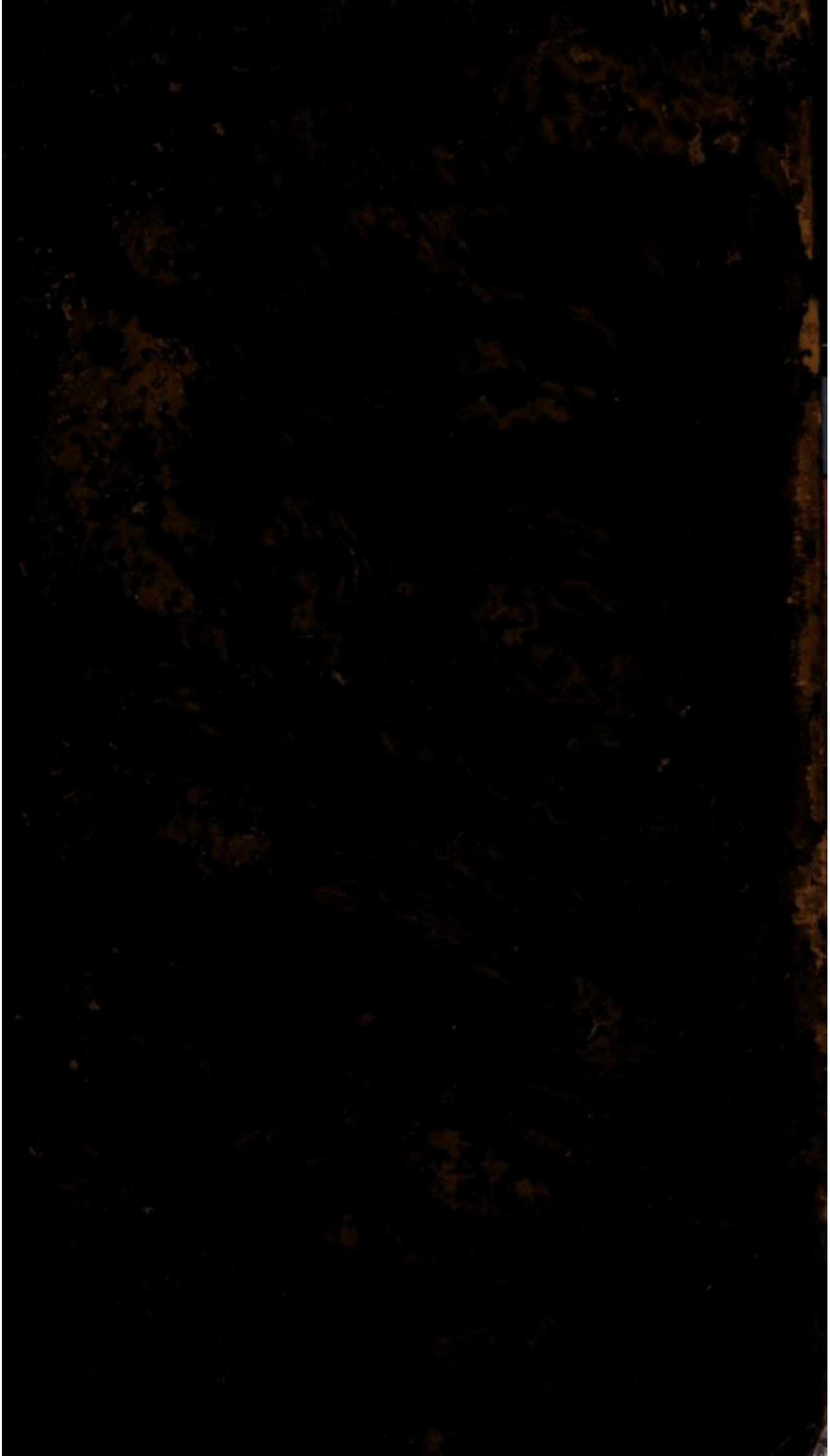
**A lecture on the situation of the large blood-vessels of the extremities, and the methods of making effectual pressure on the arteries, in cases of dangerous effusions of blood, from wounds; delivered to the scholars of the late Maritime School at Chelsea, and first printed for their use.**



Lizard

21/-

A

# LECTURE

ON THE

*SITUATION*

OF THE

LARGE BLOOD-VESSELS OF THE EXTREMITIES,

AND THE

*Methods of making effectual Preſſure on the Arteries,*

IN CASES OF

DANGEROUS EFFUSIONS OF BLOOD,

*FROM WOUNDS:*

DELIVERED TO THE SCHOLARS OF

THE LATE MARITIME SCHOOL AT CHELSEA,

*And firſt printed for their Uſe.*

FOURTH EDITION.

PRODESSE QUAM CONSPICI.

LONDON:

PRINTED BY C. AND W. GALABIN, INGRAM-COURT;
and published by
W. J. AND J. RICHARDSON, ROYAL EXCHANGE.

1803.

*To the Right Honourable* CHARLES PRICE,
*Lord Mayor, and one of the Repreſentatives in Parliament for the City of* London.

MY LORD,

The loyal and patriotic tenour of your life entitles you to the veneration of every lover of his country; but the peculiar diſplay of duty in your exalted ſtation at this critical period, renders the ſalutary energy of your character eminently conſpicuous.

Impelled by a proper ſenſe of the indignities offered to your ſovereign, the inſults and injuries to your country, and the violations of juſtice and humanity in moſt parts of the globe, you have called upon your fellow-citizens to ſtand forth in defence of our king, and the maintenance of our national independence and proſperity. The conſequence anſwers your wiſhes; and, reflecting honour on

your Lordſhip and the whole magiſtracy of London, will ſhine in the annals of the Britiſh empire.

Permit me, my Lord, to offer a faint teſtimony of my individual ſenſe of the general obligation, by inſcribing to your Lordſhip this trifle; which, if it could claim any merit, it would be, that it has been dictated by ſentiments in uniſon with thoſe which actuate your Lordſhip's exemplary conduct.

I am, with high Reſpect,

MY LORD,

Your Lordſhip's faithful humble Servant,

WILLIAM BLIZARD.

*Devonſhire-ſquare,*
*13th Aug.* 1803.

PREFACE.

# PREFACE.

THE INTRODUCTION to theſe pages, when firſt printed for the uſe of the ſcholars of the late MARITIME SCHOOL at Chelſea,* explains their original deſign; and the probable utility of ſuch a publication is expreſſed by the following paſſage in Captain DRINKWATER's Account of the Siege of Gibraltar.——"September, 1781. The 30th, "a ſoldier of the 72d loſt his legs by a ſhot "from Fort *Barbara*. He bore amputation

* An inſtitution intended for the maintenance and nautical inſtruction of the ſons of thoſe naval officers who had bravely fallen in the ſervice of their country, without a proviſion for the ſupport and education of their children. The failure of this undertaking is to be lamented as a national misfortune.

" with prodigious firmneſs; but died, ſoon
" after, through the loſs of blood previouſly
" to his being brought to the hoſpital. This
" fact being repreſented to the governor,
" the ſergeants of the different regiments
" were ordered to attend the hoſpital, to be
" taught by the ſurgeons how to apply the
" TOURNIQUET; which was afterwards
" productive of very beneficial conſequences.
" Tourniquets were alſo diſtributed to the
" different guards, to be at hand in caſe of
" neceſſity."*

Were the knowledge of the ſituation of the blood-veſſels of the extremities, ſo far as is neceſſary for checking dangerous effuſions of blood, and the uſe of the tourniquet, extended to colleges and ſchools, particularly military and nautical academies; manufactories, hoſpitals of every deſcription, priſons, plantations, fire-offices, the clergymen of pariſhes in which no ſurgeons are reſident, comman-

* Vide Drinkwater's Hiſtory of the Siege of Gibraltar, p. 190.

ders

ders of merchantmen, miners, &c. it could not fail of proving highly beneficial to mankind.

The late Sir BARNARD TURNER muſt have bled to death on the ſpot where he met the accident which terminated fatally, had not compreſſion been inſtantly made on the artery of the wounded limb. And laſt winter a man, in Cornhill, bled to death, from a ruptured veſſel in his leg, for want of the timely application of a tourniquet. —— But the experience of moſt perſons could afford inſtances of fatal conſequences through defect of this knowledge.

Rewards are aſſigned to thoſe who reſtore animation, when ſuſpended by immerſion in water; and the knowledge of the means neceſſary on ſuch an occaſion is extenſively diffuſed. Surely, then, if men be ſerious in their endeavours for the preſervation of human life, they will admit the importance of the information here recommended; as there is no doubt that many lives might have been ſaved, by a know-

ledge of the means of reſtraining HÆMORRHAGE.

The familiar form of the lecture is retained, as the beſt for the information intended to be conveyed.

*July* 30, 1786.

---

Admitting the general utility of this little tract, the propriety of republiſhing it at the preſent moment muſt be apparent.

*Aug.* 23, 1803.

INTRO

# INTRODUCTION.

FROM motives of duty, as SURGEON to the MARITIME SCHOOL, and from a ſincere regard for the objects of my care, I propoſed to teach them the ſituation of the large blood-veſſels of the extremities; and the application of the TOURNIQUET. This I attempted, in the plaineſt manner in my power, in the way of LECTURE, conſidering it as the moſt familiar and effectual method of impreſſing truths on young minds: and it was gratifying to obſerve the ATTENTION and FEELING of my young auditors.

To promote the great cauſe of the naval intereſt of my country, in that eſſential concern, THE PRESERVATION OF THE LIVES OF SEAMEN, I have now endeavoured to render that Lecture a uſeful OFFERING to theſe young warriors.

In

In the navy and army, caſes continually occur in which the information it contains is indiſpenſably neceſſary; and indeed there can hardly be a ſituation in which, at ſome period, ſuch knowledge might not prove of equal importance; whilſt it can never fail of giving additional confidence and courage in the moment of danger.

And though it were never *practically* required, it muſt be productive of good, as SCIENCE ever tends to improve the heart, and raiſe the mind to contemplate the wiſdom, power, and goodneſs, of HIM THAT MADE US!

No profeſſional fame can be gained by explaining facts known to every ſtudent in ſurgery. Whatever, therefore, is here ſuggeſted, can be ſolely with a view to the general good.

*July* 15, 1783.

A

# LECTURE, &c.

YOUNG GENTLEMEN,

AS one of the guardians of your health and lives, I requeſt your attention, while I point out what may conduce to the preſervation of theſe bleſſings when you are launched into the world, as well as during your reſidence in this ſeminary of naval ſcience.

You are here educated to a profeſſion of great honour, becauſe of great utility. A profeſſion on which depends the ſecurity of our country, our religion and laws, our commerce,

merce, and national pre-eminence. The SEAMAN, then, according to his rank and merit, has a claim to the reſpect and care of his countrymen.

Beſides, trained up in the principles of true honour and bravery, hardy in the practice of them, and conſidering his life as devoted to the ſervice of his country, the Britiſh ſailor is leſs mindful of bodily evils, and the means of averting them, than the more wary and delicate landſman. He has therefore a title, in generoſity, to that attention from others, which he himſelf forgets in the ardour of martial ſpirit.

You are ambitious to become SEAMEN, to join the veteran band, to go forth to fight the enemies of your country, and merit the eſteem and favour of your fellow-citizens.

In that ſituation, gentlemen, you will have many occaſions for the exerciſe of your judgement and ſpirit, for the preſervation of the health and lives of your men. You muſt reflect *for* them; and, finding that you are truly zealous in all things for their good, they will

will chearfully obey you, bear you through danger with ſpirit, and prove themſelves worthy of your generous regard. — Theſe conſiderations will, I truſt, engage your attention to whatever promiſes benefit to your aſſociates in war.

Though every good and brave man would lay down his life in the diſcharge of his duty to his king and country; when ſick or hurt, he is not to neglect the means of relief which PROVIDENCE has afforded.

For the preſervation of the health and lives of the officers and ſeamen of his Majeſty's navy, government have appointed a SURGEON and a certain number of MATES to each ſhip of war, according to its rate. During the time of action, the ſtation of theſe officers is in the COCK-PIT. From their neceſſary confinement to this ſituation, evils of a very ſerious nature muſt ſometimes happen; as it is impoſſible to render immediate aſſiſtance to thoſe in a remote part of the veſſel, whoſe bleeding wounds may urgently demand the aid of ſurgery.

Some

Some of the methods of chirurgical relief are very ſimple, though of the greateſt importance. Of this kind is the making of an effectual temporary preſſure upon a part, to prevent a fatal effuſion of blood, in the caſe of a wound, till means of permanent benefit can be uſed.

Men of true courage, in firm poſſeſſion of themſelves on all occaſions, are capable of exerciſing their judgement, and employing the means which they know, both for their own benefit and that of others. It is proper, then, that they ſhould know whatever is uſeful, and in their power to execute.

And here, my young friends, let me exhort you to be EXAMPLES OF *ſobriety* as well as of the other VIRTUES. No advantage can flow from knowledge or bravery in a ſtate of intoxication: and many a ſeaman has loſt his life in conſequence of inebriety at the time of receiving a wound.—By TEMPERANCE the body is preſerved from various diſorders, and the mind kept calm and firm, to direct under circumſtances of accidents, and on every critical occaſion.

From

From ſuch conſiderations as theſe, I ſubmitted to thoſe who direct your education, the propriety of your being taught the application of the TOURNIQUET, an inſtrument uſed for ſtopping the flow of blood from wounded veſſels; and it is with their ſanction, that I have the pleaſure of addreſſing you on this ſubject.

Since I propoſed to meet you, for this purpoſe, a circumſtance has occurred which has ſtrengthened my notions reſpecting the utility of the intended explanations; and which will, I doubt not, be ſatisfactory to your governors.

I requeſted the ſentiments of an intelligent naval ſurgeon on the ſubject. This was his anſwer:

"I can beſt expreſs my opinion by relating "to you the practice of an ingenious ſurgeon "in the ſervice, and aſſuring you that his and "my ſentiments perfectly coincide.—Mr. "****, ſurgeon of the BARFLEUR, had ob-"ſerved, with great concern, the dreadful "effects of wounds that happened in time of "action, from the ſeamen being entirely igno-"rant of the manner of applying the tourni-

"quet,

" quet, many inſtances having occurred of " men bleeding to death, particularly in the " tops, before aſſiſtance could poſſibly be ren- " dered them. —— To prevent theſe evils, as " much as was in his power, he provided " every ſeaman, ſtationed in the tops, with a " tourniquet; and, on every opportunity, " taught them the method of applying it; ſo " that, in a ſhort time, they became perfectly " expert in its uſe."

The pious Pſalmiſt beautifully exclaims, " I am fearfully and wonderfully made!" It would, indeed, require the ſtudy of a long life to learn the little that has been diſcovered of INFINITE WISDOM in the ſtructure of the ſeveral parts of the human body, and of INFINITE GOODNESS in the laws by which they perform their functions for the maintenance of health and life.

But, in order to underſtand the practice which will be laid down, and to enable you to adapt it to particular caſes, it is neceſſary that you ſhould at leaſt have a general idea of the circulation of the blood.

" In

"In the BLOOD is the LIFE of man." That is, this fluid contains the principles of nouriſhment, and diſtributes them to every part of the body for its ſupply and refreſhment; as the water of the ocean conveys the riches and good things of the world to every quarter of the globe.

The HEART is the ſource of this fluid. It is ſeated in the breaſt, a little to the left ſide, nearly in the centre of the body. It is hollow, to contain the blood, and has the power of contracting, and of ſtrongly propelling its contents. By its contraction the blood is puſhed forwards, with an exceedingly rapid current, to the remoteſt parts of the body; as the tide of the ſea influences and preſſes on the waters of rivers, obſervable here in the ſwelling Thames.

The veſſels, or tubes, which proceed from the heart, to convey the blood to all the parts of the body, are called ARTERIES. From the power with which the blood is propelled through this ſyſtem

of veſſels, it happens, that, whenever they are wounded, the blood flows rapidly and in jerks from the wounded part.

In order to be diſtributed to the different parts, the arteries divide from trunks, like the branches of a tree; ſo that, on preſſing together the ſides of any trunk, the flow of blood into the branches beyond the part compreſſed, is prevented.

The veſſels, which return the blood to the heart, are called VEINS. The blood in them receives but little of the impelling force of the heart, and, therefore, moves not with a ſtrong tide or current, but glides evenly and gently on, like the ebbing water; and, hence, wounds of theſe veſſels are not of much importance: a ſmall degree of reſiſtance, by a finger, or ſome folded linen, applied to the wounded part, will generally ſtop the bleeding.

The tranſmiſſion of the blood from the heart through the arteries, and back to it by the veins, is the CIRCULATION; which

was the diſcovery of our illuſtrious country man, Dr WILLIAM HARVEY.*

It is plain, that, if a bandage or ligature be made ſufficiently tight around any limb, the flow of blood into all the parts below will be prevented. But, to render this effect certain, the preſſure muſt be very great on the whole circumference of the limb; and, in ſome caſes, from the

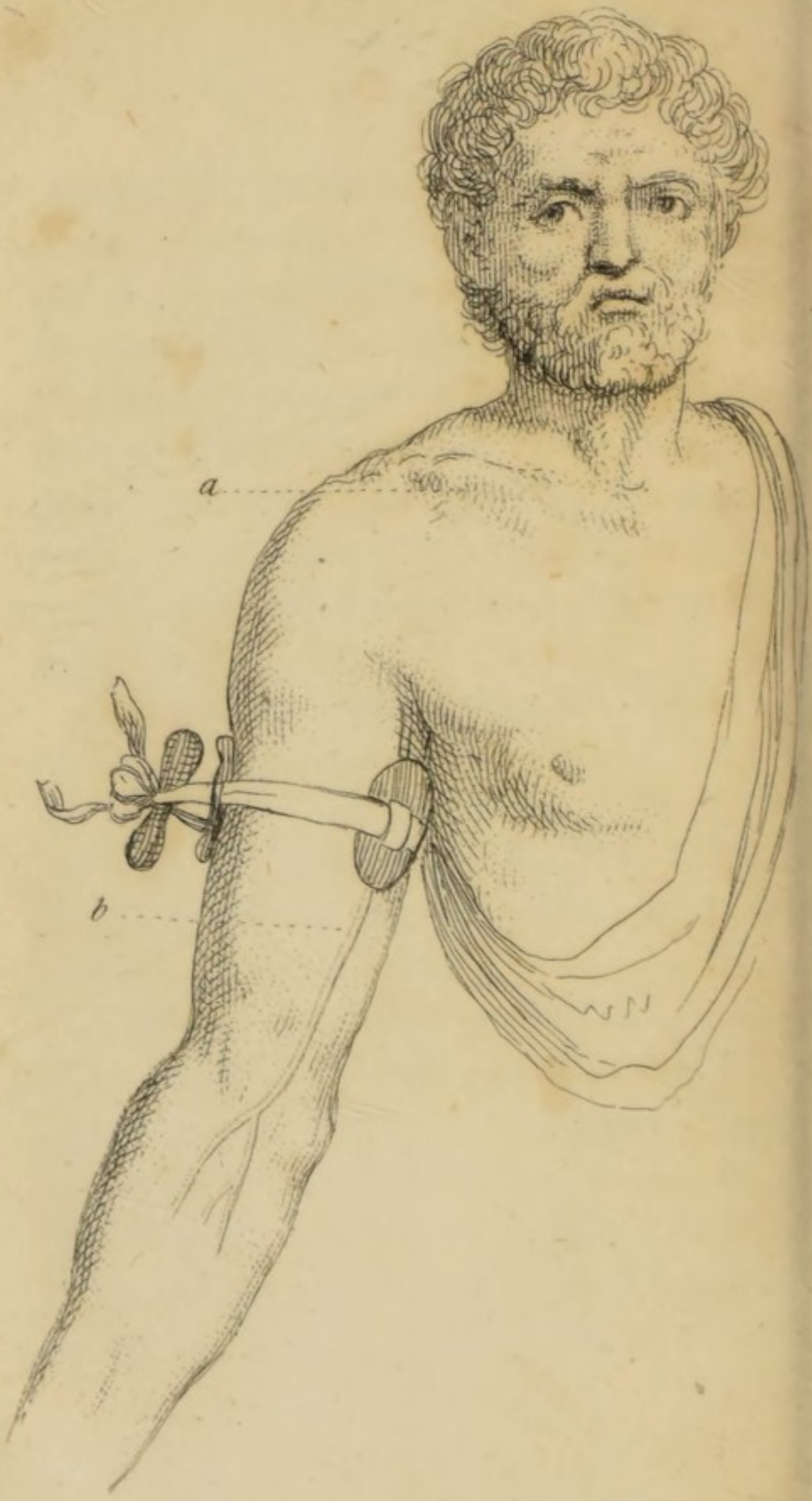


* The uſe of the lungs in the circulation is here purpoſely omitted. —— The reader, who is deſirous of enlarging his mind with the knowledge of the principal truths of anatomy and phyſiology, will be amply gratified in his inquiries. It is to be lamented that it is not generally made part of a liberal education as the ſtudy of the animal economy whilſt it affords the contemplative mind the moſt exquiſite delight, muſt alſo prove highly beneficial to ſociety, by enabling us to detect ignorance, and guard againſt quackery and its baneful conſequences. But the medical books often found in gentlemen's libraries, are likely to produce very different effects: ſummary accounts of diſeaſes, with receipts for their cure, being pillars of the moſt dangerous empiriciſm.

ſituation of arteries between bones, the end cannot be attained. To perform this proceſs, therefore, ſucceſsfully, in caſes of wounds and operations, and, at the ſame time, to prevent the evils of an exceedingly-ſtrong *general* preſſure, ſurgeons have fixed on certain parts of the TRUNKS of arteries for the application of a pad or COMPRESS. — Theſe parts are expreſſed in the annexed plate.

The PULSE is the beating, or diſtending, of an artery, from blood propelled into it by the heart. The intervals of the pulſations are the times when the heart itſelf is diſtending with blood returned to it by the veins.

Conſequently, there can be no pulſation when the flow of blood and diſtention of an artery are prevented. Where, then, a pulſe can conveniently be felt, as in the wriſt, the ceaſing of it, from a preſſure made on the trunk above, will prove that the preſſure is made effectually. To illuſtrate this by an


a
b

an experiment: — let a friend feel the pulſe in your wriſt; then apply two or three fingers in *the little pit, immediately below the collar-bone, cloſe to the ſhoulder, marked* a *in the plate.* Preſs ſtrongly, and the pulſe will ceaſe; becauſe, the artery that ſupplies the upper extremity *paſſes under the collar-bone, over the firſt and ſecond ribs, along this part,* and will be now preſſed againſt one of theſe ribs. Remove the fingers, and apply them again, and the pulſe will be found to alternate with the preſſure.

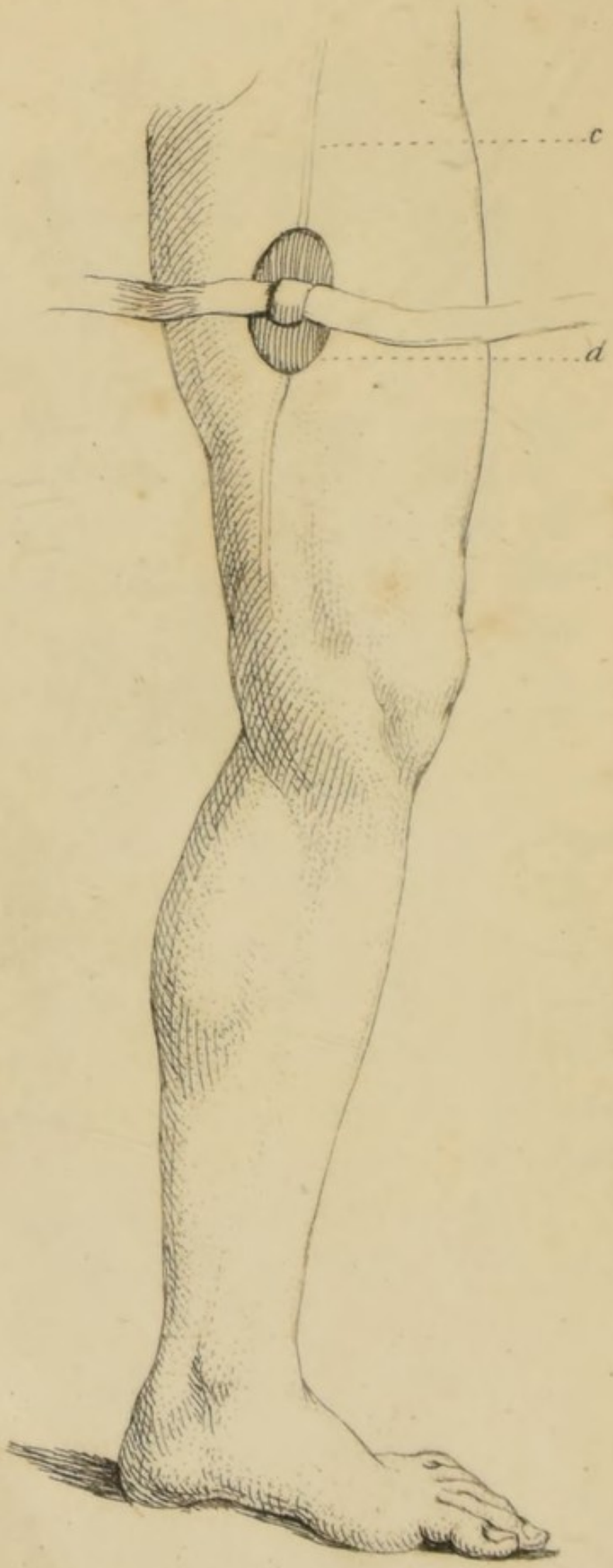
Suppoſe a wound received, an artery of a conſiderable ſize cut or torn, and a copious bleeding, in conſequence, to happen, in any part of the arm *below* the place *a:* — it is manifeſt, that, by making a preſſure with the fingers, in the manner deſcribed, or with the aſſiſtance of a pad between the fingers and the part, the bleeding would inſtantly ceaſe. Let this proceſs be your firſt exerciſe; and,

when you are expert in the practice of it, we will proceed to consider the other places in the limbs where effectual compression may be made, and the instruments proper for the purpose.

The arteries of the upper extremity, or arm, proceed from the trunk at *a*, in this manner: *the trunk passes into the arm-pit, deeply situated*; *then proceeds along the side of the arm, next the body, obliquely towards the fore part of the joint or bend*, and here divides into three branches. In this course to its division it lies near the bone, and may therefore be successfully compressed. — The situation of this trunk to its division is described in the plate by the lines *b*.

Every compression, for preventing a flow of blood from wounded arteries of the upper extremity, must, therefore, be made either at *a*, or in some part of the course of the trunk of the artery, expressed by the lines *b*, *between the arm-pit and the bend of the arm*.

The


c
d

The diſtribution of the veſſels of the lower extremity is thus: — the artery paſſes from the cavity of the belly to the GROIN, where, in thin perſons, the pulſation of it may be felt.

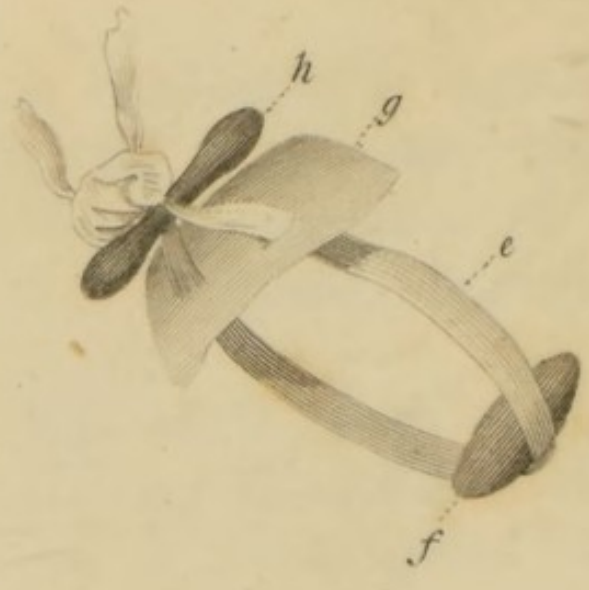
Here, in caſe of wound and effuſion of blood very high in the thigh, effectual compreſſion may be made, by the fingers preſſed very ſtrongly, in the manner deſcribed for compreſſion below the collar-bone; though it were better to have ſome kind of ſtrong pad, or firm body, ſuch as will be deſcribed, interpoſed between the fingers and the part.

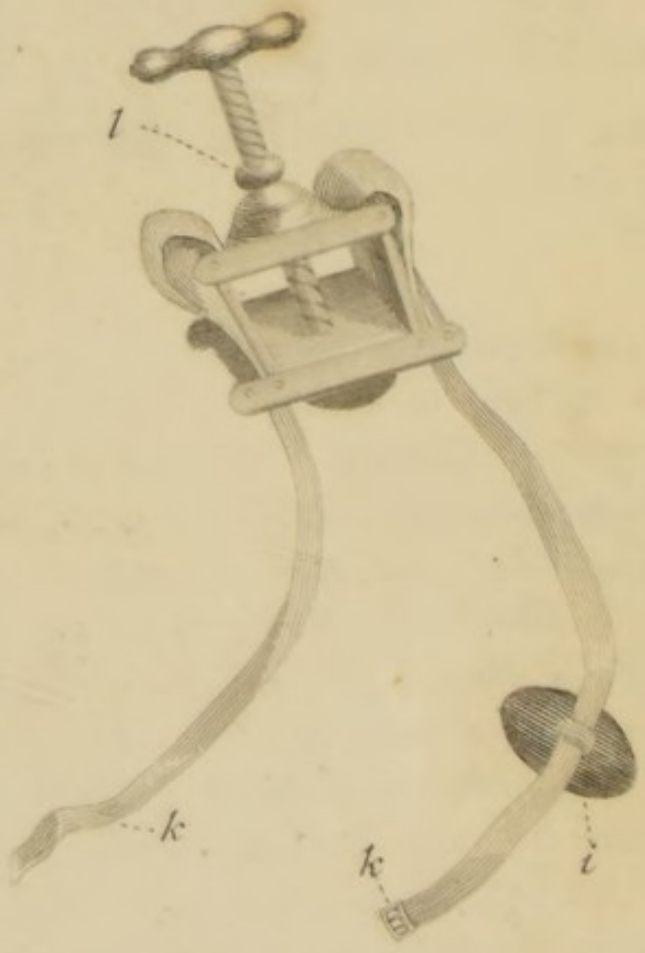
*From the groin, the artery proceeds in an oblique direction, downwards and inwards, as expreſſed by the lines* c; *and, at about the middle of the inſide of the thigh, expreſſed by the compreſs* d, *it lies cloſely to the bone.* This is the moſt favourable part for making a preſſure upon it, becauſe of the reſiſtance of the thigh-bone behind. And, where there are opportunities of choice, as in

caſes of wounds or operations *below* this part, this is the place which ſurgeons fix on for the application of the compreſſing body; it therefore deſerves particular attention.

The courſe of the veſſel is then *downwards and backwards to the* HAM; *in the hollow of which, againſt the lower flat part of the thigh-bone,** compreſſion may again be very ſucceſsfully made in all caſes of wounds or operations below the knee-joint. But *beyond* this part compreſſion muſt not be depended

* It is highly neceſſary that the greateſt attention ſhould be paid to this point of inſtruction. The pad of the tourniquet being placed as here directed, the ligature muſt be brought *round the thigh, immediately above the knee*, and the twiſting, of courſe, be made upon the thigh. If, on the contrary, the pad be placed in the hollow of the joint, and the ligature carried round the leg, the conſequence might prove fatal before the error could be corrected. But it is generally more ſafe to make compreſſion on the middle of the thigh than at the part here deſcribed, and more proper as to effects afterwards; for, it is always right that the bruiſe and irritation, which neceſſarily ariſe from the ligature, should be as diſtant as poſſible from the ſeat of injury or operation.


h
g
e
f


l
k
k
i

depended on; for, immediately below the joint the artery divides, like that of the upper extremity, into three veſſels, which are ſituated between the bones of the leg.

You have, I doubt not, anticipated any remark of mine on the goodneſs of the great CREATOR, in ordaining the ſituation of the larger blood-veſſels ſo that they ſhould not be expoſed to danger in the neceſſary offices of life.

The inſtrument called TOURNIQUET, was the invention of a ſurgeon, named MORELL, at the ſiege of BESANÇON. It conſiſts of four parts; *viz.* 1. *e*, a yard and half of ſtrong worſted, or other kind of band, an inch broad; 2. *f*, a pad of leather, tightly ſtuffed with wool or horſe-hair, two or three inches long, an inch broad, and of the ſame thickneſs, having a loop on one ſide to ſlide the band through;* 3 *g*, a piece of ſtrong leather, three

* It has been ſuggeſted, that, for the uſe of perſons who may not have an accurate remembrance of the ſituation of the veſſels, it were better that this pad ſhould be made as large again as here deſcribed.

inches

inches long and two broad, having two apertures, an inch aſunder, for paſſing the band or ligature; 4. *h*, a piece of ſmooth, round, and ſtrong, wood, about four inches long.

Deſcription often fails in things of great ſimplicity; and this may poſſibly be the caſe with reſpect to the TOURNIQUET; but the ſlighteſt view will make it underſtood.* The manner of applying it is this. — Place the pad upon the part of the artery proper to be compreſſed; bring the band, paſſed through the loop of the pad, round the limb, and carry the ends through the apertures in the leather; make a double knot with the ends, leaving a ſpace, between the knot and the leather, that will admit three or four fingers; through this ſpace paſs the ſtick, and with it twiſt the liga-

* It is much to be regretted that this inſtrument is not kept in every family: the price of it is trifling. — The life of a valuable gentleman in Hertfordſhire would have been lately loſt for want of one, had not a ſurgeon providentially called at his houſe at the moment of a dreadful effuſion of blood from a wounded artery in his hand.

ture ſufficiently tight to ſtop the flow of blood through the artery into the limb. The leather, knot, and twiſting, are to be placed and made upon the upper part of the limb, nearly oppoſite to the compreſs.

This proceſs, ſimple as it is, requires both hands for tying the knot; and, therefore, you could not apply the tourniquet to your own arm without aſſiſtance. It alſo requires a conſtant application of a hand to the ſtick, as the ligature would otherwiſe inſtantly ſlacken.

To ſupply the want of a hand in regard to the arm, let the ligature be about twelve inches long, with a loop at both ends: proceed in its uſe exactly as already deſcribed; only, inſtead of making a knot over the leather, paſs the ſtick through the loops at the ends of the ligature, and then perform the twiſting.

To fix the ends of the ſtick, ſo as to prevent the ligature from untwiſting, and the neceſſity of the conſtant application of a hand, faſten a piece of tape or packthread, by means of a hole, at each end of the ſtick; carry the

two

two pieces round the limb, and ſecure them by tying or pinning. — Many other expedients may be contrived to anſwer this purpoſe.

Beſides the tourniquet now deſcribed, there is another invented by M. PETIT, and improved by the late Mr FREKE, of St Bartholomew's Hoſpital. It need only be ſeen to be underſtood. —— The pad *i*, being placed upon the artery, and the ligature buckled at *k*, then, by turning the ſcrew, the upper moveable portion, *l*, will be raiſed from the lower, and, conſequently, the ligature may thus be drawn to the degree of tightneſs required.

The advantages of this inſtrument are very great. — It may be applied with only one hand; and, on being fixed, will remain ſafely in that ſtate without attention.

The defects of the former inſtrument are thus ſupplied; and, on every occaſion for a tourniquet, *when there is a want of* ASSISTANTS, nothing more uſeful was ever contrived

trived. By it the bleeding from wounds can inſtantly be reſtrained, and any evil conſequence, from the unavoidable delay of ſurgical aſſiſtance in the hurry of action, be prevented. — Government have wiſely directed every ſhip to be ſupplied with many SCREW-TOURNIQUETS.

And now, young gentlemen, after what has been ſaid of VESSELS and TOURNIQUETS, ſuppoſe any of you wounded with a penknife or any other inſtrument in the thigh, leg, or arm, and a large artery being punctured, a violent bleeding ſhould enſue. You have no tourniquet; but you clearly underſtand what has been taught on this ſubject. How, then, would you act? — Undoubtedly you would inſtantly pull of your garter, or take the firſt piece of ſtring or cord you could find; roll up your handkerchief, and lay it on the trunk of the artery above the wounded part; you would paſs the garter or cord over the handkerchief and round the limb; tie a knot leaving a proper ſpace; and then twiſt the ligature by

a piece of your ſtick or cane, or any other firm body you could procure.

It may be truly ſaid, that, in either of the branches of medicine, " a little learning is a " dangerous thing." My ſole deſign was, to explain to you the means of ſtopping a flow of blood from wounded limbs, and preventing a fatal conſequence, *till more effectual aid from ſurgery can be obtained.*

Printed by C. and W. Galabin, Ingram-court, London.