoid deceitful appearances; and the tests themselves should be prepared with great care, which may be more readily

done as very minute quantities judiciously applied will answer every purpose. Most of the tests indicate the substances for the detection of which they are used, by producing a sensible turbidness, which gradually collects into a precipitate. There is however, with all, a limit to this power of precipitation; for when two naturally incompatible salts are mixed together in very dilute solution, the decomposition is totally prevented by the great bulk of water compared to the saline matters. Thus very small quantities of sulphat of lime and carbonat of soda will coexist in the same water; and these will not be mutually decomposed until the bulk of liquid is reduced by evaporation. In like manner minute quantities of sulphat of magnesia and muriated lime, or muriated lime and sulphat of soda, may be contained in the same water.

Another limit to the power of tests is where the intended decomposition does indeed take place, but where the quantity of liquid is so large that the resulting compound, instead of being precipitated, remains suspended in the water.

The principle tests are the following:

Litmus. The infusion or tincture of litmus sold in the shops is a thick liquor of a very

dark purple, containing a great body of colour. The purple of litmus is changed to red by every acid; so that this is the test usually applied to discover any excess of acid in mineral waters.

It may be used either by dipping into the water a paper stained with litmus, or by adding a drop of the tincture to the water to be examined, and comparing its hue with that of an equal quantity of the tincture in distilled water. In this latter way the change is produced more speedily; and the power of the test is so great, that the act of blowing through litmus water, diluted so as to be barely coloured, will very sensibly alter the hue by means of the carbonic acid of the breath which unites with it. It should be remembered that paper or muslin stained with litmus spontaneously reddens by exposure to air, also that the colour is nearly destroyed by long exposure to light; so that when used as a test they should be recently stained.

Litmus is also reddened by sulphuretted hydrogen.

As the acid of mineral waters is generally the carbonic, and as this acid, when uncombined with any base, or in excess (in which case alone it acts on litmus as an acid) is ex-

pelled by boiling for a few minutes, the trial of litmus before and after ebullition will determine whether the acid of the water is *fixed* or *volatile*.

Litmus already reddened by an acid will have its purple restored by an alkali; and thus it may also be a test for alkalies; but it is much less active in this respect than other direct alkaline tests.

Red cabbage has been found by Mr. Watt to furnish as delicate a test for acids as litmus, and to be still more sensible to alkalies. The natural colour of an infusion of this plant is blue, which is changed to red by acids, and to green by alkalies in very minute quantities. The colour is extracted simply by infusing the fresh leaves of the plant in warm water, of about 120 degrees, for a few hours. The disadvantage of this liquor however, is, that it is peculiarly liable to change by putrefaction, when its properties as a test are lost. To preserve the cabbage for a length of time, Mr. Watt advises to mince the leaves, spread them on paper, and dry them with a gentle heat, and then put them in closely corked bottles. When to be used, digest some of the leaves in a very dilute vitriolic acid, which will give a red liquor; bring this to exact neutralization

by chalk, so that the colour is a pure blue inclining neither to green nor purple; and then pour off the clear liquor and employ it. By adding a little alcohol, it will keep good for some days.

3. *Brazil wood*. When chips of brazil wood are infused in warm water, they yield a red liquor, which readily turns blue by alkalies, either caustic or carbonated. It is also blued by the carbonated earths held in solution by carbonic acid; so that it is not an unequivocal test of alkalies till the earthy carbonats have been precipitated by boiling. Acids change to yellow the natural red of Brazil wood, and restore the red when changed by alkalies.

4. *Violets*. The delicate blue of the common scented violet is readily changed to green by alkalies; and this affords a delicate test for these substances. A tincture is to be preferred.

5. *Turmeric*. This is a very delicate test for alkalies, and on the whole, perhaps the best. The natural colour of turmeric either in watery or spirituous infusion is yellow, which is changed to a brick or orange red by alkalies, caustic or carbonated, but not by carbonated alkaline earths, on which account it is preferable to Brazil wood. The pure earths, such as lime or barytic water, produce the same change, but these are never found in mineral waters.

6. *Rhubarb*. Infusion or tincture of rhubarb undergoes a similar change with turmeric and is equally delicate.

7. *Sulphuric acid*. A drop or two of concentrated sulphuric acid added to water that contains carbonic acid, free or in combination, causes the latter to escape with a pretty brisk effervescence, whereby the presence of this gaseous acid may be detected.

8. *Nitric and oxymuriatic acid*. A peculiar use attends the employment of these acids in the sulphuretted waters, as the sulphuretted hydrogen is decomposed by them; its hydrogen is absorbed, and the sulphur separated in its natural form.

9. *Oxalic acid and oxalat of ammonia*. Oxalic acid is the most delicate test for lime that we are acquainted with, as it decomposes all the soluble calcareous salts, and precipitates with the lime as an insoluble oxalat. This precipitate, when collected and dried, and strongly heated, blackens and melts, and the acid burning off, the lime is left white and carbonated. Oxalat of lime, though nearly insoluble, in water, dissolves without difficulty in a moderate quantity of its own or any other acid; and hence in analysis oxalat of ammonia is often preferred, as no excess of this salt can re-

dissolve the precipitated oxalat of lime. On the other hand, the ammonia should not exceed, otherwise it might give a false indication.

10. *Gallic acid and tincture of galls.* This well known test of iron is peculiarly useful in the examination of mineral waters, as this is almost the only metal ever met with. Where the iron is in very minute quantity, and the water somewhat acidulous, this test does not always produce a precipitate, but only a slight reddening; but its action is much assisted by previously adding a few drops of any alkaline solution. The pure gallic acid, or the tincture or the infusion of galls, acts nearly equally well. Sometimes minute quantities of iron are well detected by suspending in the water a piece of the gall nut for some hours.

11. *Prussiat of potash and lime.* The presence of iron in waters is equally well indicated by these prussiats; and if the prussiat of potash is properly prepared, it will only be precipitated by a metallic salt; so that manganese and copper, when present, will also be detected, the former giving a white and the latter a red precipitate.

12. *Lime water.* This is the common test for carbonic acid, as it produces a cloudiness and precipitate with water that contains any of

this acid in whatever state of combination. It is however ambiguous, as it decomposes all the magnesian salts; and the magnesia which is thus separated being absolutely insoluble in water falls down as a white precipitate. The aluminous salts are decomposed in the same manner. Lime water also produces a cloudiness with most of the sulphats, owing to the formation of selenite.

13. *Ammonia*. This alkali, when perfectly caustic, serves as a distinction between the salts of lime and those of magnesia, as it precipitates the earth from the latter class but not the former. There are however two sources of error in the use of this alkali for this purpose; one is where the carbonic acid is contained in the water, either free or united with magnesia; in which case the ammonia becomes partially carbonated, and then also decomposes the solutions of lime. The other is where any salt of alumine is contained, as ammonia will decompose these as well as the magnesian salts. The former source of error may be obviated by adding a few drops of nitric or muriatic acid to the water, and boiling it for a short time, by which the carbonic acid will be got rid of, and the earths will remain in solution. Then to distinguish and separate magne-

sia from alumine, redissolve both in muriatic acid; precipitate the solution by carbonated alkali, and then transfer the precipitate into cold acetous acid, by which the carbonated magnesia will be directly dissolved, and the alumine left.

14. *Carbonated alkalies.* These are so far useful tests that they precipitate all the earths from their solutions. This is much hastened by boiling for a few minutes. Where carbonat of potash is used, particular care should be taken of its purity as it generally contains silex.

15. *Muriated alumine.* This test is proposed by Mr. Kirwan as indicative of carbonated magnesia in waters, and which cannot, like carbonated lime, be totally separated by ebullition, but remains until the whole liquid is evaporated. By adding muriated alumine to the boiled water a precipitate of carbonated alumine is found, if carbonated magnesia is present, but in no other case, unless there be an excess of alkali, which may easily be neutralized.

16. *Barytic salts.* The nitrat, muriat and acetite of barytes are all equally good tests of sulphuric acid in any combination. The power of this precipitant is greater than that of any

other, except perhaps the salts of silver for muriatic acid. In applying the barytic salts the only care required is to neutralize any excess of alkali that there may be, with any acid but the sulphuric; and if the sulphureous acid be suspected, which is very rare, to free the water from it. The nitrat or acetite of barytes are sometimes preferable to the muriat, inasmuch as they introduce into the water to be examined no acid of a kind similar to any already contained. If any excess of alkali has caused a mixture of carbonat with sulphat of barytes, they may be readily separated by digestion with moderately dilute nitric or muriatic acid, which will dissolve the carbonat and leave the sulphat.

17. *Salts of silver.* The salts of silver are the most delicate tests for muriatic acid in any combination, producing the precipitated muriat of silver or luna cornea; the composition of which is constant, and has been mentioned under silver. Any excess of alkali in the water should be previously saturated by pure nitric acid. The nitrat of silver is the salt commonly used as a test; but this as well as the acetite will also decompose the alkaline and earthy soluble salts with sulphuric acid, and a sulphat of silver will be formed, which it is not

easy to distinguish by the eye from the muriat. This may be prevented either by previously getting rid of all sulphuric acid in the water by means of nitrat or acetite of barytes, after which all the precipitate of silver will be luna cornea; or else by employing a solution of sulphat of silver, which will then only act on the muriats. It should be observed however, that nitrat of silver is a much more powerful precipitant of the muriats than of the sulphats, so that if any water where a barytic solution gives but a faint indication of sulphuric acid, an immediate precipitate is produced by nitrat of silver, we may be certain that it is the muriat of silver, and not the sulphat which falls down.

Acetite of silver has a particular use in decomposing the fixed alkaline muriats, as we are enabled thereby to distinguish the alkali more easily in the supernatant liquor; for by evaporating the latter to dryness, redissolving the remaining salt in alcohol, and gently evaporating the alcoholic solution to dryness, if it be acetite of potash, it will deliquesce, but if acetite of soda, it will remain dry and effloresce.

All the salts of silver also give a black or dark brown precipitate with the sulphuretted hydrogen as any that we possess.

18. *Salts of lead.* The nitrat and acetite of lead are the salts of this metal employed as tests. They will indicate the sulphuric, muriatic, and boracic acids, and sulphuretted hydrogen or sulphuretted alkali. The water being first freed from any excess of alkali by saturation with nitric acid, the addition of either of these salts of lead will decompose, and form a white precipitate with the acid of all the contained sulphats or muriats. But as sulphat of lead cannot by the eye be distinguished from the muriat, the precipitate should be digested in acetous or very dilute nitric acid, or merely boiled in a good deal of distilled water; by any of which means the muriat will be dissolved, but the sulphat will be untouched. In these precipitates, the acetite of lead is a more sensible test than the nitrat; but as the former when long kept will be partly decomposed by pure water, it should be assayed with water, and a little more acetous acid added, if necessary. Acetited lead is also decomposed by the carbonated earths and iron, so that the water should be boiled before this test is applied. This salt also produces an insoluble borat of lead when boracic acid is present in the water, which takes place in one or two rare instances. The borat of lead is dis-

tinguished from the sulphat of this metal by being soluble in nitric acid of 1.3 sp. gr. and from the muriat by being insoluble in water, or in weaker acids. But where boracic acid is suspected, Mr. Kirwan advises first to separate the sulphuric acid (if any) by acetited strontian, and the muriatic acid by acetited silver, neither of these acetites being decomposed by pure boracic acid.

Acetite of lead is also a very delicate test for the sulphurets, which it shows by turning to a deep brown or black. It is often applied by tracing characters on paper with acetite of lead, and immersing it in the sulphuretted water.

19. *Soap*. A solution of soap in distilled water, or in alcohol, is curdled by water containing any earthy salt. It is therefore a test of some use, but not discriminative. The metallic salts produce the same effect, but the curd is then coloured.

20. *Tartareous acid*. This acid is of use in distinguishing the salts with potash (with which it forms a precipitate of cream of tartar) from those of soda which it does not precipitate. It is necessary, however, that the solution of salt with the basis of potash (the sulphat or muriat, for example) be much

stronger than occurs in any mineral water in its natural state, so that it must be concentrated by evaporation.

21. *Nitro-muriat of platina*. This salt is still more discriminative between potash and the other alkalies than acid of tartar, and will produce a precipitate with a very weak solution of any salt with potash. It has not yet been much employed, but may often be of use.

22. *Alcohol*. This most useful reagent is applicable in a variety of ways in the analysis of mineral waters. As it dissolves some of the substances found in mineral waters, and leaves others untouched, it is a means of separating them into two classes, which saves considerable trouble in the further investigation. Those salts which it does not dissolve, it precipitates from their watery solution, but more or less completely according to the salt contained, and the strength of the alcohol; and, as a precipitant, it also assists in many decompositions. The great utility of *alcohol* to the analytical chemist has been already described.

The above are the principal tests or reagents employed. Several others might be enumerated, which will easily suggest themselves to the practical chemist; and the theory of these respective operations will be better

understood by consulting the articles themselves, to which we shall refer the reader, to avoid repetition.

The whole of the above reagents may be put up in a small case; but as the army surgeon cannot, from the nature of his situation, take with him the necessary apparatus to ascertain the quantity of gas contained in mineral waters, I purposely omit a description of the necessary vessels, &c. that would be required for a *complete analysis*.

The tests already described will be sufficient to detect the foreign substances contained in mineral waters: I will therefore proceed to enumerate those substances for which there exists any appropriate *test* or chemical reagent.

Oxygene gas—Atmospheric air.

The presence of oxygene in water may be detected, according to Scheele, by filling a vial with the water, and dropping into it a piece of newly crystallized *sulphat of iron*, and corking the bottle close. In a little time the salt will be dissolved, and in a few hours an *ochery precipitate* will be perceived, owing to the absorption of oxygene by the oxyd of iron of the salt, which then becomes insoluble.

Carbonic acid.

Test. Lime or strontian water, litmus when in excess; sulphuric acid; boiling.

Sulphuretted hydrogen.

Tests. Nitric and oxymuriatic acids, salts of lead and silver. A few globules of clean mercury allowed to remain for several hours in contact with the water, closely corked, will detect very minute quantities of it, by being blackened at the surface. Silver leaf will answer as well.

Sulphureous acid.

Test. Mr. Kirwan gives us the only decisive test of this acid gas being held in solution in water, that when mixed with a tincture of roses reddened by an acid, it renders this tincture colourless. This acid is also known by the smell. If perfectly pure, it ought *not* to precipitate muriated barytes nor nitrated mercury, but it always does, which perhaps is owing to an inseparable admixture of sulphuric acid.

Mineral acids uncombined.

Test. Reddening litmus after the water has been boiled.

Boracic acid.

Test. Acetite of lead.

Carbonated alkalies.

Tests. Turmeric. Rhubarb. Violets. If the change of colour does not take place after ebullition for several minutes, it shows that the alkali was ammonia.

Ammonia.

Test. The presence of this alkali is partly distinguished in the way mentioned above, but more certainly by boiling a pretty large quantity of the water in a retort, carefully collecting the first ounce that distils and moistening with this portion a piece of well burnt lime, by which the ammoniacal smell will be distinctly perceived. The object of this distillation is to concentrate in a small compass all the ammonia of a larger quantity of liquid, which might be too dilute to indicate the alkali without this method.

Carbonats of lime and magnesia.

Tests. Precipitated by ebullition, the former totally, the latter partially. After boiling, the magnesian carbonat remaining is indicated by muriat of alumine.

The acid of the sulphats.

Tests. Salts of barytes and lead. All the sulphats are also insoluble in alcohol, and precipitable by it from their watery solutions. But sulphat of lime exceeds all the others in the ease with which it is thus precipitated.

The acid of the muriats.

Test. Salts of silver. Alcohol unless very highly rectified dissolves a small quantity of muriat of soda, and does not precipitate the muriats with the ease with which it separates the sulphats.

Neutral salts of potash as distinguished from those of soda.

Tests. Tartareous acid, nitro-muriat of platina. Acetited barytes with the sulphats; and acetited silver with the muriats.

The earth of the calcareous salts.

Test. Oxalic acid or oxalat of ammonia. Pure ammonia *not* precipitating it. Sulphuric acid, or better the alkaline sulphats, also decomposes the muriat of lime, and the resulting selenite is precipitated. This may be hastened by alcohol.

The earth of the magnesian salts.

Tests. Pure ammonia. Lime water.

The earth of the aluminous salts.

Tests. Pure ammonia. Lime water.

Silex.

Test. This is chiefly suspected by its refusing to dissolve in any acid after the water has been once evaporated to dryness. It may be more certainly ascertained by melting it before the blow pipe, with three or four parts of dry carbonat of soda, into a clear globule, which *then* will dissolve in water. Some of the waters which contain silex will *gelatinize* when evaporated almost to dryness, after which the silex will not redissolve by restoring the water which has been lost. This agrees with the known properties of silex in the analysis of minerals.

Salts of iron.

Tests. Galls. Prussiat of potash or lime. The carbonat of iron is precipitated totally by boiling.

Salts of copper.

Tests. Prussiat of potash. Ammonia. Me-

tallic iron. The copper will be deposited on the iron.

Manganese.

Test. The brown colour of its oxyd, and its solubility in carbonat of potash.

Carbonaceous matter.

Test. Dissolves in concentrated sulphuric acid, giving it a clear brown colour.

The experimenter by referring to the description of the *tests* in the preceding pages, and the results on adding them to the waters containing the articles therein described, will be enabled to judge of the contents of the mineral water under examination.

DIRECTIONS
TO
NURSES* AND ORDERLY MEN
FOR THE

Preparation of the diet, &c. for the sick.

THE preparation of tea, chocolate and coffee is too well known to need any direction.

Sage tea.

Take of the leaves of green sage, plucked from the stalks and washed clean, from half an ounce to an ounce; white sugar one ounce; a small quantity of lemon peel; boiling water one quart. Infuse them in an earthen ware vessel for half an hour, then pour off the tea. A less proportion of dry sage may be used. In the same way teas may be prepared of balm and other herbs in general use.

* A little treatise entitled the *Nurse's Guide*, by doctor Johnson, ought to be in the hands of all hospital nurses. Republished by James Humphreys, Philadelphia.

Flaxseed tea.

Take flaxseed (linseed) *whole* one ounce; sugar one or two ounces; lemon juice two ounces, (or cream of tartar two drams); *boiling water* one quart; let them stand in a stone jug for three or four hours, then strain off the tea.

Oatmeal tea.

Take of oatmeal one handful; boiling water one gallon; let them stand in a stone vessel for an hour, then pour off the clear liquor, which may be simmered for a few minutes, and sweetened.

Malt tea.

Take of ground malt one pint; boiling water three pints; stir them well together and let it stand close covered for three hours, then strain off the tea.

Bran tea.

Take of bran two handfuls; brown sugar a sufficient quantity to make it palatable; boiling water six pints; mix them, and when they have stood three or four hours, strain off the tea.

Camomile tea.

Take of camomile flowers one handful; boil-

ing water one gallon; let the flowers infuse for half an hour, then strain off the tea.

Wine whey.

Take new milk one quart; water half a pint; boil them together, then add a sufficient quantity of white wine until the milk curdles, (one gill of good wine will be sufficient); it must then be strained off and sweetened. Vinegar whey and cream of tartar whey may be made by adding a sufficient quantity of either, to curdle the milk, which is then to be strained as before, and sweetened.

Lemonade.

Take of lemon juice one ounce; the rind of fresh lemon (or if at sea, the dry lemon peel) loaf sugar two ounces; *boiling water* a pint and a half.

Imperial drink.

Take of cream of tartar one drachm; orange or lemon peel half a drachm; loaf sugar one ounce; *boiling water* two pints. When they have stood in an earthen vessel for a quarter of an hour, strain off the liquor.

Barley water.

Take of barley (pearl barley is the best)
2 Q

two ounces; water two quarts. First wash the barley in a little water, then boil it in a small quantity of water, which is to be thrown away; then put the barley into the water, as above directed, boil it away to one half, and strain off the liquor, which may be sweetened to the taste.

Rice water.

Take of rice two ounces; wash it in clean water; then put it into three quarts of boiling water; let it boil until it is perfectly soft; strain off the liquor and sweeten it for use. Make up the quantity boiled away by adding clear water. A few raisins may be added.

Neither the barley nor the rice should be *thrown away*; both will make an agreeable dish for convalescents, by adding a little sugar, wine and nutmeg.

Water gruel.

Take of oatmeal two large spoonfuls; water one quart; mix them well and boil them ten or fifteen minutes; then strain the gruel through a sieve, and add salt or sugar to make it palatable. No wine or spices must be added without the *surgeon's* direction.

Sago.

Take of sago one large spoonful; water one pint; boil them gently, and stir them often until the mixture become smooth and free from lumps; then add a small quantity of wine and nutmeg, and sweeten it.

Rice gruel.

Take of ground rice two ounces; water four pints; boil them for half an hour, then add a small piece of cinnamon and a sufficient quantity of sugar to make it palatable; and *wine*, if allowed.

White Caudle.

Take of oatmeal two spoonfuls; water one quart; boil it well, then add sugar, wine and nutmeg to make it palatable. Toasted bread may sometimes be added.

The dernier resort.

Take ship biscuit one pound; water eight pounds; boil them in an earthen pot or saucepan for an hour, then add as much hot water as the mixture has lost by boiling; strain it, and add powdered cinnamon, lemon or orange juice and sugar, or wine and sugar; this makes an agreeable diet; when it is cold, it becomes

a jelly. This is a formula of *Rouppe's*. As it can be made, when all the articles of *hospital stores are expended*, I have called it the *dernier resort*.

Panado.

Take of bread one ounce; water one pint; boil them till they mix and become smooth; then add sugar, grated nutmeg and wine.

Tapioca jelly.

Take two tablespoonfuls of tapioca; put it into a pint and a half of pure water, let it stand one hour, then boil it over a gentle fire, stirring it occasionally until it is dissolved and becomes transparent. Lemon or orange juice and sugar may be added to make it palatable; or wine, sugar and nutmeg.

Arrow root.

Take of the powder of arrow root two teaspoonfuls; put it into a bowl, and add two tablespoonfuls of cold water, or a sufficient quantity to reduce the powder into a smooth, even paste, then pour on it one pint of *boiling water*, keep stirring it whilst you add the water, until a jelly-like mixture be formed; sweeten it with loaf sugar, and add a little powder-

ed cinnamon or nutmeg. If it be convenient, a gill of milk may be added. The water must be in a *boiling state* when it is added. This is a very convenient article for the use of the sick at sea, it is prepared with so much ease.

Portable soup.

To make soup from this article, one or two cakes must be *dissolved* in a pint of *boiling water*, to which may be added two or three teaspoonfuls of powdered rice, or whole rice boiled soft; then add a little dry celery powder or parsley; sometimes a little salt, pepper, cloves and wine may be added, but this should never be done, unless by the direction of the surgeon. If the portable soup be of the consistence of a jelly, in a canister, one tablespoonful will be sufficient for a pint of water. It should *never be boiled*; as it renders the whole unpleasant, and gives it the taste of glue.

Mutton broth.

Take of the leg, breast or neck of mutton, cut into small pieces, one pound; water three pints; put it into a pot or saucepan, set it over the fire and when the scum begins to rise, take it off clean; continue the boiling until the meat be tender, pour it into a bason and when it is

cold, skim off the fat, after which the liquor may be again boiled with rice or barley and seasoned with a little salt and pepper; a little dry toast may sometimes be added, or broken biscuit.

Beef tea.

Take a pound of lean beef, cut it into very fine pieces, put it into a jar and pour a quart of boiling water on it, cover it very close to keep in the steam, let it stand by the fire for an hour or two; a little salt may be added; it should be milk warm.

Beef broth.

Take of lean beef, as clear of fat as possible, one quarter of a pound; water a pint and a half; put it on the fire, when it boils skim it, then add a little salt and a blade or two of mace or two or three grains of allspice or sweet marjoram. If this article be made for those who are in a convalescent state, some rice or barley, with pepper, celery powder, &c. or other seasoning may be added.

Chicken broth.

Take a common sized chicken, cut it into pieces, put it into a saucepan with three pints of water, as it boils, remove the scum and fat,

then add a little salt, with *a small quantity* of any agreeable aromatic, such as mace, cloves, allspice, or sweet basil; put some pieces of biscuit or soft bread into it.

Boiled chicken.

Take thin slices of bread, and pour a little of the broth prepared as above over them, then lay the chicken upon it. It must be eaten without any sauce.

Mutton, beef or chicken may be occasionally broiled for those whose appetites are recovered.

Bread pudding without eggs.

Take some soft bread, pour over it half a pint of boiling milk, cover it close and let it stand until the milk is soaked up, then tie it up lightly in a cloth, and boil it for fifteen or twenty minutes; then lay it in a plate; it may be eaten with a little molasses, or sugar and wine.

Rice pudding may be made in the same way, by previously boiling the rice; it may be eaten with a little salt; and sometimes with wine, sugar, and nutmeg.

Blanc manger.

Take of isinglass sliced, one ounce, Infuse

it in cold water for two hours, pour off the water, and then put the isinglass into a quart of new milk, with a little orange juice or lemon peel; set it upon a clear fire and stir it frequently until the isinglass is dissolved; then strain it through a hair sieve, sweeten it to the taste with loaf sugar; when it has stood for ten or fifteen minutes, pour it into cups, first wet; when it is cold turn it out upon plates. It may be used in this state, or melted with a little sugar and wine.

Another.

Take of hartshorn jelly eight ounces; loaf sugar four drachms; almonds beaten to a paste one ounce; essence of lemon, three drops; liquefy over a gentle fire, and put it into cups as above directed.

Hartshorn jelly.

Take hartshorn shavings half a pound; water three pints; loaf sugar six ounces; white wine one gill; orange or lemon juice one ounce; boil the hartshorn with the water by a gentle fire in a stone or well tinned vessel, until two parts are evaporated, strain out the remaining liquor and add the other ingredients; boil it again gently and let it cool.

Isinglass jelly.

Take isinglass one ounce; water three pints; cinnamon two drachms. Boil it down to three half pints, strain the liquor through a flannel bag and add four ounces of loaf sugar and a little wine; when they are well mixed, pour it into cups for use.

Calves' feet jelly.

Boil two calves' feet in one gallon of water till it is reduced to a quart, then strain it, and when it is cold, skim off the fat carefully, and take up the jelly clear; if there is any sediment leave it. Put the jelly into a saucepan, with a pint of wine, half a pound of loaf sugar, the juice of four lemons, and the whites of six or eight eggs; beat it up with a whisk; mix all well together, set the saucepan upon a clear fire, and stir the jelly till it boils. When it has boiled a few minutes, pour it through a piece of new flannel till it runs clear. Have a large bason with some lemon peel in it, cut as thin as possible; let the clear jelly run upon them, while warm; and from these it will acquire both an amber colour and an agreeable flavour; afterwards it may be poured into glasses or

cups. Some add a small quantity of the essence of lemon.

Common custard.

Take a quart of milk,* set it over a slow fire with a little cinnamon in it, and four ounces of loaf sugar; when it has boiled take it off the fire; beat the yolks of eight eggs together for ten minutes; then add the milk by degrees; keep beating them until they are cold; put the mixture into cups, and set them in an earthen dish or pan, in hot water; keep them on the fire till they are set, or they may be baked in the galley oven.

Tablettes de bouillon, or portable soup.

Take, calves' feet, 4; the lean part of a rump of beef 12 pounds; fillet of veal 3 pounds; leg of mutton 10 pounds. These are to be boiled in a sufficient quantity of water and the scum taken off. When the meat becomes very tender, the liquor is to be separated from it by expression; and when cold, the fat must be carefully taken off. The jelly-like substance must then be dissolved over the fire and clarified with five or six whites of eggs. It is then to

* Every hospital ship should have a cow on board or goats; the former is preferable.

be salted to the taste and boiled down to the consistence of paste, when it is to be poured out on a marble table and cut into pieces, either round or square, and dried in a stove room. When perfectly hard, they should be put up in close vessels of tin or glass. Powdered rice, beans, peas, barley, celery, with any grateful aromatic may be added; but for the use of the sick it should be made plain.

It may be simply made either of beef, mutton or veal.

GLEANINGS
FOR THE USE OF
SEA OFFICERS AND MEN.

Ushant pudding.

CAPTAIN Faylor of the *Fame* assures Dr. Trotter, physician to the British fleet, that *molasses* mixed with *flour pudding* is an excellent substitute for eggs; to which I beg leave to add a small quantity of suet.

Bread.

“ The process of making yeast, as practised at Edinburgh, is as follows:

“ Take two ounces of hops; boil them for an hour in two gallons of water; and, boiling hot, scald eight or ten pounds of flour, and stir it very well into a paste. Do this about eleven in the forenoon. Let it stand till six o'clock in the evening; then add about a quart of yeast to forward the fermentation, and mix it well together. Next morning add about as much more flour and water sufficient to make it into dough; and in the afternoon it will be fit

for setting sponge and baking. Reserve always a piece of the old dough to mix with the new batch instead of the yeast; which is necessary only the first time, to hasten the process. The above quantity of hops will suffice for an hundred and twenty quartern loaves.

“ This process in Scotland requires about thirty hours; in a warm climate a few hours would suffice, as fermentation there advances with great rapidity. A due attention must be paid to that circumstance, as every thing depends upon it.”

How to use the dough.

“ Take a piece of dough and keep it for use. It will keep for several days very well. Mix the dough with some warm water, not very hot, and knead it up with some flour, to ferment and sponge. Divide the flour into four parts: mix a quarter of the flour with the leaven, and a sufficient quantity of water to make it into dough, and knead it well. Let this remain until it ferments and rises properly; then dilute it with more water, and add another quarter of the flour, and let it remain to rise. Do the same with the other two quarters of the flour, one quarter after the other, taking par-

ticular care never to mix more flour until the last has risen properly. When finished, divide it into loaves; and let the loaves remain to rise, in order to overcome the pressure of the hand in forming them; then put them into the oven, and reserve a piece of the dough for the next baking. Dough thus kept, might, with proper care, be prevented from going into the acetous fermentation, by mixing, from time to time, fresh flour. This practice is particularly recommended to be followed by those persons who do not like any *acidity* in their bread, or have an equal dislike to the bitter arising from hops. On board a ship, this mode may be easily practised, as, from the regularity of keeping watch, the time for mixing the flour can be adhered to with great exactness. From an ignorance of the art of baking with leaven, very few ships attempt even to bake rolls for the officers, and fewer still for the ship's company."

The above extracts are so plain, that nobody can misunderstand the directions given. The surgeon, therefore, by purchasing a quart of yeast when he goes first to sea, to begin the fermentation of the leaven, may order the process to be continued daily so as to afford rolls

for any number of sick; and we earnestly recommend this practice.

The leaven here directed also possesses the quality of raising the *flour pudding*, and making it light and easy of digestion. Half the quantity of leaven ordered above will serve the whole puddings used at one meal by six hundred men, which is the complement of a seventy-four gun ship.

Beer.

“ To every quart of porter or strong ale, add two quarts of water moderately warm. To every quart of this mixture, add a table spoonful of brown sugar, or a wineglassful of sirup or molasses. Put the whole into a tub; beat and whisk it with a bundle of rods for at least half an hour; bottle and cork it, and tie the corks down with strings. The pressure of the corks upon the strings will show the progress of fermentation, which will be slow or quick in proportion to the warmth of the weather. In the East or West Indies, fermentation is so quick, that what is made in the evening is ripe next day. When once made, always preserve a bottle or two of the old, and mix it with the new making, as it quickens the fermentation, and makes it more brisk and live-

ly. The quantity made must be, in warm climates, in proportion to the daily consumption, as it speedily turns sour. If this small beer is wanted in large quantities, it may be made in casks, in the same manner as spruce beer, but do not draw it entirely off; always reserve a proportion of the old to mix with the new. The ale to be taken to use for the purpose of making this beverage ought to be made very strong; but by no means to be reduced to an extract, or such a substance by boiling, as will evaporate the vinous and active part of the malt liquor. Good strong ale, that will bear thrice its quantity of water, will be sufficient."

Minced collops.

"In short cruises the following mode of preserving beef is recommended. Take beef, and chop and mince it very small; to which add some salt and pepper. Put this in its raw state into small jars, and pour on the top of it some clarified butter. When intended for use, put the clarified butter into a fryingpan, and slice some onions into the pan, and fry them. Add a little water to it, and then put in the minced meat: stew it well, and in a few minutes it will be fit to serve up. This is a fa-

vourite dish in Scotland. Few families are without it, as it keeps well, and is always ready as an extra dish."

"To render pea soup or barley broth pleasant and palatable, fry onions in butter, and pour into the soup."

"There is a practice now in use on board of the American whalers, who are generally out ten or twelve months in a voyage, that deserves to be mentioned. They take cider on board in casks, into which they put a quantity of sound apples. The apples are thus kept in high preservation; and as they draw off the cider, the apples are given to the men, to be either eaten raw, or made into puddings."

Melroe's soup.

"SIR,

London, Jan. 29th, 1798.

"I have hit upon a method of making cheap soups, and other dishes suitable to the necessity of the times. One or two of the soups will be proper, I flatter myself, in the navy and other departments; I have, therefore, taken the liberty to address you on the subject, and communicate the method of making the soup, wishing you will have the goodness to make a trial of it; first in the officers' messes, and then in the seamen's.

"By the experiments which I have made

on animal diet, I have found that fat is the essence of meat, or nearly so: my "Cookery" is founded on this, as will appear from the recipe:

Take beef suet, four ounces.

Scotch barley, 1-2 lb.

Oatmeal or flour, 3 or 4 ounces.

Onions, three or four ounces, or

Leekseed, a small quantity.

Celery-seed, a small quantity.

Salt and pepper, a sufficient quantity.

Water, a gallon.

The barley is to be boiled in the usual way: about an hour before the soup is removed from the fire, add the oatmeal or flour previously mixed in a little cold water. The suet had better be melted before the fire, and added fifteen minutes, (along with the onions, celery-seed, &c. in a bruised state,) previously to the cookery being finished.

"The value of the above will be found to be about 4*d.* a gallon, sufficient for eight men: if a cake and a quarter of portable soup is added, the value will be 10*d.* If you suppose my cookery to be unwholesome from the suet contained in it, then by the same chain of reasoning, the seamen's pudding must be unwholesome, when eight men eat double the

quantity of it, viz. 1-2lb. to 3 1-2 of flour, if I mistake not.

“ The fat combined with mucilage, as in the barley broth, forms a mixture easily digestible, and, I think, highly nutritious. But I am open to conviction; if you can make it appear otherwise, by any chemical or physical reason, I will be glad to be informed. The soup is pleasantly tasted; but being a new fangled mess, objections may be made, and an unfounded prejudice held against it. But at sea I can venture to predict, when nothing but *salt junk* is the order of the day, and should the day be cold, a pint of this soup will be a grateful meal to a seafaring man. I am, sir,

“ Your most obedient servant,

(Signed)

“ ELIZA MELROE.

“ To Dr. Trotter.”

Onions.

To preserve them for use at sea, cut the root off to the quick, and apply a slight solution of lunar caustic to the wound which checks the vegetation; by this means they may be preserved six months. This philosophical experiment may be easily accomplished by a *hot poker* or any *piece of iron*, with which the roots should be effectually *seared*. Country people are in the custom of running a *red hot knitting*

needle from the root to the top of the onion, which answers better.

Oranges.

To preserve the juice of oranges, see page 31.

Lemon juice may be preserved in the same way; also without evaporation, by clearing it of feculent matter.

The common process for preserving it in large quantities, is to express the juice and let it remain twenty four hours in a tub; the scum being carefully taken off, and the juice passed through a hair sieve, it is to be put into a clean cask; two or three gallons of spirit should be added to every hogshead of juice, which will preserve it good for a considerable length of time. A ship furnished plentifully with this article may bid defiance to the scurvy.

Cabbages and French beans.

“Cabbage, French beans, &c. may be preserved by putting them in clean, dry, stone jars or pots, with a layer of salt at the bottom, then a thin layer of the vegetable covered with salt, and so alternately until the pot is full; then the whole must be pressed down with a weight, and its mouth quite stopped with a cork or

timber plug, well pitched over, that no air or moisture may enter; thus the vegetable may be kept fresh and green for a whole year. At the time of using it, the salt is to be washed off with warm water. Scurvy grass may also be preserved in this way."

Beets

May be preserved from six to nine months if packed in a tight cask with earth. They must be perfectly sound, when packed.

Turnips.

The juice of turnips may be inspissated; it is an excellent ingredient in soup for sea use; the juice of carrots may also be added.

Milk

May be preserved by boiling it with loaf sugar and bottling it tight. A good substitute may be made by rubbing a piece of butter freed from salt, with powdered gum arabic and loaf sugar; water is to be gradually added until it becomes of the consistence of cream.

To make a pleasant drink for hot weather.

Take cream of tartar, three ounces.

One lemon and rind.

Seven quarts of boiling water, sweeten it to your taste with white sugar, and when cold, bottle it. It must be kept in a cool situation, or it will burst the bottles. It may be drunk the day after it is made.

Spruce beer.

Take four ounces of the essence of spruce, mix it well with one gallon of molasses, two gallons of warm water and half a pint of yeast; stir them well until the liquor bears a froth; then put it into a cask which will contain fifteen gallons, fill it with water and shake it well to mix the ingredients; let it ferment for two or three days with the bung open; when it is sufficiently worked, bung it close and set it by for use. If intended for bottling, it will be the better for standing three or four days. The sediment remaining at the bottom of the cask will serve instead of yeast for the second brewing.

Beer.

Take of porter two quarts, grated ginger two drachms, soft sugar half a pound, water four quarts. Put the liquor into strong bottles and cork them well for use.

Eggs

May be preserved as recommended at page 251.

Cucumbers

May be procured at different ports during the summer months, when large quantities may be purchased at a trifling expense, and pickled *on board* for the use of the crew; which will not only be a good preservative against the scurvy, but a valuable treat to men, who have been on salt junk for some time.

To pickle cucumbers.

Take cucumbers of a middling size, put them in a match tub, and cover them with salt and water for a few days until they become somewhat yellow, stirring them daily, then pour it off. Boil a sufficient quantity of vinegar and water to cover them, pour it over them whilst it is hot, and cover the tub with boards; when they become green, pack them in kegs and pour strong vinegar over them, made luke warm. A small quantity of pepper may be added.

The cask should be headed up, after they are packed, and the vinegar poured in at the bung-hole; when the cask is filled, close it tight.

The casks should be examined occasionally and kept filled with vinegar. Red cabbages, beans, &c. may all be preserved at a trifling expense.

Dr. Trotter recommends a work entitled Economical Cookery, by Mrs. Melroe; he remarks that it contains a variety of pleasant dishes, that will be found acceptable to both the officers and seamen at sea; and the humane surgeon will find among them many useful hints for improving the diet of his sick berth.

Regulations established in the British naval service, in 1805.

Taken from Turnbull's Naval Surgeon.

It is ordered, that the number of assistants heretofore called "Surgeon's Mates," to be allowed to the surgeons of his majesty's ships, shall in future be regulated as follows:

First rate	3	Assistants
Second rate	3	ditto
Third rate	2	ditto
Fourth rate	2	ditto
Hospital ships	3	ditto
And all other ships entitled according to the existing regulation to bear mates	1	ditto

That no person shall, in future, be appointed to serve as an assistant to the surgeon of any of his majesty's ships, who shall not have been found qualified on examination to serve as surgeon, or as first assistant: that the pay of assistants so qualified shall be 6*s.* 6*d.* a-day, besides the ship's provisions; with half pay when reduced, at the rate of 2*s.* per day, provided they shall then have served two years subsequent to the date of this regulation; and 3*s.* per day, if they shall have served three years from that date. That such assistants shall be required to furnish themselves with such surgical instruments* as the commissioners for sick and wounded seamen shall direct; and that they shall be rated on the ship's books, where the complement admits of more than one, according to their seniority on the list to be kept by the Sick and Wounded Board.

All surgeons of the navy who shall not have served in the whole six years, of which not more than three years' time as hospital mate or assistant surgeon shall be allowed, shall receive, when employed, a full pay of 10*s.* per day; and when not employed, a half-pay of 5*s.* per day.

Surgeons of ships in active service, after having served six years, of which not more than three years' time as hospital

* See page 334, for a list of these instruments.

mate or assistant surgeon shall be allowed, shall be paid 11*s.* per day; their half-pay to be 6*s.* per day.

After having served ten years, allowing not more than three years as hospital mate or assistant surgeon, the surgeon's full pay shall be augmented to 14*s.* per day, his half-pay to remain at 6*s.* per day.

Surgeons of receiving-ships, slop-ships, convalescent-ships, prison-ships, and all other ships, except hospital-ships, employed only in harbour duty, shall be allowed full pay, 10*s.* per day, with half-pay according to the time of their service.

Surgeons appointed to hospital ships shall receive a full pay of 15*s.* per day, unless in cases where, by the length of their service, they may have become entitled to a superior rate of payment; their half-pay to be regulated, as in the case of surgeons of other ships, by the length of their service.

Every surgeon in the navy, excepting surgeons serving on board receiving-ships, slop-ships, convalescent-ships, or any other ships than hospital-ships, employed only on harbour duty, shall, after twenty years' service on full pay, including not more than three years' time as hospital mate or assistant surgeon, be allowed 18*s.* per day: and after such length of service, all surgeons, in whatever ships they may have served, shall have a claim to retire on a half-pay of 6*s.* per day; but if the cause of their retirement shall be ill health contracted in the service, and it shall be so certified by the commissioners for sick and wounded seamen, the rate of half-pay on such retirement, after twenty years' actual service, shall be 10*s.* per day.

Every surgeon in the navy, after thirty years' service on full pay, including not more than three years as hospital mate or assistant surgeon, shall have an unqualified right to retire on half pay, at the rate of 15*s.* per day.

That medicines and utensils shall be provided for the service of his majesty's ships and vessels, at the expense of government, in such proportions as shall from time to time be arranged by the commissioners for sick and wounded seamen; but the surgeons shall be required to provide, at their own expense, such surgical instruments as shall be judged necessary by the said commissioners.

No person shall be appointed physician to a fleet or an hospital, who shall not have served as surgeon at least five years; the daily pay of a physician on his first appointment, to be one guinea, his half-pay half a guinea.

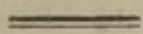
When he shall have served three years as physician to a fleet or an hospital, his full pay shall be one guinea and a half per day, his half-pay 15s. per day.

The full pay of a physician, who shall have served in that capacity more than ten years, shall be two guineas per day, his half pay one guinea per day.

That physicians, when a residence is not provided for them, shall be allowed one guinea per week lodging money.

To the widows of physicians and surgeons, such a pension shall be allowed as the lords commissioners of the admiralty shall think it right to grant.

None of the officers before mentioned, who shall retire from their respective employments without the approbation of the commissioners for sick and wounded seamen, or who shall refuse to serve when called on, if judged capable of service, shall be allowed to receive half-pay, nor shall their names remain on the naval list. Their widows will not in consequence be entitled to any pension.



List of medicines, &c. formerly allowed in the British navy.

The quantities are intended for one year, for one hundred men, according to the different rates of the vessels.

Dietetic Articles.

The articles of diet for the sick will fall properly to the charge of the purser, but should consist of the following list of necessities.

Barley,	lb. 300	Rice,	lb. 200
Eggs, greased and put in		Coarse sugar	100
salt,	doz. 20	Sago,	20

Extract of spruce,	lb. 12	Salep,	lb. 10
Lemon-juice, clarified and preserved by adding to it a small proportion of ardent spirits,	gal. 5	Portable soup, Tamarinds, Best white wine,	50 10 gal. 300
Raisins,	lb. 50	Best red wine,	100

*Pharmaceutical Articles.**Principal Articles.*

Peruvian bark,	lb. 10*	Opium,	oz. 1
Calomel,	oz. $2\frac{1}{2}$	Purgine salts,	lb. 10
Emetic tartar,	$1\frac{1}{2}$	Senna leaves,	2
Ipecacuanha,	4		

Secondary Articles.

Aloes,	oz. $\frac{1}{2}$	Corrosive sublimate,	oz. 1
Ammoniacum,	2	Nitre,	8
Balsam of copaiva,	3	Oil of almonds,	pt. 1
Cantharides,	1	Castor-oil,	$\frac{1}{2}$
Capsicum,	3	Linseed-oil,	3
Traumatic balsam,	4	Essential oil of mint,	oz. 1
Camphor,	3	Jamaica pepper,	4
Castor,	$1\frac{1}{2}$	Blistering plaster,	lb. 10
Chamomile flowers, or hops,	lb. 2	Quassia,	oz. 8
Cinnamon,	oz. 1	Salt of hartshorn,	2
Prepared chalk, or oyster shells,	6	Salt of steel,	$\frac{1}{2}$
Conserve of roses,	lb. $\frac{1}{2}$	Salt of wormwood,	10
Cordial confection,	oz. 2	Castile soap,	lb. $\frac{1}{2}$
Cathartic extract,	$\frac{1}{2}$	Sarsaparilla,	3
Extract of hemlock,	3	Serpentary,	oz. 4
Extract of logwood,	1	Spermaceti,	4
Gentian,	5	Rectified spirit of wine,	pt. 1
		Weak spirit of vitriol,	$\frac{1}{2}$
		Spirit of Mindererus,	2

* But if the ship is destined for a hot climate, twenty pounds.

Ginger,	oz. 3	Spirit of turpentine,	oz. 4
Gum arabic,	4	Dried squills,	$\frac{1}{2}$
Gum guaiacum,	3	Flowers of sulphur,	lb. 1
Powder of jalap,	$1\frac{1}{2}$	Golden sulphur of anti-	
Laudanum,	4	mony,	oz. $\frac{1}{2}$
Linseed,	lb. 1	Cream of tartar,	lb. 1
Magnesia,	oz. 6	Vinegar,	pt. 6
Manna,	8	White vitriol,	dr. 6
Whole mustard-seed,	lb. $\frac{1}{2}$	Wormwood,	lb. 1
Myrrh,	oz. 4	Flowers of zinc,	dr. 2
Crude mercury,	2		

As not any distilled waters, or tinctures, enter into the above list, it is intended that the former should be made by the surgeon, with the essential oils, by blending a drop with an ounce of common water. The latter, or the tinctures, may be prepared on board with rum or other spirits.

Surgical Division.

The first part of this division to be noticed is the set of instruments which are ordered by the Board of Sick and Hurt, and consists of the following arrangement.

A List of Instruments, according to the new regulations, for a surgeon in the navy.

3 Amputation knives,	6 Scalpels,
Do. saw with spare blade,	1 Head razor,
Metacarpal saw, with do.	1 Key-tooth instrument,
2 Catlins,	1 Gum lancet,
1 Pair artery forceps, with a slide,	1 Tooth punch,
24 Curved needles,	2 Tooth forceps,
2 Tenaculums,	6 Pewter syringes,
6 Field tourniquets,	2 Seton needles in scales,
1 Pair bone nippers,	1 Pair curved scissors,
1 Turnscrew,	1 Curved bistory, with button in handle,
3 Trephines,	1 Long probe,

1 Head-saw,	1 Pair bullet forceps,
1 Lenticular,	1 Scoop for extracting balls,
1 Raspatory,	2 Probangs,
1 Pair forceps,	2 Sets of common splints,
1 Scalpel,	1 Set of japanned, for legs,
1 Elevator,	2 Pair ditto, for thighs,
1 Brush,	12 Rollers,
2 Trocars,	2 Eighteen tail bandages,
2 Silver Catheters,	2 Pint pewter syringes,
2 Elastic gum ditto,	1 Set pocket instruments,
2 Dozen bougies in a case,	4 Lancets in a case.

Assistant surgeons to furnish themselves with the under-mentioned.

2 Amputation knives,	2 Trocars,
1 Ditto, saw,	2 Silver catheters,
1 Metacarpal ditto, with spare blade,	1 Elastic gum ditto,
1 Catlin,	6 Scalpels,
12 Curved needles,	1 Key-tooth instrument,
2 Tenaculums.	3 Spare claws,
2 Tourniquets,	1 Gum lancet,
1 Pair bone nippers,	Tooth forceps curved,
2 Trephines,	1 Ditto straight,
1 Head-saw,	1 Punch,
2 Lenticular,	1 Seton needle,
1 Raspatory,	1 Long probe,
1 Pair forceps,	1 Pair bullet forceps,
1 Brush,	1 Set pocket instruments,
1 Elevator,	12 Lancets,
	6 Pewter syringes.

Local Remedies.

The local applications necessary for surgical use are not numerous. The following list will be sufficient for one year for one hundred men; and they can be increased in proportion to the rate of the vessel, as the necessity for them is more uncertain than for the medical remedies.

Cerate,	lb. 6	Blister plaster,	lb. 6
Simple ointment,	6	Powder of Spanish flies,	1
Red precipitate,	1	Extract of lead,	4
Blue vitriol,	$\frac{1}{2}$	Sugar of lead,	4

Sticking plaster spread on cloth, tow, lint, rags, &c. at the surgeon's discretion.

New List of Medicines.

The quantities to be regulated in proportion to the size of the vessel, and the number of men, at the discretion of the surgeon; but as a useful regulation for him, he is only to consult the previous table by Dr. Blane, where the quantity of each article for one hundred men is exactly ascertained.

	lb. oz.		lb. oz.
Acid vitriol: dilut:	-	Ol: ricin:	-
Adip: suill: pp:	-	terebinth:	-
Aloes socotr:	-	Opium	-
Antimon: tartariz:	-	Pulv: antimonialis	-
Aq: litharg: acetat:	-	ipecac: c:	-
Arg: nitrat:	-	Quassia: ras:	-
Calomel:	-	Res flav:	-
Camphor	-	Rhabarb pulv:	-
Cera flav:	-	Sal: vol: c: c:	-
Cerat: lap: calam:	-	Sem: lini	-
Cerus: acetat:	-	Senna	-
Cinchon: pulv:	-	Sperm: cet:	-
flav:	-	Sp: lavend: c:	-
Conf: aromat:	-	Tinct: ferr: muriat:	-
Crem: tart: pulv:	-	scillæ	-
Cret: pp:	-	Ung: Ceræ:	-
Cuprum: vitriol:	-	hydrarg: fort:	-
Digital: purp: pulv:	-	nitrat:	-
Emp: cantharid:	-	resin: flav:	-
ceræ c:	-	Zinc: vitriol:	-
Litharg:	-	Zingiber: pulv:	-
comp:	-	Bolus knife,	No.

	lb. oz.		
Emp: Litharg: cum hydr:		Tile,	No.
Extr: colocy: c: -		Bottles, (half pint)	doz.
Flor: chamæm: -		Corks for ditto,	gro.
Sulph: -		Gallipots in sorts,	doz.
Gum: ammon: gutt:		Pewter measure,	
Arab: -		(1 oz.)	No.
guaiac: -		Mortar and pestle,	
Hydr: muriat: -		(metal)	No.
nitrat: rub: -		Ditto, Wedgewood	No.
Jalap: pulv: -		Needles, com.	chart.
Ipecac: pulv: -		Scales and weights,	
Kali pp: - -		(small)	box
Liquor: vol: c: c:		Spatula (plaster)	No.
Magnes: alb: -		Ditto (pot)	No.
vitriol:		Funnel	No.
Mel: acetat: -		Spong:	-
Natron: vitriol: -		Bottles, pots, &s.	
Nitr: purif: -		Tow,	-
Ol: lini - -		Chest,	-
menth: piper -		Box,	-
olivar: - -		Porterage,	-

Surgeons in the British navy rank with lieutenants; and lieutenants with captains *of the army*.

FINIS.

DIRECTIONS
FOR
PRESERVING THE HEALTH
OF
SOLDIERS,
ADDRESSED TO THE OFFICERS OF THE ARMY
OF THE
UNITED STATES,

BY BENJAMIN RUSH, M. D.

Then Physician general to the Military Hospitals of the United States.

Published by order of the Board of War.

At a Board of War, September 5th, 1777,
Ordered, that Dr. B. Rush be requested to republish, in a
small pamphlet, certain Directions for preserving the Health
of Soldiers; published in the Pennsylvania Packet, No. 284,
with such additions and alterations as he shall think proper.

Extract from the minutes,
RICHARD PETERS, Secretary.

DIRECTIONS, &c.

FATAL experience has taught the people of America that a greater proportion of men have perished with sickness in our armies than have fallen by the sword. The two last campaigns produced melancholy proofs of this assertion. But we ought to consider upon this occasion, not only the mere loss of those worthy citizens who perished in this manner. The complicated distress, which accompanied their sickness and death, should never be forgotten. The gallant youth who had torn himself from the arms of his parents, or the partner of his joys, who had plighted his life to his country in the field, and who perhaps, in the enthusiasm of his military ardor, has courted death from a musket or a cannon ball, was often forced from the scene of action and glory by the attack of a fever, and obliged to languish for days or weeks in a hospital; and, at last, to close his eyes, deprived of the sweet consolation of a dying soldier, the thoughts of ending his life in the arms of victory, or in an act of just resentment against the enemies of the liberties of his country.

The munificence of the congress has made the most ample provision for lessening the calamities

of war from sickness in their armies, and, if possible, to prevent it altogether; for I maintain that the mortality from sickness in camps is not necessarily connected with a soldier's life: It was unknown to the armies of ancient Greece and Rome. Their armies had no diseases peculiar to themselves; nor were the diseases, to which their soldiers were subject, attended with any peculiar symptoms. But the munificence of the congress, and the skill of physicians and surgeons, will avail but little in preventing mortality from sickness among our soldiers, without the concurrence of the officers of the army. Your authority, gentlemen, is absolutely necessary to enforce the most salutary plan, and precepts for preserving the health of the soldiers. Your own personal safety is concerned in concurring in the plan adopted by the congress. But if this were not the case, I am persuaded humanity and patriotism would not plead in vain in favour of those brave men, whose lives are committed to your care by the suffrages of your country.

The art of preserving the health of a soldier consists in attending to the following particulars: 1 DRESS. 2 DIET. 3 CLEANLINESS. 4 ENCAMPMENTS. And, 5 EXERCISE.

1. The *Dress* of a soldier has a great influence upon his health. It is to be lamented, that the peculiar situation of our country, from the infancy of our foreign trade and domestic manufactures, has obliged us to clothe our soldiers chiefly in linen. It is a well known fact, that the perspiration of the

body, by attaching itself to linen, and afterwards, by mixing with rain, is disposed to form miasmata, which produce fevers. Upon this account I could wish the rifle shirt was banished from our army. Besides accumulating putrid miasmata, it conceals filth, and prevents a due regard being paid to cleanliness. The Roman soldiers wore flannel shirts next to their skins. This was one among other causes of the healthiness of the Roman armies. During the last war in America, general (then colonel) Gage obliged the soldiers of his regiment to wear flannel shirts, from an accidental want of linen; and it was remarkable, during a sickly campaign on the lakes, not a single soldier, belonging to that regiment was ever seen in any of the military hospitals. I have known several instances where the yearly visits of the intermitting fever have been checked in the state of Pennsylvania, in places most subject to that disease, by nothing else but the use of flannel shirts.

The hair, by being long uncombed, is apt to accumulate the perspiration of the head, which by becoming putrid sometimes produces diseases. There are two methods of guarding against this evil: the first is by combing and dressing the hair every day; the second is by wearing it thin and short in the neck. The former is attended with delays often incompatible with the duty of a soldier; and therefore the latter is to be preferred to it. This easy mode of wearing the hair is strongly recommended by count Saxe, and by all modern writers on the military art.

2. The *Diet* of soldiers should consist *chiefly* of vegetables. The nature of their duty, as well as their former habits of life, require it. If every tree on the continent of America produced Jesuit's bark, it would not be sufficient to preserve or to restore the health of soldiers who eat one or two pounds of flesh in a day. Their vegetables should be well cooked. It is of the last consequence that damaged flour should not be used in the camp. It is the seed of many diseases. It is of equal consequence that good flour should not be rendered unwholesome by an error in making it into bread. Perhaps it was the danger to which flour was always exposed of being damaged in a camp, or being rendered unwholesome from the manner of baking it, that led the Roman generals to use wheat instead of flour, for the daily food of their soldiers. Cæsar fed his troops with wheat only, in his expedition into Gaul. It was prepared by being husked and well boiled; and was eaten with spoons in the room of bread. If a little sugar or molasses is added to wheat prepared in this manner, it forms not only a wholesome food, but a most agreeable repast.

What shall I say to the custom of drinking spirituous liquors, which prevails so generally in our army? I am aware of the prejudices in favour of it. It requires an arm more powerful than mine; the arm of a Hercules to encounter it. The common apology for the use of rum in our army is, that it is necessary to guard against the effects of heat and cold. But I maintain, that in no case

whatever, does rum abate the effects of either of them upon the constitution. On the contrary I believe it always increases them. The temporary elevation of spirits in summer, and the temporary generation of warmth in winter, produced by rum, always leave the body languid, and more liable to be affected with heat and cold afterwards. Happy would it be for our soldiers, if the evil ended here! The use of rum, by gradually wearing away the powers of the system, lays the foundation of fevers, fluxes, jaundices, and the most of diseases which occur in military hospitals. It is a vulgar error to suppose that the fatigue arising from violent exercise or hard labour is relieved by the use of spirituous liquors. The principles of animal life are the same in a horse as in a man; and horses, we find undergo the severest labour with no other liquor than cool water. There are many instances where even reapers have been forced to acknowledge that plentiful draughts of milk and water have enabled them to go through the fatigues of harvest with more pleasure and fewer inconveniences to their health, than ever they experienced from the use of a mixture of rum and water.

Spirituous liquors were unknown to the armies of ancient Rome. The canteen of every soldier was filled with nothing but vinegar; and it was by frequently drinking a small quantity of this wholesome liquor mixed with water, that the Roman soldiers were enabled to sustain tedious marches through scorching sands, without being subject

to sickness of any kind. The vinegar effectually resists that tendency to putrefaction, to which heat and labour dispose the fluids. It moreover calms the inordinate action of the solids, which is created by hard duty. It would be foreign to my purpose, or I might show that the abstraction of rum from our soldiers, would contribute greatly to promote discipline and a faithful discharge of duty among them. General Wolfe, who was a philosopher as well as a general, never suffered a drop of spirits to be drunk by his soldiers, except when they served as sentries or upon fatigue duty in rainy weather. Perhaps these are the only cases in which a small quantity of rum may be useful. It will be of the most essential service if it be mixed with three or four times its quantity of water.

3. Too much cannot be said in favour of *Cleanliness*. If soldiers grew as speedily and spontaneously as blades of grass on the continent of America, the want of cleanliness would reduce them in two or three campaigns to a handful of men. It should extend, 1. To the *body* of a soldier. He should be obliged to wash his hands and face at least once every day, and his whole body two or three times a week, especially in summer. The cold bath was part of the military discipline of the Roman soldiers, and contributed much to preserve their health. 2. It should extend to the *clothes* of a soldier. Frequent changes of linen are indispensably necessary; and unless a strict regard is paid to this articles, all our pains to preserve the health of our

soldiers, will be to no purpose, 3. It should extend to the *food* of a soldier. Great care should be taken that the vessels in which he cooks his victuals should be carefully washed after each time of their being used.

Too many soldiers should not be allowed on any pretence whatever to crowd into the same tent or quarter. The gaol fever is the offspring of the perspiration and respiration of human bodies brought into a compass too narrow to be diluted, and rendered inert by a mixture with the atmosphere.

It has been remarked that the men are most healthy when the exigencies of a campaign have made it necessary for an army to send off their tents. This must be occasioned by the tents being rendered unhealthy from being too much crowded, or from not being kept clean.

The straw or hay which composes the bed of a soldier, should be often changed, and his blanket should be exposed every day to the sun. This will prevent the perspiration from becoming morbid and dangerous by accumulating upon it.

The commanding officer should take the utmost care never to suffer a soldier to sleep, or even to sit down in his tent with wet clothes, nor to lie down in a wet blanket or upon damp straw. The utmost vigilance will be necessary to guard against this fruitful source of diseases among soldiers.

The environs of each tent, and of the camp in general, should be kept perfectly clean of the offals of animals and of filth of all kinds. They should

be buried or carefully removed every day beyond the neighbourhood of the camp.

4. The formation of an *Encampment* is of the utmost importance to the health of an army. It is to no purpose to seek for security from an enemy in the wisest disposition of troops in a country where marshes and mill-ponds let loose intermitting fevers upon them. Sometimes it may be necessary to encamp an army upon the side of a river. Previously to this step, it is the duty of the quarter master to inquire from what quarter the winds come at the season of his encampment. If they pass across the river before they reach his army, they will probably bring with them the seeds of bilious and intermitting fevers, and this will more especially be the case in the fall of the year. The British troops at Pensacola, by shifting their quarters every year, so as to avoid the winds that come over a river in the neighbourhood of the town, at a certain season, have preserved their health in a manner scarcely so be paralleled in so warm a climate.

Frequently changing the spot of an encampment has been found to contribute greatly to the health of an army. It effectually guards the men against the effects of those offal matters which are so small, or so concealed, as to elude the vigilance of an officer.

It is the duty of the commanding officer of a division or detachment of the army, to avoid as much as possible, exposing his troops to *unneces-*

sary fatigue, or watchfulness. The daily exercises of the manual, and manœuvres, (which contribute to the health of soldiers) as also all marches, should be performed in the cool of the morning and evening in summer. Sentries should always be provided with watchcoats; and they should be *often* relieved in very hot, cold, and rainy weather.

It is a good custom for a sentry always to eat a hearty meal before he enters upon duty in cold weather. The gentle fever excited by his food contributes to guard him in a degree against the effects of the cold.

5. Idleness is the bane of a soldier. It exposes him to temptations not only to every kind of military vice, but to every species of military disorder. But his exercise should be *regular*, and performed at *stated* periods; nor should it be suspended during his recess from the toils of war in his winter quarters. "We remark (says Montesquieu in his excellent treatise on the rise and fall of the Roman greatness) in modern times, that our soldiers perish from *immoderate* fatigue, notwithstanding it was by immense labour the Romans preserved their armies. The reason I believe was, their labour was *constant*, whereas among us our soldiers pass from the extremes of labour to the extremes of idleness, than which nothing can be more destructive to the lives of men."

The fire and smoke of wood, as also the burning of sulphur, and the explosion of gunpowder, have a singular efficacy in preserving and restoring

the purity of the air. There was an instance in the last war between Britain and France, of a ship in sir Edward Hawke's fleet, that had above a hundred men on board ill with a low fever. This ship was obliged to bear her part in the well known battle between sir Edward and Monsieur Conflans. A few days after the engagement, every man on board this ship recovered, and an entire stop was put to the progress of the disease. This extraordinary event was thought to be occasioned by the explosion and effluvia of the gunpowder.

I shall conclude these directions by suggesting a few hints which appear to be worthy of the attention of the gentlemen of the army.

Consider in the first place, that the principle study of an officer, in the time of war, should be to save the blood of his men. An heroic exploit is admired most when it has been performed with the loss of a few lives. But if it be meritorious to save the lives of soldiers by skill and attention in the field, why should it be thought less so to preserve them by skill and attention of another kind in a march, or an encampment? And on the contrary, if it be criminal in an officer to sacrifice the lives of thousands by his temerity in a battle, why should it be thought less so to sacrifice twice their number in a hospital, by his negligence?

Consider in the second place, that an attention to the health of your soldiers is absolutely necessary to form a *great* military character. Had it not been for this eminent quality, Xenophon would

never have led ten thousand Greeks for sixteen months through a cold and most inhospitable country; nor would Fabius have kept that army together, without it, which conquered Hannibal, and delivered Rome.

Consider thirdly, that the discipline necessary to make an army victorious, requires that the principle of self-preservation should in some measure be suspended in a soldier. If he be taught that it is a crime to have a single thought about his life in the field, he will soon transfer the same indifference about his life to the camp, or to his quarters. It argues therefore a want of understanding in an officer to charge his men with carelessness of their health and lives. Julius Cæsar wanted nothing but strength in a man to make him a soldier. He supplied every other want from his own great fund of military qualities. Nature has given the Americans strength; and the cause of liberty has given them principle above the common soldiers of any other army upon the face of the earth. The blame, therefore, will only be yours, if they are not made superior to them in all the arts which improve and adorn a soldier's person and character.

Lastly. Consider that your country and posterity look up to you for the preservation of the only means of establishing the liberties of America. The wisdom and eloquence of writers and orators have long since yielded to the more powerful oratory of our sword. All our hopes, therefore, are in our army. But if any thing can be added to

these motives, consider further, that there is scarcely a soldier under your command who has not a mother, a wife, a sister, or a child. These helpless members of society made great sacrifices to their country when they urged the beloved objects of their affection to follow the recruiting drum to the camp. Whenever, therefore, your duty requires that you should attend to the health of your men, imagine you see *one* or perhaps *all* of their female and helpless connexions standing at the door of your tents or quarters, and beseeching you by the remembrance of the pleasures you have enjoyed, and by the prospect of the pleasures you expect, in those connexions, to repair immediately to the tents or huts of your men, and to attend to every thing which reason and conscience tell you are necessary for the preservation of their health and lives.

Thomas Dobson's

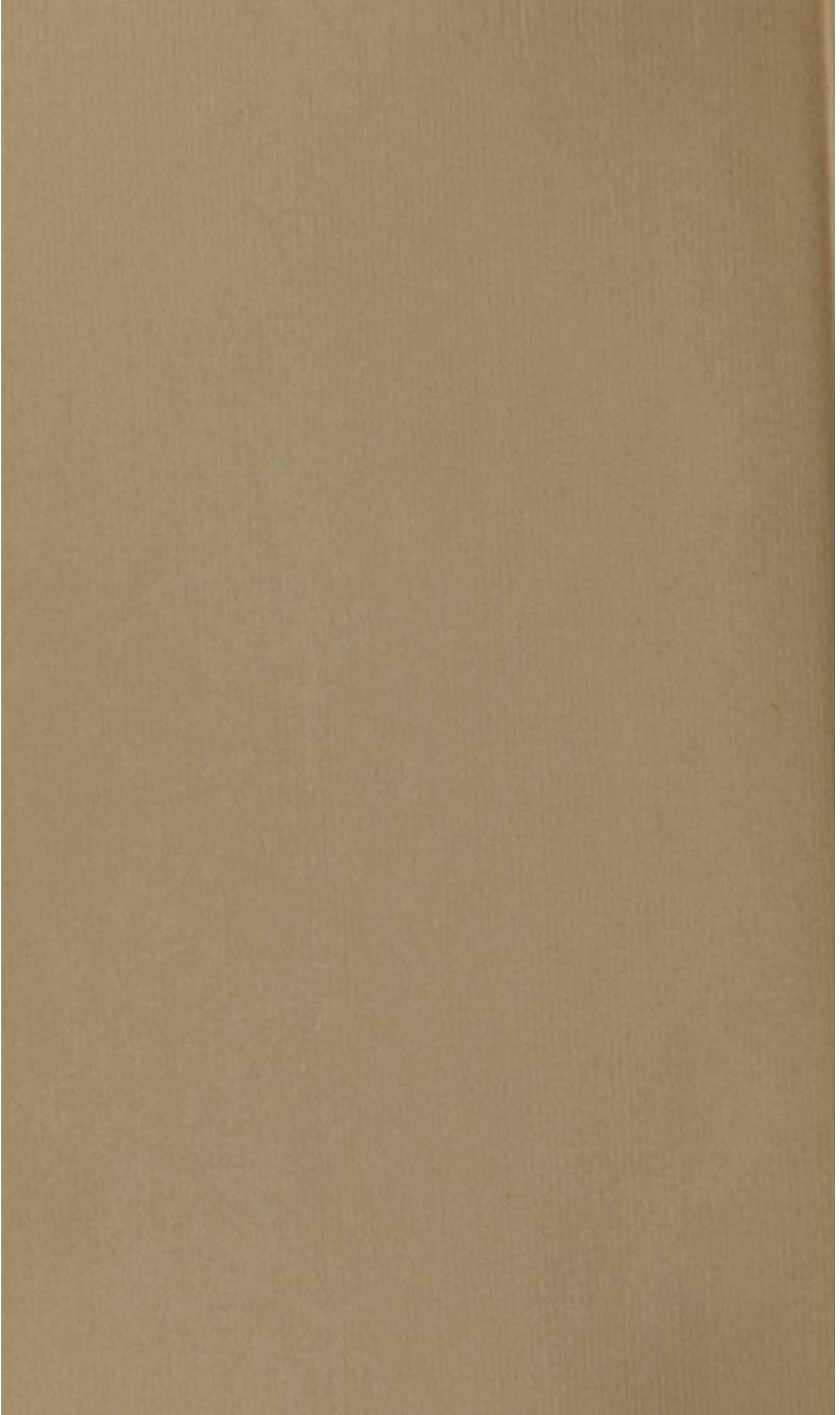
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