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M4/I

Rules and Regulations

OF THE

ARMY MEDICAL OFFICERS'

BENEVOLENT SOCIETY.

INSTITUTED 1820.

London :

PRINTED BY T. BRETTELL, RUPERT STREET, HAYMARKET.

1833.

ARMY MEDICAL OFFICERS'
BENEVOLENT SOCIETY.

President.

SIR WILLIAM FRANKLIN, M.D. K.C.H.
Principal Inspector-General of the Army Medical Department.

Vice Presidents.

DR. RENNY, *Director-General in Ireland.*
SIR CHARLES MANSFIELD CLARKE, Bart.
THEODORE GORDON, Esq., *Principal Inspector-General.*

Trustees.

THEODORE GORDON, Esq.,
Principal Inspector-General of the Army Medical Department.

WILLIAM RANDALL SHAPTER, M.D.
Inspector-General of Hospitals.

Bankers.

MESSRS. DRUMMOND.

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RULES AND REGULATIONS,

§c. §c.

CHAPTER I.

OBJECTS OF THE SOCIETY.

1. THE ARMY MEDICAL OFFICERS' BENEVOLENT SOCIETY is instituted with the view of affording relief to those Orphans of Commissioned Officers of the Medical Department of the Army, who may be left under circumstances of peculiar distress; or, who may be enabled, by a small addition of income, at a certain period of their lives, to procure a better education than their limited means would otherwise admit; or who may require some assistance on their first establishment in life.

2. Orphan Children of Officers whose Mothers are still living, will be admitted to participate in the benefits of the Fund, provided the Mother's income be inadequate to their education; but Orphans who have lost both Parents, will, if otherwise destitute, be considered to have a claim superior to those whose Mothers are still living.

3. Where there is an equality of claim, the preference will be shown to those Orphans, whose Fathers contributed to the Fund.

4. The nature of the claims which may be made being very indefinite, the relief afforded by the Fund is not limited by any specification of age, or otherwise; but the objects of its bounty will be selected from among those whose claims are the strongest.

CHAPTER II.

MODE OF RAISING THE FUND.

1. THE Army Medical Officers' Benevolent Fund is to be raised and supported by means of Donations, Voluntary Subscriptions, and Legacies.

2. Donations will be thankfully received from all Officers of the Army, whether belonging to the Medical Department, or otherwise; and from all persons whatsoever, who may be desirous of promoting the benevolent objects of the Society.

3. The names of all Donors to the Fund will be carefully registered in a book kept for that purpose, and noticed in the printed Report of the proceedings.

4. An Annual Subscription of One Guinea is the lowest which entitles the Subscriber to any share in the management of the Fund: the same continued or made up at any time to Fifteen Guineas, or Ten Guineas given at once, will entitle the Donor to such privilege for life.

5. It is hoped that the Oculent in the Department will hereafter remember this Society in their testamentary dispositions; and to give permanency to their benevolent intentions, it is hereby expressly provided that all Legacies whatsoever are to be immediately added to the *accumulating Fund*.

6. With the same object, it is also hereby provided that all Donations of Ten Pounds and upwards, in one Sum, be forthwith added to the accumulating Fund.

7. One-third of the Annual Subscriptions, and of the Donations under Ten Pounds, together with the whole or such part of the Annual Interest of the capital Stock, as to the Committee shall appear proper, shall be annually distributed amongst the Claimants. The remaining two-thirds of the Subscriptions and small Donations, and all

Donations of Ten Pounds and upwards, and all Legacies, shall be added to the Stock of the Society.

CHAPTER III.

MANAGEMENT OF THE FUND.

1. THE management of the Fund is vested in the Life and Annual Subscribers, who will hold a meeting in the month of May in each Year, for appointing Officers, and regulating the concerns of the Society. It is provided, however, that none but those who are serving, or have served, in the Medical Department of the Army, can be considered as entitled to any share in the management and regulation of the Society.

2. The immediate direction is entrusted to a President, Vice-Presidents, two Trustees, a Committee, and a Secretary.

3. The President, Vice-Presidents, and Trustees, are elected for life, and are officially Members of the Committee. The other Members of the Committee will be chosen Annually, at the General Meeting, in May, from among such of the Subscribers as may be resident in, or in the immediate neighbourhood of, London.

4. The Committee to consist of seven, of whom not more than five can have been upon the Committee of the former Year.

5. At the Annual General Meeting, two Auditors (not Members of the Committee) to be appointed for inspecting the accounts of the ensuing Year.

CHAPTER IV.

DISTRIBUTION OF RELIEF.

1. THE relief afforded by this Fund is to be in the

form of Donation, and never in that of Annuity, even for a limited number of Years.

2. The amount of relief to be afforded in each particular instance is to be judged of annually, and proportioned to the peculiar circumstances of the case, the extent of means of which the Society may be possessed, and the number of claimants.

3. Certificates of Claims to be sent in on or before the first of April in each year; in default of which no relief can be afforded by the Fund, except under circumstances of peculiar urgency, hereafter to be specially provided for.

4. The distribution of relief will take place annually, at the General Meeting of Subscribers, in the month of May.

5. The amount of relief granted in each case by the Annual General Meeting, to be paid either in one sum, or by half-yearly or quarterly instalments, at the discretion of the Committee.

CHAPTER V.

OF THE COMMITTEE.

1. THE Committee, appointed as aforesaid (Chap. III.), are to conduct the concerns of the Fund, subject, however, at all times, to the controul of the General Meeting.

2. The duty of the Committee is to inquire into the correctness of the Statements put forth in the respective Certificates of Claims; to report thereon in writing to the Annual General Meeting; and to recommend to the General Meeting, the amount of relief proper to be afforded in each case. It is the duty of the Committee also to see that the Donations, Subscriptions, and Legacies are funded, or otherwise applied, according to the present Regulations, or the Instructions of a General Meeting; to draw up Annual Reports of the state of the Fund; and, in

general, to take such measures as may appear calculated to promote the Interests of the Fund.

3. The Committee are to meet for these purposes on the first Thursday in January, April, July, and October, in each year, at two o'clock.

4. At all Meetings of the Committee, three constitute a quorum.

5. In cases of urgent and unforeseen distress, the Committee to have the power of issuing sums on their own authority, but the quorum on such occasions must consist of five.

6. The Chairman of the Committee has a casting vote, when the votes are equal, independent of his vote as a Member of the Committee.

7. The President, or any two of the Committee, to have the power of calling an extraordinary Meeting of the Committee, at any time, stating in the summons the object of the Meeting.

CHAPTER VI.

OF THE SECRETARY.

1. THE Secretary is to enter into a book, the names of all Donors and Subscribers, with the amount of the sums respectively paid by them, and the dates of such payment.

2. He is to attend all Meetings of the Committee, as well as all General Meetings, and to issue such summonses for the same, as may be requisite.

3. He will follow such instructions as he may receive from the Committee, and pay, on the 1st of every month, or oftener, into the Bankers' hands, all monies received by him.

4. He will take receipts for all monies disbursed by him, and enter the same in a book, which is at all times to be open to the Members of the Committee and Auditors, for examination.

CHAPTER VII.

OF THE GENERAL MEETINGS.

1. DUE notice of the Annual General Meeting is to be given by the Committee, at least one month previous to its being held.

2. At this Meeting, a full statement of the Income of the Society is to be, in the first place, laid before the Meeting, and the Report of the Auditors and Committee received; after which, the Meeting will decide on the sum to be appropriated; and then proceed to consider the different claims, and to determine the extent of relief to be afforded in such cases as the Committee shall recommend to be proper objects of the Society.

3. A Report of the state of the Fund, and of the Proceedings of the General Meeting, to be afterwards printed for circulation among the Subscribers.

4. At all General Meetings of the Subscribers to the Fund, a majority of the votes of those present determines the question; the Chairman having a casting vote.

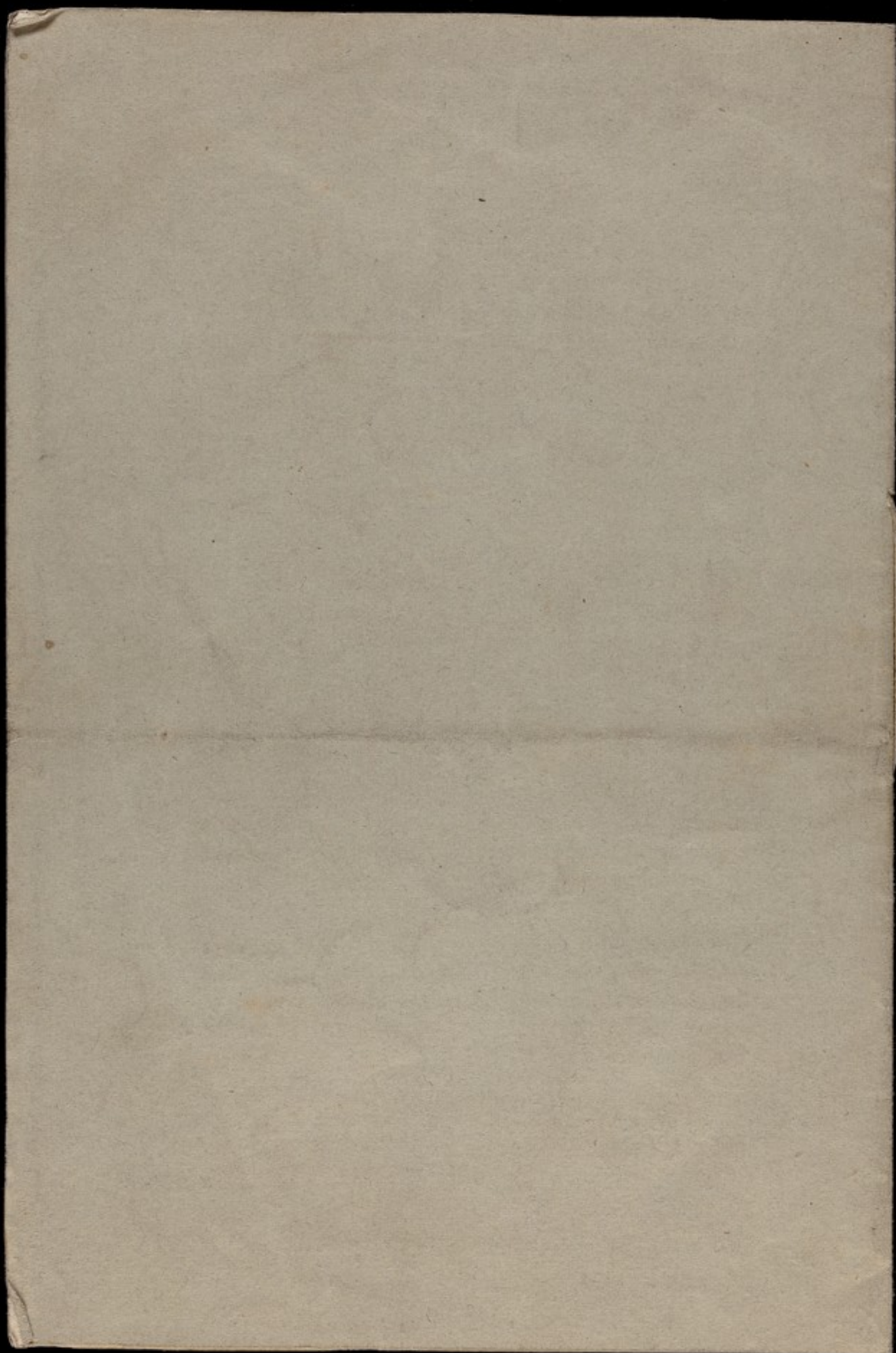
The Committee earnestly recommend to those who are opulent among them, to recollect this Society, when considering the testamentary disposal of their property; and to such as are inclined to become Benefactors, by will, the following Form is recommended as proper:—

"I give and bequeath to the President, Vice-Presidents, Treasurer, and Members of the Society for the Benefit of Orphans of Officers of the Medical Department of the Army, in Trust, the Sum of which I desire may be paid out of my personal Estate, and applied to the purposes of the said Society."

N.B.—Devises on Houses or Lands, or Money charged on Land, or to be laid out in Land, are void by the Statute of Mortmain.

All Communications regarding the Fund, to be addressed to the SECRETARY. Donations and Subscriptions may be paid to Messrs. DRUMMOND, Bankers, Charing Cross; and to the SECRETARY.

Printed by T. Brettell, Rupert Street, Haymarket.



J. Hall

M4/2

RULES OF THE SOCIETY
FOR THE
BENEFIT OF THE WIDOWS
OF THE
OFFICERS
OF THE
Hospital and Regimental Medical Staff
OF
HER MAJESTY'S ARMY.

Certified as in conformity to Law, and with the provisions of the Act
10th Geo. IV. c. 56, as amended by 4th and 5th Will. IV. c. 40,
on being enrolled as a Friendly Society, August 3d, 1838.

LONDON :
PRINTED BY J. BRADLEY, 78, GREAT TITCHFIELD STREET,
ST. MARTY-LE-BONE.
1838.

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RULES.

WHEREAS, in the year 1816, an Instrument was drawn up and executed by the Officers of the Hospital Department of His Majesty's Army, under the following designation, and with the hereinafter-mentioned recital, viz :—

DEED OF SETTLEMENT, &c.

“ To all whom these presents shall come, We, whose
 “ names are hereunto subscribed and seals affixed,
 “ ‘ Officers of the Hospital Staff, and Regimental Medical
 “ ‘ Officers of His Majesty's Army,’ send greeting.
 “ Whereas we, being desirous of establishing a Fund for
 “ the better support and maintenance of our widows, for
 “ the better effectuating such our design, and for securing
 “ an annuity or yearly sum to the wives of such of us as
 “ shall survive us, have agreed, and by these presents do
 “ agree, to erect and form ourselves into a voluntary
 “ society and mutual contribution, by the name, style,
 “ and title of, ‘The Society for the Benefit of the
 “ ‘ Widows of the Officers of the Hospital and Regi-
 “ ‘ mental Medical Staff of His Majesty's Army;’ and
 “ to create a Fund for that purpose, upon and under,
 “ and subject to, the terms and conditions, clauses,
 “ orders, regulations, provisions, and agreements, herein-
 “ after expressed and declared; and for the better form-

ing, governing, and regulating such Society, and the proceedings thereof, and the more effectual promotion of such useful and beneficial ends and purposes, we do hereby severally consent, covenant, promise, undertake, and agree, each and every of us for himself, to and with the others, and other of us, to conform to, observe, fulfil and keep, all and singular, the articles, clauses, provisions, agreements, conditions, rules and regulations, hereinafter contained or mentioned."—And whereas the Forty-seventh Article or Clause of the said Deed of Settlement was expressed in the words following, viz. :—

"That the articles herein contained, and all other laws, rules, orders, and regulations, of the said Society, may be altered, rescinded, or made void, and totally abolished; and any new laws, rules, orders, and regulations, for the better ordering and management of the affairs of the said Society, may be made and established in manner hereinafter mentioned; that is to say, every new law, rule, order, or regulation, shall be first proposed in writing, signed by at least three Members of this Society and delivered to and laid before the Committee for the time being, at one of their quarterly meetings, and shall be carefully examined and considered by the said Committee, at two of their meetings at least; and if the same shall be approved by the said Committee, at any two successive quarterly meetings, then, and not otherwise, such new law, rule, order, or regulation, together with the resolution of the said Committee thereupon, and their opinion concerning the same, shall, by the said Committee, be laid before the next general meeting of the said Society, for their consideration; which general meeting may (if upon reckoning and casting up the number of votes, there shall be full three-fourth parts of

the votes of all the members present, for passing and establishing such newly proposed law, rule, order, or regulation), then, and not otherwise, pass the same into, and confirm and establish it as a law of the Society; and such determination shall be conclusive and binding to and upon all the Members of the said Society, as well as the Members dissenting therefrom, as those consenting thereto." And whereas the said contemplated Society having been established, and being in full operation, it was on 22d May 1828 deemed necessary to rescind, make void, and totally abolish the aforesaid laws, rules, orders, and regulations, contained in the said Deed of Settlement, and to substitute, in lieu thereof, other laws, rules, orders, and regulations then passed, confirmed, and established at a general meeting of the said Society, conformably to the provisions and directions contained in the before-mentioned Forty-seventh Article or Clause, but which it is again (at the Annual Meeting, on 31st May 1838) considered necessary, through a similar clause, to rescind, make void and totally abolish. Now, therefore, be it remembered, that the said laws, rules, orders, and regulations, contained in the last-named Deed of Settlement, shall be, and the same are accordingly, hereby rescinded, made void, and totally abolished; and that from henceforth the said Society shall be governed by the articles, clauses, orders, laws, rules, conditions, provisions, and regulations herein-after mentioned and specified; that is to say :—

I.

That this Society shall and may consist of all such persons as now are, or hereafter shall be, Commissioned Officers of the Hospital and Regimental Medical Staff of Her Majesty's Army, whether upon full or half-pay.

II.

The Society shall consist of two Classes of Subscribers; the Widows of the First Class of Subscribers shall receive an Annuity not exceeding Forty Pounds; and the Widows of the Second Class of Subscribers, an Annuity not exceeding Twenty Pounds.

III.

All Subscribers of the First Class, who are married, shall pay an Annual Subscription of Seven Pounds, except in the cases hereinafter specified.

IV.

All Subscribers of the Second Class, who are married, shall pay an Annual Subscription of Three Pounds Ten Shillings, except in the cases hereinafter specified.

V.

All Subscribers of the First Class, who are unmarried, shall pay an Annual Subscription of Two Guineas.

VI.

All Subscribers of the Second Class, who are unmarried shall pay an Annual Subscription of One Guinea.

VII.

All persons hereafter joining this Society as married Members, shall, if of the First Class of Subscribers, pay a Fine of Twenty Guineas; and if of the Second Class of Subscribers, a Fine of Ten Guineas, together with the fine specified in Article X., in addition to the first year's Subscription, which shall be to such persons Ten Pounds

annually if of the First Class, and Five Pounds annually if of the Second Class.

VIII.

That every Member of this Society, being single at the time of his admission, who shall afterwards marry, shall pay a Marriage Fine of Twenty Guineas if a Subscriber of the First Class, and of Ten Guineas if a Subscriber of the Second Class, in addition to the before-mentioned Subscription of Seven Pounds, and Three Pounds Ten Shillings for the First and Second Class Subscribers.

IX.

That every Member of this Society, being a Subscriber of the Second Class, may be admitted, with the consent of the Committee, at any future period, to become a Subscriber of the First Class, and shall thereupon be entitled to all the advantages thence arising, provided he pay up the difference between the Fine and Subscription of the First and Second Class, with interest at the rate of £5. per cent per annum, and compound interest at the like rate, from the period when he first became a Member of the Society; the application for such admission to be accompanied by a certificate of the state of his health, signed by two medical men (officers of the army when practicable); and he will also be expected to undergo such medical examination as may be deemed expedient by the Committee.

X.

That all Officers becoming Members, who shall be married at the time of their becoming such, or who may after-

wards marry, and whose respective ages exceed those of their wives respectively more than five years, shall respectively pay for every year beyond that limit a Fine (exclusive of the marriage fines mentioned in the seventh and eighth Articles) according to the scale and rate following, viz. Subscribers of the First Class, under the age of

Years.	£.	s.	d.
30	2	10	0
35	3	0	0
40	3	10	0
45	4	4	0
50	4	15	0
55	5	10	0
60	6	10	0
65	7	10	0
70	10	0	0

and Subscribers of the Second Class half the above sums.

XI.

Every Member of the Society shall be liable to pay his Annual Payment or Contribution Money only as a bachelor for all such time as he shall have been a bachelor or widower; every such payment as a widower to commence and be computed from the last day of June or December next after the death of his wife; and as a married man, from the last day of June or December next before his marriage.

XII.

That these Rules shall be printed, and copies thereof distributed by the Committee to all the Officers mentioned in the first Clause.

XIII.

That all unmarried Officers now in the Service, not being

Members of the Society, and all Officers hereafter entering the medical department of the army, and omitting to join the Society within twelve calendar months after the period of their admission to the Service, and after due notice given and received, shall not be admitted at any future period, except as married Subscribers, under the provisions in Article VII., and with the consent of the Committee and two-thirds of the Members present at the next Annual General Meeting.

XIV.

That if any Member of this Society shall on any account whatever quit or leave the army, such Member making regularly the payment of the said Contribution Money, and all other fines and payments from time to time accruing due from him to the Society, and in all things conforming to the rules, orders, and regulations thereof, shall and may be and continue a Member of this Society; and the widow of every such Member shall be entitled to the like dividends, annuity, and advantages, as she would have been entitled to if such Member had not quitted the army.

XV.

That the Trustees shall invest all surplus subscriptions and fines in the purchase of real or heritable property, or in Stocks, Banks, or securities, or pay the same into the Bank of England on receipts, pursuant to 10 Geo. IV. c. 56, s. 13, 31, for the purpose of forming a Fund for the benefit of this Society; and that the annual dividends, or interest of the Society's said stock or capital, together

with the fines on marriage, and the Annual Payments or Contribution money, shall be deemed the annual income of the Society, and shall be charged and chargeable with, and applied in the first place for, and in payment of, the ordinary expenses of the Society, and all such extraordinary expenses as the Committee for the time being shall think necessary or expedient to be allowed; and the Annuities shall then be paid in their relative proportions every half-year to and amongst all and every the widows of the deceased Members of the Society; not exceeding Twenty Pounds half-yearly to each Widow of a Member of the First Class of Subscribers, and Ten Pounds half-yearly to each Widow of a Member of the Second Class of Subscribers.

XVI.

Provided always, nevertheless, that no Widow of any Member of the Society shall be entitled to any annuity or yearly payment from this Society until her husband shall have been a married Subscriber five years, and made six annual payments as her husband, except in the following cases, viz.—

That from all Bachelors and Widowers, Members of the Society, and who have belonged to the Society prior to the first of January, 1825, the probationary period of one year from the date of marriage be required, before the Widow can be entitled to any annuity; and that to them the option be given of compounding for the further period of four years, at the rate of Ten Pounds for each year, by which such probation is relieved, over and above the other Fines and Annual Subscriptions already specified; such payments in the way of composition to be made in ad-

vance; and that this clause shall be subject to the conditions and regulations following, viz.—

First.—The option as to the number of years to be compounded for is to be declared to the Secretary in writing, on the expiration of the first year after the Member's marriage.

Second.—The Compensation Fine for such period is to be paid on the day of the expiration of the first year after the Member's marriage, or within thirty days afterwards.

Third.—The payment of Ten Pounds on such last-mentioned day reduces such Member's probationary period to three years from that date; the payment of Twenty Pounds to two years; and of Thirty Pounds, to one year; and by the payment of Forty Pounds, such Member's widow will become entitled to her annuity immediately upon his decease.

Fourth.—No Member is to be allowed to compound except at the period above mentioned; and his first decision must be final and binding upon him.

Fifth.—The Resolutions of the Annual General Meeting shall be considered as applying to those married Members who entered the Society prior to the first of January, 1825, as Bachelors, and who have not been married five years.

XVII.

That every Member of the said Society, or the agent or substitute of such Member, who shall neglect to pay the annual contribution money, or other monies payable to this Society, which will become due the 1st of January of each year, on or before the 31st of January next after the same became due, shall be, by letter from the Secretary, by order of the Committee, required to pay the same on or before the 1st of March then next following.

XVIII.

That every Member of the said Society, by himself, his agent, or substitute, refusing or neglecting to pay such annual contributions, or other monies by him payable, as aforesaid, on or before the 1st day of March

after such notice, shall thenceforth be expelled from, and shall cease to be, and shall never afterwards be admitted, a Member of the Society, unless such explanation for the non-payment shall be given as may appear satisfactory to the Committee for the time being, and subject to the approbation of the next General Meeting; and such expulsion shall include a forfeiture of all monies by such Member theretofore paid to, or for the use of, the said Society, and of all benefit and advantage whatever to arise to such expelled Member, or to the Widow of such expelled Member, or any person or persons claiming under them, or either of them.

XIX.

That, on or before the first day of March in every year, an Account shall be made up and stated by the Secretary of the Society for the time being, of all receipts and disbursements of the Society up to 31st of December preceding.

XX.

That after payment of the Secretary's salary, and all ordinary and extraordinary expenses and half-yearly payments to Widows, all surplus monies of the Society shall be applied in the purchase of Stock, by way of increase of the Capital or Fund of the Society.

XXI.

That no monies belonging to this Society shall be paid, unless ordered by the Committee for the time being, or by some General Meeting of the Society.

XXII.

That the Widows' Annuities shall be paid to them half-yearly, without fee or reward to any agent or officer of the said Society.

XXIII.

That the Widow of every Member of this Society shall, before payment of any Annuity, or yearly Sum, by this Society, make and deliver to the Committee for the time being, a Declaration (according to the Form in use) made before a Justice of the Peace, resident in or near to the place where she shall then live or reside, setting forth her age and place of abode: that she was lawfully married to her husband, and when and where; and the place and time of his death, and of her being then unmarried; and shall also (if thereto required by the Committee) produce a Certificate, or other sufficient proof, of the said marriage; and shall afterwards, upon application for, and previous to, every half-yearly Payment, make and produce to, and leave with the Committee for the time being, or the Secretary, a Declaration (according to the form in use), made before a Justice of the Peace, residing in or near the place where she shall then live; to be expressed in such Declaration that she is now the Widow of her deceased husband, who was a Member of this Society, and is not married to any other person; and thereupon such Annuity, or half-yearly payment, may be made (with the consent of the Committee) by the Secretary of the Society.

XXIV.

Provided, That if any deceit or fraud shall be made use of by any such Annuitant, in any such Declaration, upon

discovery and proof thereof she shall be struck off the Society's list of Annuitants, and forfeit all right and title to any benefit or Annuity from the Society.

XXV.

That all married or unmarried Members of this Society are to give the earliest notice to the Secretary of any change of their situation; and every unmarried Subscriber shall, upon his marriage, accompany such notice with a declaration (agreeably to Form in use) of his own and his wife's age respectively, and of the date of his marriage; and if the age of the husband or wife be misrepresented in such declaration, all claims of the Widow upon the Society are forfeited. And further, that if any Member should continue to subscribe as a Bachelor for more than six calendar months after his marriage, or shall omit to conform to the provisions of the before-mentioned Seventh and Thirteenth Articles, and to constitute himself accordingly, in every respect, a new Member, his Widow shall not be entitled to any benefit or Annuity from the Society; and all monies previously paid by him to the Society shall become forfeited to, and for the use and benefit of, the said Society.

XXVI.

That every Widow enjoying any Annuity or yearly Payment under this Society, and marrying again, shall forfeit all title to the benefits of the Society during such marriage; but in case of her surviving her last husband, she is then to become entitled to her former Annuity or yearly Payment during her future Widowhood.

XXVII.

That a Member of this Society marrying an Annuitant, shall not pay the Marriage Fines hereinbefore mentioned, and shall be only required to continue his Subscription as a single man; it being the intention of the Society, and so hereby declared, that no Widow shall be ever entitled to more than one Annuity.

XXVIII.

That as often as any Member shall marry, he shall pay the before-mentioned Fines for every such marriage (unless he marries an Annuitant), and his Widow shall not be entitled to any Annuity or yearly Sum from the Society until he shall have made six Annual Payments as her Husband.

XXIX.

That for the better and more orderly management of the affairs and business of the said society, there shall be a President, and an unlimited number of Vice-Presidents, to be chosen by the Annual General Meeting of the said Society, and who shall be continued for life; likewise an Annual Committee of nine Members to be chosen as hereinafter mentioned.

XXX.

That a General Meeting of the Society shall be held once a year, in the month of May; the day and place of meeting to be fixed upon by the Committee, who will direct the Secretary to issue notices accordingly.

XXXI.

That at every Annual General Meeting of the said

society, one-third of the Committee shall go out by rotation, and the new Members shall be chosen by the majority of the votes of the Members present; the Committee to consist and be composed of nine of such of the Members as shall be resident, or then on duty, in London, or its vicinity; and, as well the present Committee as every future Committee, shall meet and assemble together, at some convenient house or room in London, at least once in every three calendar months, and at all such other times as they shall think fit; provided always, that they meet on, or immediately subsequent to, the 1st day of January and the 1st day of July in every year; and any *five*, or more of them, being so met or assembled together shall have power to conduct and direct all the affairs and business of the said Society, according to the rules, directions, orders, and regulations hereinbefore and hereinafter particularly mentioned, and according to such bye-laws, orders, or ordinances, as shall, at any time or times hereafter, be made and agreed to by them, and approved of by and at a General Meeting of this Society, as hereinafter is expressed.

XXXII.

That all proceedings of the said Committee shall be entered or minuted in a book to be kept for that purpose. And that at every meeting of the said Committee, all letters addressed to the said Committee, or to the said Society, or to their Secretary, since the last meeting, shall be read; and all such letters, and the answers thereto, shall be registered and duly entered.

XXXIII.

That the Committee shall, as far as in them lies, take

care that the laws of the Society be duly observed by the Members thereof, and shall report every breach or violation of such laws which may come to their knowledge, at the next General Meeting of the said Society.

XXXIV.

That if any Member of the Yearly Committee shall, within the period for which he was chosen, die, or remove from London, then the other Members of the Committee shall, at their next meeting, elect and choose some other Member of the said Society, resident in London or its vicinity, and who shall from thenceforth, for the remainder of the then current year, be a Committee-man in the place and stead of the Committee-man dying or removing as aforesaid.

XXXV.

That at every Annual General Meeting, two Members of the Society (not Members of the Committee of Management) shall be chosen from the general body, by the majority of the votes of the Members present, to be Auditors of the Society's accounts for the ensuing year, of whom one shall have been an Auditor for the year preceding.

XXXVI.

If the said Committee shall have doubts concerning any Declaration laid before or transmitted to them, or to the Society's Secretary, they shall inquire into and examine the matter thereof; and shall not order payment of any annuity or yearly sum to the Widow transmitting such Declaration, until their doubts respecting the same shall have been cleared up and fully obviated.

XXXVII.

The said Committee shall order the payment of all annuities justly payable by the Society, to all such Widows concerning whose declarations no doubt shall have arisen, expressing the exact sum to be paid to every such Widow; and shall likewise order the payment of such remuneration or annual salary to the Secretary as may be recommended by the Committee, subject to the approval of the Annual General Meeting, and all other ordinary expenses payable by the Society; and shall lay a state or account of the Society's extraordinary expenses, whenever there are any, before the Society at their next General Meeting after such expenses shall have been incurred, and come to the knowledge of the Committee.

XXXVIII.

The said Committee shall see that all the sums of money by them ordered to be paid, be duly paid accordingly: and that all monies directed by them to be received by the Secretary, be by him regularly and properly brought to account; and that the Annual Subscriptions paid by the married and unmarried members, and every Fine paid and to be paid, together with the name of each person paying the same, shall be plainly, separately, and distinctly set down and expressed in the account book.

XXXIX.

That after every Annual General Meeting the Committee shall cause to be prepared, pursuant to 10 Geo. IV. c. 56, s. 33, a general statement of the funds and effects of

or belonging to the Society, and every member shall be entitled to a copy, on payment of a sum not exceeding sixpence.

XL.

That every matter proposed to or moved in the Committee, which in their judgment they have not power to settle, shall at the next General Meeting be reported and referred to the Society, by whom a select Committee shall be nominated, for carrying such matters into effect.

XLI.

That the Auditors shall, at the end of each year, examine and sign the secretary's books of accounts, or render to the next General Meeting a sufficient reason for not signing the same.

XLII.

That every such Committee, in their meetings to be held as aforesaid, are to direct, order, transact, and do all such other matters, business, and affairs of and concerning the said Society as shall come before them, or as they in their judgment and discretion shall think necessary and expedient; subject, nevertheless, to the control or revocation of the next or any subsequent General Meeting of the Society.

XLIII.

That there shall be three Trustees chosen for life; and any vacancy in the Trustees, by death or resignation, shall be filled up by the Committee, subject to the approval of the next Annual General Meeting. And that the Trustees for the time being, in whose names the capital or stock of the Society may happen to stand, shall and may, from

time to time, jointly grant any letter or letters of attorney, as occasion may require, to enable the Committee for the time being, or any person or persons in their behalf, to receive the dividends of the Society's stock for the purposes of the said Society.

XLIV.

That whenever it shall be necessary to lay out any of the Society's money in the public funds, the Committee shall then take care and see that the same be duly and properly laid out, as directed in Article XV., in the names of the Trustees for the time being.

XLV.

That at every General Meeting the Committee shall exhibit and lay before the Society a true state of the accounts, and all such other proceedings, affairs, and business concerning the Society as the said Committee shall judge proper and necessary, or as such General Meeting shall direct. And every such General Meeting shall have thereupon full power and authority, by a majority of the votes of the Members then present, to approve, or disapprove of such accounts, or any items or articles therein contained; and to approve or disapprove, confirm or annul, any act of the said Committee done after or since the then last General Meeting; or to refer to the Committee for the time being any business, affair, or matter brought before them concerning the said Society, to be by the said Committee reported at the next General Meeting, for confirmation.

XLVI.

That the proceedings of all the General Meetings of this

Society shall be duly minuted, and entered in a book or books to be kept for that purpose.

XLVII.

That all and every, or any, of the Articles herein contained, and all other Laws, Rules, Orders, and Regulations of the said Society may be altered, rescinded, or made void and totally abolished; and any new Laws, Rules, Orders, and Regulations for the better ordering and management of the affairs of the said Society may be made and established in manner hereinafter mentioned; that is to say, every new Law, Rule, Order, or Regulation shall be first proposed in writing, signed by at least seven Members of this Society, and delivered to and laid before the Committee for the time being, at one of their Quarterly Meetings, and shall be carefully examined and considered by the said Committee at two of their Meetings at least; and if the same shall be approved by the said Committee, at any two successive Quarterly Meetings, then, and not otherwise, every such new Law, Rule, Order, or Regulation, together with the Resolution of the said Committee thereupon, and their opinion concerning the same, shall, by the said Committee, be laid before the next General Meeting of the said Society for their consideration; which General Meeting may (if upon reckoning and casting up the number of votes, there shall be full three-fourth parts of the votes of all the Members present for passing and establishing such newly-proposed Law, Rule, Order, or Regulation) then, and not otherwise, pass the same into, and confirm and establish it as, a law of the Society; and such determination shall be conclusive and binding to and upon all the Members of the said Society—as well the Members dissenting therefrom as those consenting thereto.

XLVIII.

That the Committee-men and Trustees for the time being of this Society, shall be indemnified and saved harmless by the Society, of, from, and against all costs, charges, damages, and expenses, which they, or any of them, shall sustain, or be put unto, for, or by reason, or means of their acting in the due execution of the several trusts and matters thereby in them respectively reposed; and that none of them shall be answerable or accountable for the acts, receipts, neglects, or defaults, of the other or others of them; but each of them for his own acts, receipts, neglects, and defaults, only.

XLIX.

Provided always, that such indemnity shall not extend to affect the private and particular fortune or estate of any Member or Members of this Society; but only the joint stock, or other estate or effects, which shall from time to time belong to the said Society.

L.

That if any difficulty, doubt, or controversy shall at any time arise, touching the management of the concerns of the Society, or the payment of subscriptions, fines, or annuities, or any other matters relative to this Society, or touching the construction of any article, clause, or regulation herein contained, the matters in dispute shall be submitted to the decision of the Trustees for the time being; and if not satisfactory to both parties, shall be finally decided by arbitration, pursuant to 10 Geo. IV. Chap. 56. Sec. 27,—i. e. At the first Meeting of the Society, after the enrolment of these Rules, *five* Arbitrators shall

be named and elected; none of them being directly or indirectly beneficially interested in the funds of the Society; and in each case of dispute, the names of the arbitrators shall be written on pieces of paper, and placed in a box or glass; and the three, whose names are first drawn out by the complaining party, or by some one on his or her behalf, shall be the arbitrators to decide the matter in dispute.

LI.

That no subject whatever be proposed or agitated in this Society, but what relates to the objects for which it is established.

LII.

That these presents, and every thing herein contained, shall be, and are, binding in every respect, to all intents and purposes, upon all and every the person and persons hereunto subscribing, and thereby, or in any manner howsoever becoming or deemed Members of this Society.

LIII.

Every Officer on becoming a Member of this Society, shall be required to sign a declaration of consent to its Rules, &c. agreeably to Form in use, within three calendar months after his admission if in the United Kingdom, six calendar months if out of the United Kingdom but in Europe, and twelve calendar months if in other quarters of the globe, which must be forwarded, without delay, to the Secretary of the Society; and every married Subscriber shall also fill up a declaration, agreeably to Form, of his own and wife's ages respectively, and date of marriage.

LIV.

That an examination of the Society's affairs shall take place every fifth year, by a Committee of Revision, to be especially appointed for that purpose by the preceding General Annual Meeting, who shall be empowered and directed to investigate the liabilities of the Society incurred and contingent, in the mode usually practised by Assurance Societies; to take the opinion of Actuaries on the same; and to report their opinion thereon, to the next Annual General Meeting; and that the first Examination so to take place, shall be made in the year 1842.

NOTE.—All Communications whatever, relative to the business of the Society, are to be made, by Letter, to the Secretary of the Society.

 The following Forms, now in use, are adapted for the convenience of Members, but are not included in the Certificate of the Barrister at Law,—that they may be varied according to circumstances.

(No. 1.)

Form of Declaration to be signed by all Members.

I, _____ years of age, do hereby consent to all the Laws, Rules, Orders, and Regulations, for the time being, of the Society for the Benefit of the Widows of Officers of the Hospital and Regimental Medical Staff of Her Majesty's Army; and as a Member of the same do hereby subscribe my name, and authorize the Secretary of the Society to add the same to the General Deed of the Society.

Dated this _____ day of _____

Signed _____

(No. 2.)

Form of Declaration to be made by Married Members.

I, _____ being desirous of becoming a married Member of the Society for the Benefit of the Widows of Officers of the Hospital and Regimental Medical Staff of Her Majesty's Army, do hereby declare, that the under-mentioned Statement of the ages of myself and Wife, and of the date of our Marriage, respectively, is correct.

OWN AGE.		WIFE'S AGE.	
Years,		Years,	
on	day of 18	on	day of 18

Date of Marriage,

Signed _____ Husband

I declare this to be a correct statement.

Signed _____ Wife.

Dated at _____, this _____ day of _____

N.B. If the age of the Husband or Wife be misrepresented, the Insurance is null and void. See Article XXV.

(No. 3.)

Form of Declaration required for placing a Widow on the Annuity Fund.

_____ came this day before me, and solemnly declared that she is _____ years of age, and now resides at _____; that she was lawfully married at _____ on the _____ day of _____, in the year _____, to _____

late a Member of the Class of the Society for the Benefit of the Widows of Officers of the Medical Department of the Army, who died at _____, on the _____ day of _____, in the year _____; and that she is a Widow at this present time.

The Widow to sign here &c. _____

Declared before me at _____ this _____ day of _____ in the year _____

} Magistrate's name
and
residence.

(No. 4.)

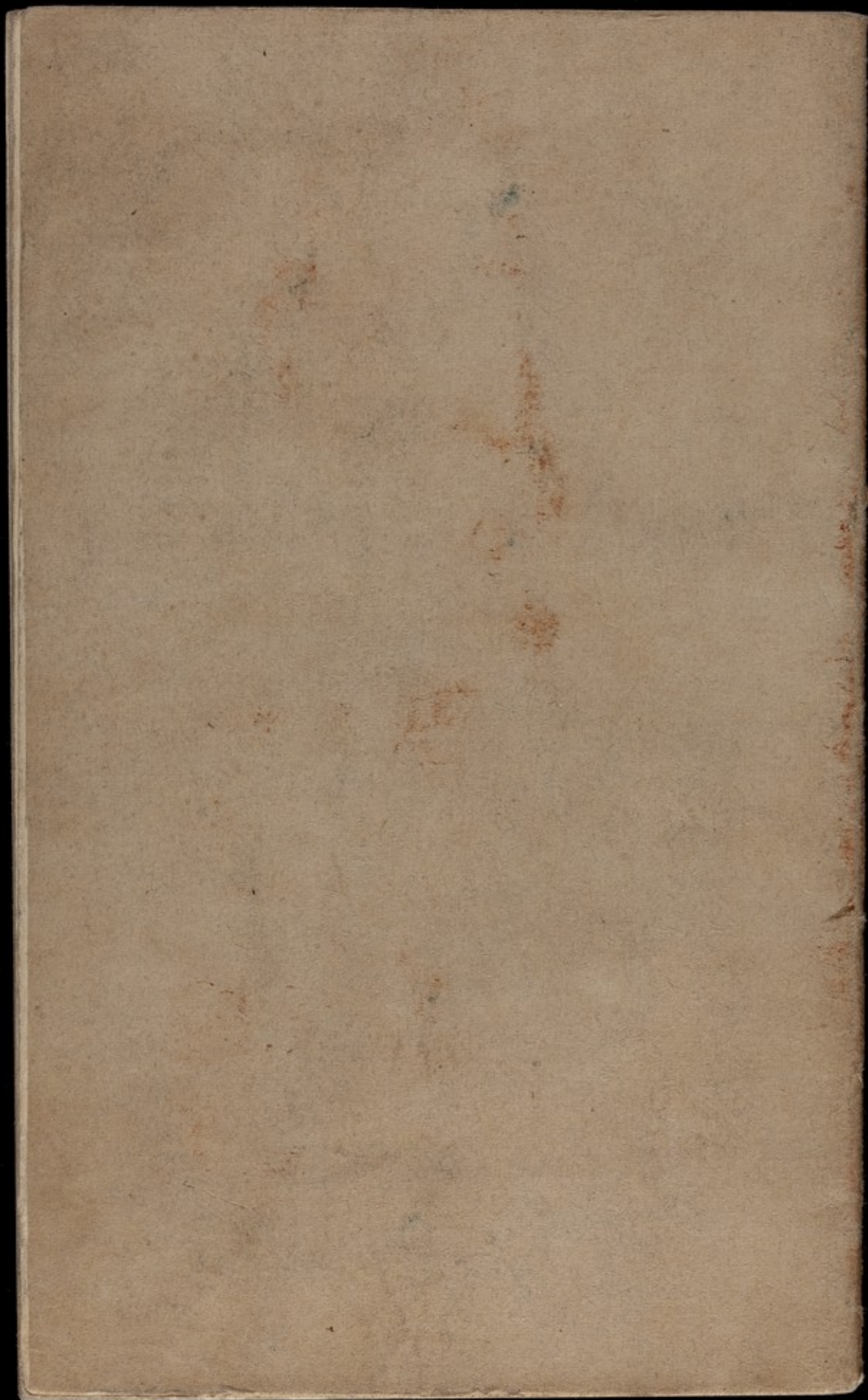
Form of Declaration required to be made half-yearly by every Widow placed on the Annuity Fund.

_____ came this day before me, and solemnly declared, that she is now the Widow of her deceased husband _____ late a Member of the _____ Class of the Society for the Benefit of Widows of Officers of the Medical Department of the Army; and that she is not married to any other person.

The Widow to sign here  _____

Declared before me at _____ this }
day of _____ in the year }

_____ } Magistrate's name
and
residence.



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REGULATIONS

Officers'

SOCIETY,

820.

1848.

Don :

UN STREET, BISHOPSGATE.

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ARMY MEDICAL OFFICERS'
RULES AND REGULATIONS

OF THE

Army Medical Officers'

BENEVOLENT SOCIETY,

INSTITUTED 1820.

REVISED 1848.

London :

PRINTED BY T. WINN, 10, GUN STREET, BISHOPSGATE.

1848.

ARMY MEDICAL OFFICERS' Benevolent Society.

PRESIDENT.

Sir CHARLES MANSFIELD CLARKE, Bart.

VICE-PRESIDENTS.

Dr. KENNY, Inspector General.
JOHN WARREN, Esq., Inspector General.
Sir JAMES FELLOWES, Inspector General.

TRUSTEES.

GEORGE JAMES GUTHRIE, Esq., F.R.S., Deputy Inspector General.
Dr. GEORGE GREGORY.
Dr. A. STEWART, Deputy Inspector General.

BANKER.

C. R. M'GRIGOR, Esq., 17, Charles Street, St. James's.

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RULES AND REGULATIONS,

- &c. &c.

CHAPTER I.

OBJECTS OF THE SOCIETY.

1. THE ARMY MEDICAL OFFICERS' BENEVOLENT SOCIETY shall consist of Commissioned Officers of the Medical Department of the Army, and such Honorary Members as they may appoint. It is instituted with the view of affording relief to those Orphans of Commissioned Officers of the Medical Department of the Army who may be left under circumstances of peculiar distress; or, who may be enabled, by a small addition of income, at a certain period of their lives, to procure a better education than their limited means would otherwise admit.
2. Orphans, whose Mothers are still living, will be admitted to participate in the benefits of the Fund, provided the Mother's income be inadequate to their education; but Orphans who have lost both Parents, will, if otherwise destitute, be considered to have a claim superior to those whose Mothers are still living.
3. Where there is an equality of claim, the preference will be shown to those Orphans, whose Fathers contributed to the Fund.
4. The objects of the Society's bounty will be selected from among those whose claims are the strongest; but it is expressly provided that relief to Orphans is not to extend beyond the age of 21, except in special cases of mental or bodily decrepitude, when the Committee are authorized to recommend to the General Meeting to afford relief from the Fund, provided the total amount of the sums so recommended and awarded, does not exceed, in any one year, the sum of £50.

CHAPTER II.

MODE OF RAISING THE FUND.

1. The Army Medical Officers' Benevolent Fund is raised and supported by means of Donations, Voluntary Subscriptions, and Legacies.

2. Donations will be thankfully received from all Officers of the Army, whether belonging to the Medical Department, or otherwise; and from all persons whatsoever, who may be desirous of promoting the benevolent objects of the Society.

3. The names of all Donors to the Fund will be carefully registered in a book kept for that purpose, and noticed in the printed Report of the proceedings.

4. An Annual Subscription of One Guinea is the lowest which entitles the Subscriber to any share in the management of the Fund: the same continued or made up at any time to Fifteen Guineas, or Ten Guineas given at once, will entitle the Donor to such privilege for life, subject to the provision of Article 1, Chapter III.

5. It is hoped that the Opulent in the Department will follow the good example of many of their deceased brethren, and bear in remembrance this Society in their testamentary dispositions. To give permanency to their benevolent intentions, it is hereby expressly provided that all Legacies whatsoever are to be immediately added to the *accumulating Fund*.

6. The funded property of the Society to be considered inviolate. The annual interest thereof, together with such proportion of the Donations and Subscriptions as the Committee may suggest, and the General Meeting sanction, to be distributed annually. All surplus receipts to be forthwith added to the funded stock of the Society.

CHAPTER III.

MANAGEMENT OF THE FUND.

1. The management of the Fund is vested in the Life and Annual Subscribers, who will hold a meeting in the month of May in each year, for appointing Officers, and regulating the concerns of the Society. It is provided, however, that none but those who are serving, or have served, in the Medical Department of the Army, shall be entitled to any share in the management and regulation of the Society's affairs.

2. The immediate direction is entrusted to a President, Vice-Presidents, three Trustees, a Committee (elected from among the ordinary Members), and a Secretary.

3. The President, Vice-Presidents, and Trustees, are elected for life, and are officially Members of the Committee. The other Members of the Committee will be chosen annually, at the General Meeting, in May, from among such of the ordinary Members as may then be resident in, or in the immediate neighbourhood of, London.

4. The Committee to consist of seven, of whom two shall go out annually by rotation.

5. At the Annual General Meeting, two Auditors (not Members of the Committee) to be appointed for examining and reporting on the accounts of the ensuing year.

CHAPTER IV.

DISTRIBUTION OF RELIEF.

1. The relief afforded by this Fund is to be in the form of Donation, and never in that of Annuity, even for a limited number of years.

2. The amount of relief to be afforded in each particular instance is to be judged of annually, and proportioned to the pec-

cular circumstances of the case, the extent of means of which the Society may be possessed, and the number of claimants.

3. Certificates of Claims to be sent in on or before the first of March in each year; in default of which no relief can be afforded by the Fund, except under the circumstances of peculiar urgency specified in Article 5, Chap. 5.

4. The distribution of relief will take place annually, at the General Meeting of Subscribers, in the month of May.

5. The amount of relief granted in each case by the Annual General Meeting, to be paid either in one sum, or by half-yearly or quarterly instalments, at the discretion of the Committee.

CHAPTER V. OF THE COMMITTEE.

1. The Committee, appointed as aforesaid (Chap. III), are to conduct the concerns of the Fund, subject, however, at all times, to the controul of the General Meeting.

2. The duty of the Committee is to inquire into the correctness of the Statements put forth in the respective Certificates of Claims; to report thereon in writing to the Annual General Meeting; and to recommend to the General Meeting, the amount of relief proper to be afforded in each case. It is the duty of the Committee also to see that the Donations, Subscriptions, and Legacies are funded, or otherwise applied, according to the present Regulations, or the Instructions of a General Meeting; to draw up Annual Reports of the state of the Fund; and, in general, to take such measures as may appear calculated to promote the interests of the Fund.

3. The Committee are to meet for these purposes on the first Thursday in January, April, July, and October, in each year, at two o'clock.

4. At all Meetings of the Committee, three constitute a quorum.

5. In cases of urgent and unforeseen distress, the Committee to have the power of issuing small sums on their own authority; provided always, that the total amount of the sums so appropriated does not in any one year exceed Ten Pounds.

6. The Chairman of the Committee has a casting vote, when the votes are equal, independent of his vote as a Member of the Committee.

7. The President, or any two of the Committee, to have the power of calling an extraordinary Meeting of the Committee, at any time, stating in the summons the object of the Meeting.

CHAPTER VI. OF THE SECRETARY.

1. The Secretary is to enter into a book, the names of all Donors and Subscribers, with the amount of the sums respectively paid by them, and the dates of such payment.

2. He is to attend all Meetings of the Committee, as well as all General Meetings, and to issue such summonses for the same, as may be requisite.

3. He will follow such instructions as he may receive from the Committee, and pay, on the 1st of every month, or oftener, into the Banker's hands, all monies received by him.

4. He will take receipts for all monies disbursed by him, and enter the same in a book, which is at all times to be open to the Members of the Committee and Auditors, for examination.

CHAPTER VII.

OF THE GENERAL MEETINGS.

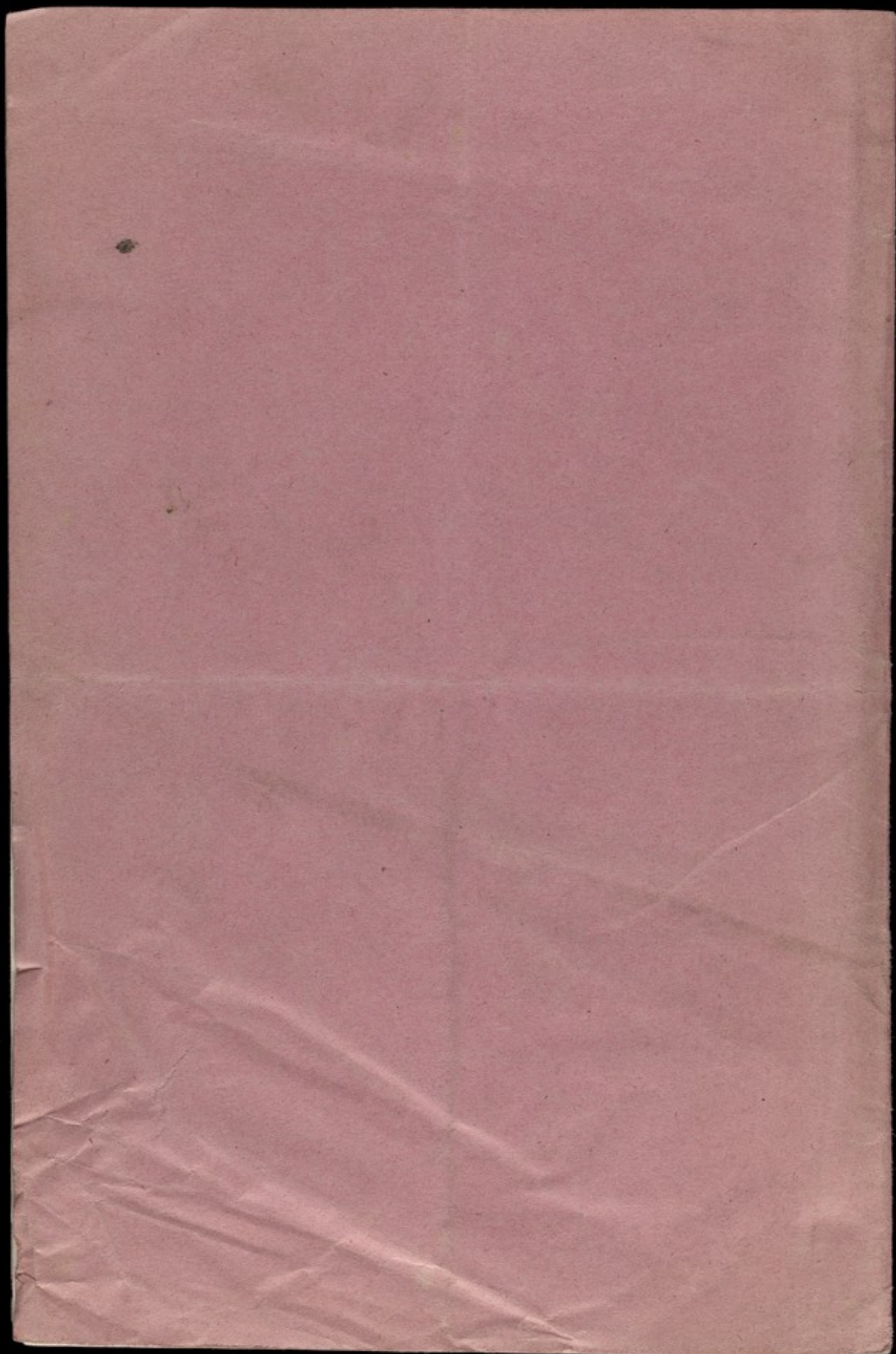
1. Due notice of the Annual General Meeting is to be given by the Committee, at least one month previous to its being held.
2. At this Meeting a full statement of the Income and Expenditure of the Society is to be submitted, together with the Report of the Auditors, and the recommendation of the Committee, both as to the number of applicants for relief, and the extent of aid to be afforded in each case. These the General Meeting will subsequently consider and determine upon.
3. A detailed Report of the Income and Expenditure of the Society, and of the proceedings of the General Meeting, together with a list of the Donors and Subscribers, and of the persons to whom relief has been awarded, to be afterwards printed for circulation.
4. At all General Meetings of the Subscribers to the Fund, a majority of the votes of those present is to determine the question, the Chairman having an additional or casting vote.
5. Gentlemen (not being Commissioned Officers of the Army) may be elected by the General Meeting as Honorary Members, on the recommendation of the Committee.

The Committee recommend to such Members of the Society as may be inclined to become Benefactors, by will, the following form:—

"I give and bequeath to the President, Vice-Presidents, Treasurer, and Members of the Society for the benefit of Orphans of Officers of the Medical Department of the Army, in Trust, the Sum of
"which I desire may be paid out of my personal Estate, and applied to
"the purposes of the said Society."

N.B.—Devises on Houses or Lands, or Money charged on Land, or to be laid out in Land, are void by the Statute of Mortmain.

All Communications regarding the Fund, to be addressed to the SECRETARY.—Donations and Subscriptions may be paid to C. R. M'GRIGOR, Esq., Banker, 17, Charles Street, St. James's, and to the SECRETARY.



ARMY MEDICAL OFFICERS' FRIENDLY SOCIETY.

REPORT

Of the Committee of Revision of the Army Medical Officers' Friendly Society, for the quinquennial period ending the 31st December, 1855.

IN presenting to the General Annual Meeting the following Report upon the present condition of the Society, and the extent of its liabilities, incurred and contingent, the Committee of Revision beg to state that they have not deemed it necessary to call in an Actuary, the copious tables drawn up by Mr. Neison at the last quinquennial investigation having enabled them to make all the necessary calculations. Being desirous of bringing clearly before the Members the progress of the Society during the past five years they have prepared the following detailed statement, containing all the information they have been able to collect, arranged under the three heads of I. Members: II. Money: III. Liabilities.

I.—MEMBERS..

The Members of the Society may be divided into three classes,—

- A.—The Widows in receipt of Annuities
- B.—The married Members.
- C.—The Unmarried Members.

A.—WIDOWS—ANNUITANTS.

The following Table shows at a glance the "movement" in this portion of the Society during the past five years.

Years.	No. placed on List.		No. who have died.	
	1st Class.	2nd Class.	1st Class.	2nd Class.
1851	1	1	2	2
1852	2	1	5	..
1853	7	1	5	..
1854	2	1	4	1
1855	5	2	5	1
	17	6	21	4

There have been no re-marriages during the period.

The number of Annuitants on the list on 1st January, 1856, was,

1st Class.....	84
2nd „	33
Total	<u>117</u>

As it is a point of much importance to the Society to know whether the mortality among the annuitants corresponds with that of the female population generally, at the same periods of life, or to what extent it differs, the following Table has been prepared from No. I. of Appendix, on the principles explained by Mr. Neison at page 14 of his Report. It shews the mortality among the widows in decennial periods of life, and the number of deaths which would have occurred among the same number of females in the general population, calculated from an average of ten years, (1843-52,) stated in the Registrar General's returns.

Ages.	Annuitants.		Deaths which would have occurred in the same Nos. living as the Annuitants.
	Years of Life.	Deaths.	
25-34	3	..	0.03
35-44	26	2	0.83
45-54	124	7	1.97
55-64	212	7	0.00
65-74	189	5	11.50
75-84	34	4	4.61
Total	588	25	24.44

From this Table it appears that while the mortality varies considerably from that of the general population at some of the decennial periods, the aggregate is a very small fraction higher. Mr. Neison, founding his deductions upon the results obtained in the investigation into the state of the Military Funds in India, estimated the deterioration of life and the chance of re-marriage to be equal to an addition of six years to the ages of the annuitants on the list. But this table shews the deterioration to have been scarcely perceptible, and there have been no re-marriages. It is true the data are not sufficiently extensive to justify very positive conclusions, but these results ought to make the Society cautious of estimating the value of the pensions upon a presumed duration of life shorter than the average of the general female population.

B.—MARRIED MEMBERS.

The changes among the married members during the five years under investigation have been as follows:—

Years.	New Members.		Ceased to be Married Members by				Ceased to be Married Members by Withdrawal.
	1st Class.	2nd Class.	Their own Deaths.		Their Wives' Deaths.		
			1st Class.	2nd Class.	1st Class.	2nd Class.	
1851	1	..	2	1	1	..	..
1852	5	1	3	1	3	..	1
1853	5	1	5	2	1	..	1
1854	7	..	3	1	4	..	..
1855	3	..	5	3	..	2	1
Total ...	21	2	18	8	9	2	3

Number of Married members on the list on 1st January, 1856,
1st Class 98
2nd „ 28
Total 126

The following Abstract, condensed from the Tables annexed to this Report, shews the ages at which the deaths of the Members and their wives respectively occurred, arranged in decennial periods.

Ages.	Married Members.		No. of Deaths which would have occurred in same Numbers of civil population.	Wives of Members.		No. of Deaths which would have occurred in the same numbers of females in the general population.
	Years of Life.	Deaths.		Years of Life.	Deaths.	
Under 25	..	..	..	46	..	39
25-34	73	1	73	153	1	143
35-44	141	1	181	110	1	140
45-54	78	6	144	160	..	255
55-64	219	6	6.97	157	4	445
65-74	143	9	9.62	59	4	359
75-84	40	3	5.92	9	1	122
Total	694	26	26.49	604	11	1523

The calculations of the mortality in civil life are made from Table XI. page 9 of the Fifteenth Report of the Registrar General, on the average deaths in ten years, 1843-52.

Thus it appears that the mortality among the married Members of the Society, has been almost exactly the same as that of an equal number of male persons in the United Kingdom similarly distributed as regards age, while the mortality of their wives has been lower than that of the female general population. The latter circumstance however, and the irregularity in some of the results, may probably arise from the limited number under observation. This objection would indeed apply to all the results and prevent our placing much reliance on them, had it not been that they correspond with those obtained by Mr. Neison from more extensive data.

C.—UNMARRIED MEMBERS.

During the past five years the changes among the unmarried Members of the Society have been as follows:—

Years.	New Members.		Reverted as Widowers.		Deaths in		Marriages in		Withdrawals from		Total.	
	1st Class.	2nd Class.	1st Class.	2nd Class.	1st Class.	2nd Class.	1st Class.	2nd Class.	1st Class.	2nd Class.	Increase.	Decrease.
1851	27	..	1	..	9	..	..	..	..	..	28	9
1852	3	..	1	..	7	1	4	1	7	..	4	21
1853	..	1	1	..	14	1	6	1	3	1	2	26
1854	2	1	..	1	11	1	7	..	3	1	4	23
1855	..	..	..	2	11	1	3	..	..	..	2	15
Total	32	2	3	3	52	4	20	2	13	3	40	94

This shows a remarkable decrease in the number of unmarried Members, and we have to lament that a large proportion of it has been caused by death. Independent of this, however, the cessation of new Members joining is a circumstance to be regretted. Although during the last two years the Department has been enormously increased, only three new Members have joined the Society. It is to be feared also that the number of withdrawals has been understated, for it appears that the rule regarding the removal of the names of all Members more than three years in arrear has not been rigidly carried out. Had this been done a still greater decrease would have been apparent. The following Table shows the ages at which the deaths among the unmarried Members took place and the extent of the mortality as compared with that of the male population of England at the same ages.

Ages.	Years of Life.	Deaths.	No. of Deaths which would have occurred in civil life.
20—24	31	1	25
25—34	605	20	604
35—44	401	21	516
45—54	112	5	220
55—64	98	5	312
65—74	45	..	303
75—84	33	2	488
Unknown	8	2	..
	1340	56	2468

Thus the mortality among the unmarried members of the Society has been more than double that in civil life, a result doubtless attributable to the unhealthy climates, to the influence of which they are exposed on foreign service. It is also higher than that shewn in Mr. Neison's Report, in the proportion of 54 to 34, but the rule as to striking off the names of members in arrear was not passed till 1851, and it is known that several defaulters were retained on the list at the period of his investigation who were then dead, although the fact of their deaths was not known till some time afterwards, and therefore could not be included in his calculations. With a view to obtain correct information as to the rate of mortality occurring among the members of the Society, it is very desirable that the Rule of 31st May, 1851, should be adhered to, and that the records relating to the unmarried members should, in future, be kept with the same care as those of the married.

II.—MONEY.

The next branch of the inquiry is that of the Receipts, the Expenditure, and the Funded Capital of the Society during the past five years. This is shewn at one glance in the following Abstract.

		1851.	1852.	1853.	1854.	1855.
INCOME.	Marriage Fees	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
	Subscriptions	1804 17 2	1618 6 0	1331 0 0	1285 17 3	2008 13 0
	Interest	2574 3 10	2903 19 0	2931 19 0	2709 7 7	2913 17 8
	Total	£4378 1 0	4521 19 0	4262 1 11	4004 5 0	4921 19 8
EXPENDITURE.	Annuitants	4084 1 2	4045 11 9	3855 16 8	4028 19 0	3930 18 4
	Expense of Management	118 19 9	146 4 1	154 1 7	154 18 10	204 5 7
	Extraordinary Expenses	..	748 1 6	..	..	..
	Total	£4202 0 11	4264 17 6	4009 17 10	4183 15 10	4135 19 1
FUNDED CAPITAL.	With Conty. for reduction of N. Debt	73,503 16 4	73,503 16 4	73,605 19 7	76,907 13 5	76,332 2 8
	New Account	..	148 16 0	943 19 0	397 16 0	350 4 1
	Total	£73,503 16 4	73,651 14 8	74,548 18 7	77,304 9 5	76,682 6 10

The Committee of Revision regret that it is their duty to call attention to certain unfavourable points connected with the finance of the Society, for this abstract shews a steadily diminishing income from Subscription, and a steadily increasing expenditure under the head of Management, while, during the past year, it has been necessary to trench upon the Funded Capital to meet the demands upon the Society. The diminution in the subscriptions has, in a great measure, arisen from the cessation of the supply of new unmarried members, the most profitable class to the Society, because, in receiving their subscription, no contingent liabilities are incurred as is the case with the married members. The question of the best mode of recruiting this class deserves the serious consideration of the Society.

III.—LIABILITIES.

It now remains for your Committee to shew what are the liabilities of the Society, incurred and contingent. Detailed tables on this head are annexed to the Report, from which the following results have been obtained. The incurred liabilities are the annuities of the existing widows, of which the present value is as follows:—

1st Class, 84 widows (the aggregate value of whose pensions at present is)	£35,819 0 0
2nd „ 33 „ „	7,024 15 7
Total 117	£42,843 15 7
Additional value in consideration of being payable half-yearly	1,004 18 9
Aggregate value	£43,848 14 4

These calculations are made on the supposition that the average duration of the lives of the widows is the same as that of the

general female population. If Mr. Neison's opinion be correct, that there is a deterioration, by impaired health and remarriage, equal to an advance of six years beyond the actual age, the liabilities, on account of their annuities, would only amount to £35,650, but in the preceding part of this Report your Committee have shewn reason why this opinion should be received with great caution. The contingent liabilities of the Society consist of the reversionary annuities to the wives of existing members upon the death of their husbands. The present value of these, calculated upon the table framed by Mr. Neison from the actual experience of the Society, is as follows:—

1st Class, 98 wives	{ the aggregate value of whose	£17,321 13 7
2nd „ 28 „	{ reversionary annuities is }	2,299 12 5
Total 126		£19,621 6 0

But against these liabilities must be set off the value of the future contributions of the husbands, which, as shewn in Table D, amount to,—

1st Class, £8113 4 7	£9,022 4 11
2nd „ 909 0 4	

From the preceding detail your Committee have drawn up the following statement of the present condition of the Society.

ASSETS.	On the 31st Dec., 1855, the Funded Property of the Society amounted to	£76,591 6 10
	The Present Value of the Future Contributions receivable from the married members on the Society's books at the same date was	9,022 4 11
	Total Assets, realised and otherwise	£85,613 11 9
LIABILITIES.	On the 31st Dec., 1855, the Present Value of the Annuities of the existing widows was	43,848 14 4
	And the Present Value of the Annuities to the wives of members was	19,621 6 0
	Total Liabilities, incurred and contingent	63,470 0 4
	Excess of Assets over Liabilities	£22,143 11 5

This statement shews an excess of Assets over Liabilities amounting to £22,000. But if Mr. Neison's opinion be adopted as to the diminished expectation of life of the widows, the present value of their annuities would be only £35,650 17s., and the excess would consequently amount to £30,341. Your Committee are of opinion, however, that it would not be safe to adopt the latter calculation. If the preceding statement be compared with that made by Mr. Neison in 1851, the excess of Assets will be found to have increased £8434 during the last five years; but it must not be lost sight of that this has arisen not from an addition to the realised property of the Society, for that has only been £2000, but from the depreciation in the value of the annuities, arising from the increased ages of the widows and wives. An addition of a number of young married members would reduce this balance very quickly.

The question now arises, would it be advisable from this large apparent balance in favour of the Society to increase the amount of the annuities granted to the widows, and, if so, to what extent?

An increase of £10 a year to the 1st Class and £5 a year to the 2nd Class Annuitants would involve an immediate additional expenditure of £1,005 per annum, and an increase in the present liabilities of the Society of £10,962 3s. 7d., and in the contingent liabilities of £4905 6s. 6d., making a total of £15,867 10s. 1d.

Your Committee are not prepared to recommend the immediate adoption of such a step for the following reasons:—

1. Because of the great falling off in the number of unmarried Members, while no new Members of that class are joining. Mr. Neison in his Report observes,—“No allowance has been made for the expenses of management. The liabilities must, therefore, be augmented in consideration of that circumstance, provided the hypothesis be adopted that no extraneous aid is derivable from the contributions of the unmarried.” Now, unfortunately, this hypothesis appears to be rapidly tending towards realisation, and it seems prudent to wait until it be ascertained whether this is likely to be a permanent feature in the constitution of the Society.

2. Because, owing to the high rate of mortality among the younger Members of the Society, resulting probably from their exposure to unhealthy climates, if any considerable number of married officers of that Class were to join,—an event by no means unlikely if the pension were increased,—an immediate decrease in the assets of the Society would take place by the amount of contingent liability thereby incurred.

3. Because already it has been necessary to draw upon the funded capital to meet current expenses; an additional expenditure of £1,000 a year would, therefore, soon reduce the capital to a point which would render it impossible to continue even the present rates.

4. Because, before taking such a step, it would be highly advisable to have “the elementary facts which bear upon the assets and liabilities of the Society, and its experience as connected with the

"mortality of the Members, their wives and widows," ascertained more accurately and recorded more perfectly. Your Committee cannot but express their regret that the judicious recommendation of Mr. Neison on this head has not been attended to, for they can truly adopt his concluding words, and say, that "the imperfect nature of the records of the Society made the inquiry still more perplexing and irksome in working out the details than it would otherwise have been."

Your Committee feel justified, however, in recommending that, in cases where the widow is ineligible to be placed upon the list of annuitants in consequence of the husband's death having taken place within the prescribed limit of five years, the Society should in future return to her, as a gratuity for her sole use and benefit, the amount of marriage fines and of such subscriptions as may have been paid subsequent to the marriage.

J. HARRINGTON,

Chairman.

Note.—It has not been considered necessary to print the Tables from which the various abstracts have been prepared, and to which reference is made in the Report as forming the Appendix. They are in possession of the Secretary and may be consulted by any Members who feel interested in the subject.

M4/5

J. Hall

Bye-Laws and Ordinances

OF

THE ROYAL

COLLEGE OF SURGEONS

OF ENGLAND.



PRINTED BY RICHARD AND JOHN E. TAYLOR,
RED LION COURT, FLEET STREET.

BYE-LAWS

AND

ORDINANCES.

SECT. I.

CANDIDATES FOR THE FELLOWSHIP.

1. THAT, except in the cases and instances hereinafter provided for to the contrary, every Candidate for the Fellowship, whether a Member of the College or not, shall produce Certificates satisfactory to the Court of Examiners,—

That he is twenty-five years of age.

That he is (if found qualified upon his examination) a fit and proper person to be admitted to the Fellowship, and the Certificate of which shall be signed by three Fellows.

B

That he has attained a competent knowledge of the Greek, Latin and French Languages, and of the Elements of Mathematics.

That he has been engaged for six years in the acquirement of professional knowledge in recognized Hospitals or Schools of Surgery and Medicine within the United Kingdom of Great Britain and Ireland, or in Foreign Countries; and that three of such years at least have been passed in one or more of such recognized Hospitals or Schools in London.

That he has attended the Surgical Practice of a recognized Hospital or Hospitals during four years, and the Medical Practice of a recognized Hospital or Hospitals for one year.

That he has studied Anatomy and Physiology by attendance on Lectures and Demonstrations and by Dissections, during three Winter Sessions of not less than six months each, at one or more recognized School or Schools.

That he has attended Lectures on the Theory and Practice of Medicine, and on Clinical Medicine, and also on the Theory and Practice of Surgery, and on Clinical Surgery, during two

Sessions of six months each, at one or more recognized School or Schools.

That he has attended one course of Lectures on each of the following subjects, viz. Chemistry, Materia Medica, Midwifery, Medical Jurisprudence, and Comparative Anatomy, at one or more recognized School or Schools. And, that he has served the office of House Surgeon or Dresser in a recognized Hospital in the United Kingdom. Every such Candidate (except in the cases and instances hereinafter provided for to the contrary) shall also present for examination Clinical Reports, with observations of six or more Surgical cases taken by himself at a recognized Hospital, or recognized Hospitals within the United Kingdom, with sufficient Certificates of their authenticity and genuineness, and shall leave such Reports at the College.

2. That the Council of the College shall annually, on some day in the month of July, publish in the London Gazette a List of all such Hospitals and Schools of Surgery and Medicine within the United Kingdom, and in Foreign Countries, as for the year commencing from the First day of

August then next ensuing, will be considered as having been recognized Hospitals and Schools, from which Certificates of the professional education of Candidates for the Fellowship will be received, and that such Hospitals and Schools, and no others, shall be, and be considered to have been during such year, recognized Hospitals or Schools within the meaning of these Bye-Laws and Ordinances accordingly.

3. That as to any Candidate, who shall have taken the Degree of Bachelor of Arts in an English University, and shall produce satisfactory evidence thereof, it shall, instead of the Certificate or Certificates that he has been engaged for six years in the acquirement of the professional knowledge as before mentioned, be sufficient for him to produce a satisfactory Certificate or Certificates that he has been engaged for five years in the acquirement of professional knowledge in recognized Hospitals and Schools of Surgery and Medicine within the United Kingdom, or in Foreign Countries, and that three of such years at least have been passed in one or more of the recognized Hospitals and Schools of London :

and that it shall not be necessary for any Candidate having so taken the Degree of Bachelor of Arts to produce any Certificate of his having acquired a competent knowledge of the Greek, Latin and French Languages, and of the Elements of Mathematics.

4. That upon the first day of January, one thousand eight hundred and fifty, or at any earlier period which may be thought proper, the Council shall, under such regulations and for such time or period as to them shall seem proper, (but always subject to removal at the pleasure of the Council,) appoint three persons, and being, or not being, and either all, or in part, Members of the College, as the Council shall think proper, for the purpose of examining persons intending to become Candidates for the Fellowship, and required to be examined in the Greek, Latin and French Languages, and in the Elements of Mathematics : and the said Council, from time to time after the first appointment of such persons for such purpose as aforesaid, and as often as shall be necessary, or to the said Council shall seem proper in that behalf, shall

appoint such other person and persons as to them shall seem fit and proper to succeed or supply the place or places of any person or persons previously appointed for such purpose, and that from and after the first appointment of any such persons for the purpose of making such examination as aforesaid, no Certificate of a Candidate having competent knowledge of the Greek, Latin and French Languages, and of the Elements of Mathematics, shall be received or allowed by the Court of Examiners, except the Certificate or Certificates of the persons for the time being so appointed as aforesaid.

5. That all Members of the College, future as well as present, shall be entitled to be admitted to the examination for the Fellowship according to the foregoing Bye-Laws and Ordinances.

6. That any person who shall have been a Member of the College on the fourteenth day of September, one thousand eight hundred and forty-four, shall, after the expiration of eight years from the date of his diploma, also be entitled to be admitted to the examination for the Fellowship upon the production of a Certificate

signed by three Fellows that he has been eight years in the practice of the Profession of Surgery, and that he is a fit and proper person to be admitted a Fellow, if upon examination he shall be found qualified.

7. That any person who shall have become a Member of the College after the said fourteenth day of September, one thousand eight hundred and forty-four, shall, after the expiration of twelve years from the date of the Diploma, also be entitled to be admitted to the examination for the Fellowship upon the production of a Certificate signed by three Fellows that he has been for twelve years in the practice of the profession of Surgery, and that he is a fit and proper person to be admitted a Fellow, if upon examination he shall be found qualified; and also, if he have not taken the Degree of Bachelor of Arts in an English University, of a Certificate or Certificates that he has a competent knowledge of the Greek, Latin and French Languages, and of the Elements of Mathematics.

SECT. II.

EXAMINATION OF CANDIDATES FOR
THE FELLOWSHIP.

1. The Examination for the Fellowship shall be held three times in the year, at or within such periods as the Council shall from time to time determine.
2. Each Candidate shall be Examined on two days, either successive or at such an interval as the Court of Examiners may appoint.
3. The subjects of the first day's Examination shall be Anatomy and Physiology, those of the second, Pathology, Therapeutics and Surgery.
4. The time allowed for Examination each day shall be from ten o'clock in the forenoon until five o'clock in the afternoon.
5. The Examinations shall be conducted in the following manner. Each Candidate shall, upon going in for Examination, have delivered to him a written or printed copy of such questions as shall have been previously determined upon by the Court of Examiners, and to which questions

he shall give written answers, and which answers shall be considered by the Court of Examiners.

The Court may, however, if they should think fit, interrogate any Candidate on any matters connected with the questions or answers. In the Anatomical Examination the Candidate shall also perform dissections and operations on the dead body in the presence of the Court of Examiners, or of such Members thereof as may be deputed by the Court to superintend the same. Candidates whose qualification shall be found insufficient shall not be allowed to present themselves a second time until after the expiration of one year from their First Examination. The Court of Examiners shall report in writing to the Council the names of such persons as they shall have found upon examination to be qualified for the Fellowship.

SECT. III.

ADMISSION OF FELLOWS.

1. The Council shall direct Diplomas of Fellowship to be issued to such persons as the

Court of Examiners shall from time to time report to have been found qualified for the same.

2. Every Member of the College shall, prior to his admission as a Fellow, make and subscribe his name to the following Declaration, viz.—

"I, A. B., of C., Member of the Royal College of Surgeons of England, do solemnly and sincerely declare that while a Fellow of the said College, I will observe the Bye-Laws and Ordinances thereof relating to the Fellowship, and will obey every lawful summons issued by order of the Council of the said College, having no reasonable excuse to the contrary: And I make this solemn declaration by virtue of the provisions of an Act passed in the sixth year of the Reign of His late Majesty King William the Fourth, intituled, An Act to repeal an Act of the present Session of Parliament, intituled An Act for the more effectual Abolition of Oaths and Affirmations taken and made in various departments of the State, and to substitute Declarations in lieu thereof, and for the more entire suppression of voluntary and extra-judicial oaths

and affidavits, and to make other provisions for the abolition of unnecessary Oaths."

3. Every Member of the College shall, prior to his admission as a Fellow, subscribe his name to a Copy of the Bye-Laws and Ordinances relating to the Fellowship in testimony of having engaged himself to the observance thereof.

4. Every Member of the College, prior to his admission as a Fellow, shall pay the sum of Ten Guineas over and besides all charges for stamps.

5. Every person not being previously a Member of the College shall, prior to his admission as a Fellow, make and subscribe his name to the following Declaration, viz.—

"I, A. B., of C., do solemnly and sincerely declare, that while a Fellow or Member of the Royal College of Surgeons of England, I will observe the Bye-Laws and Ordinances thereof, and will obey every lawful summons issued by the Council of the said College, having no reasonable excuse to the contrary, and will to the utmost of my power maintain the dignity and welfare of the College. And I make this solemn declaration by virtue of the provisions of an Act passed in the

sixth year of the reign of His late Majesty King William the Fourth, intituled An Act to repeal an Act of the present Session of Parliament, intituled An Act for the more effectual abolition of oaths and affirmations taken and made in various departments of the State, and to substitute Declarations in lieu thereof, and for the more entire suppression of voluntary and extra-judicial oaths and affidavits, and to make other provisions for the abolition of unnecessary Oaths."

6. Every person not being previously a Member of the College shall, prior to his admission as a Fellow, subscribe his name to a Copy of the Bye-Laws and Ordinances relating to the Fellowship, and also to a Copy of the Bye-Laws and Ordinances relating to the Members of the College.

7. Every person not being previously a Member of the College shall, prior to his admission as a Fellow, pay the sum of Thirty Guineas over and besides all charges for stamps.

8. The Diploma of a Fellow shall be in the form following, or in such other form as the Council may from time to time direct:—

"Know all Men, by these Presents, That Mr. A. B., of C., is hereby admitted a Fellow of the Royal College of Surgeons of England. Dated this Day of , in the Year of our Lord 18 .
No. "

9. That besides the Common Seal of the College being affixed to the Diploma of every Fellow, the same shall be signed by the President and Vice-Presidents.

10. When more than one Member of the College shall be admitted to the Fellowship at the same time, the Diplomas shall be granted and numbered according to the priority of the dates of their respective Diplomas as Members; and should a person not previously a Member be admitted a Fellow at the same time as a Member or Members, the Diploma or Diplomas of the latter shall take the precedence.

SECT. IV.

That all the foregoing Bye-Laws and Ordinances shall be without prejudice to the power

of the Council within one year from the date of the new Charter to appoint Fellows, as authorized and provided by such new Charter.

SECT. V.

ELECTION OF MEMBERS OF COUNCIL.

1. Notice of the place and time appointed for every Meeting of the Fellows, for the Election of Members or a Member of the Council, shall be given to the Fellows by advertisement in the London Gazette, and in two London Daily Newspapers, at least fourteen, and not more than twenty-one days, before the day of Election.

2. That at every such Meeting, the Chairman having declared the business of the day, the Secretary of the College, or person acting for him, shall proceed to announce to the Meeting the names of the Fellows, as directed by the Charter; and that in order to entitle any Fellow to be balloted for as a Member of the Council, he shall, upon his name being so announced to the Meeting, be nominated in writing by three Fellows, such nomination to be delivered in to

the Chairman by such nominating Fellows, or one of them, and to contain a Certificate in writing, signed by such three Fellows, testifying on their personal knowledge that the person so nominated does not practise, and has not at any time, during the five preceding years, practised Midwifery or Pharmacy, and that he then resides, and *bona fide* practises his profession of a Surgeon within five miles, by highway or road, from the General Post Office in St. Martin's le Grand, and that he is a fit and proper person to be a Member of the Council of the Royal College of Surgeons of England.

3. That at the Meetings at which there shall be more than one Member of the Council to be elected, no Ballot shall be taken until the number of Fellows nominated in manner aforesaid shall be equal to the number of Members of Council to be elected.

4. That upon such nomination, as aforesaid, of any Fellow when there shall be only one Member of Council to be elected, and upon such nominations, as aforesaid, of a number of Fellows equal to the number of Members of Council to be

elected, when there shall be more than one such Member to be elected, the Chairman shall cause a Ballot or Ballots for such nominated Fellow or Fellows to be forthwith taken, and such Ballot or Ballots, as the case may be, shall be kept open for two hours, unless for the space of ten minutes after notice from the Chairman of his intention to close such Ballot or Ballots, no Fellow shall actually ballot, in which case the Chairman shall declare such Ballot or Ballots to be closed, although the two hours may not have expired; and at the expiration of such two hours, or upon such previous closing of the Ballot or Ballots, as the case may be, the Box or Boxes shall be opened by the Chairman, who shall thereupon declare whether such nominated Fellow or Fellows respectively have been elected or not.

5. That should any Fellow or Fellows so balloted for not be elected, the proceedings of the Meeting shall be continued, in manner aforesaid, until the vacancy, or until all the existing vacancies, if more than one, in the Council shall be filled up.

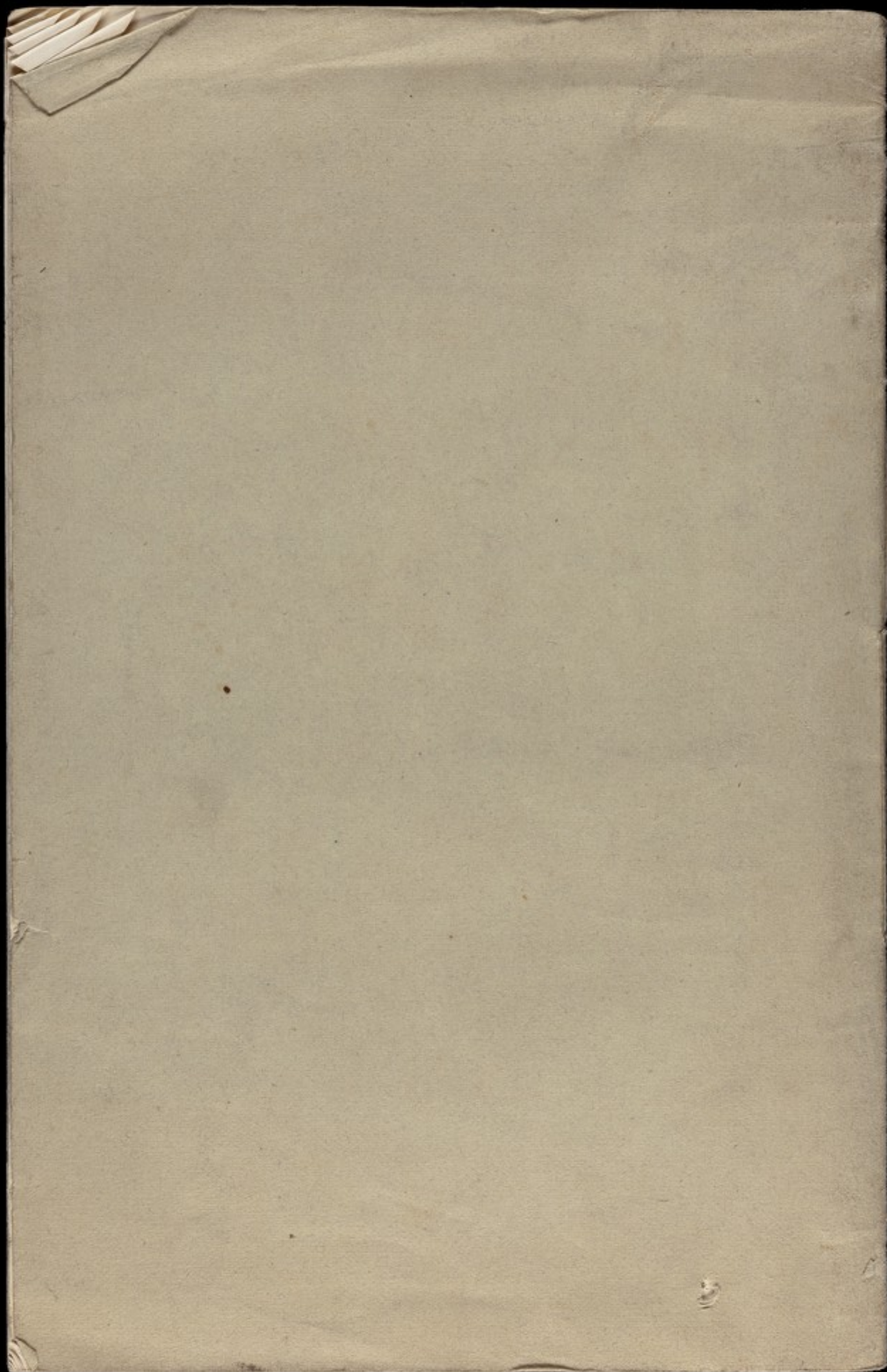
6. That an eligible Fellow whose name, on its

being announced to any Meeting as aforesaid, shall have been passed by for want of such Nomination and Certificate as aforesaid, or who shall upon a Ballot not have been elected into the Council, shall be eligible on a second occasion, provided notice of an intention to propose him, signed by not less than six Fellows, shall be transmitted to the President and Council, at the Hall of the said College, at least one month previous to the day on which the annual election of Members of the Council next after the passing by or non-election of such Fellow shall be held, and in the notice to the Fellows of such Election such intended special nomination shall be stated: Provided always, that before any such eligible Fellow shall be passed by for want of such Nomination and Certificate, as aforesaid, his name shall be announced to the Meeting a second time.

7. That the sum of Twenty Guineas, payable by every Member of the Council prior to admission, shall be payable upon his first admission only.

SECT. VI.

That all such, or such parts of the existing Bye-Laws and Ordinances of the College as are inconsistent with the above Bye-Laws and Ordinances, or any of them, or with the new Charter granted to the College, or any of the provisions thereof, shall be and the same are accordingly hereby repealed and abrogated; but in all other respects, *mutatis mutandis*, such existing Bye-Laws and Ordinances shall continue in force.



M4/6

REGULATIONS
OF THE
MEDICAL AND PHYSICAL SOCIETY OF BOMBAY.
M. DCCC. XLVIII.

Objects.

- I. The encouragement of the cultivation of Medical Science and its collateral branches by discussion at periodical meetings, and by the publication of original communications.

Constitution.

- II. The Society is composed of Ordinary, Corresponding, and Honorary Members.

Ordinary Members.

III. Under the head of Ordinary Members are to be classed all who contribute to the funds of the Society, and all who are admitted in accordance with Regulation VII.

IV. All Medical men residing in India who can produce certificates of a regular medical education, are eligible as Ordinary Members.

V. Medical Officers of Her Majesty's or the Hon'ble Company's Service, are elected ordinary members of the Society on application by letter addressed to the Secretary.

VI. Qualified Medical Practitioners not belonging to Her Majesty's or the Hon'ble Company's Service, are elected by ballot at the ordinary meetings of the Society, and a majority of three fourths of the members present is necessary to secure the election.

VII. Assistant Surgeons on first entering the Bombay Medical Service are considered ordinary members of the Society, free of the payment of admission fee and annual subscription, and continue so for a period of two years, after which, should they not intimate their wish to be considered ordinary members by payment of the regulated admission fee and annual subscription, they are considered to have withdrawn from the Society.

Payments.

VIII. Ordinary members to pay an admission fee of Rs. 5, and an annual subscription of Rs. 12, payable in advance in the month of January of each year.

IX. Ordinary members absent from India, are not chargeable with subscriptions for the period of their absence.

X. Ordinary members neglecting to pay their annual subscription, for two successive years, are considered to have withdrawn from the Society, and are liable to have their names erased from the list of members, under a resolution passed to that effect, at an ordinary meeting of the Society.

Corresponding Members.

XI. Ordinary members on retiring from service in India, on being proposed and seconded at an ordinary meeting of the Society, are eligible by ballot, as Corresponding Members. A majority of four fifths of the members present is necessary to secure their election.

Honorary Members.

XII. Medical men of celebrity not residing in India are eligible as Honorary Members. On being proposed, and seconded at an ordinary meeting of the Society, they may be elected at the next meeting by the unanimous consent of the members present.

Election of Office-Bearers.

XIII. The Committee of Management of the Society consists of eight members, elected annually from among the ordinary members resident in Bombay by the general vote of the ordinary members residing under the Government of Bombay.

XIV. The voting lists are circulated in the first week of November of each year, and the result of the election is declared at the next ordinary meeting of the Society.

XV. In the event of vacancies occurring in the Committee between the periods of election, such vacancies to be filled up in rotation, by the individuals who commanded the number of votes next to those of the members returned at the last election.

XVI. A President, and two Vice-Presidents of the Society, are elected annually from among the members of the Committee of Management, by the members of the Society present at the ordinary meeting at which the annual election of the Committee is declared.

XVII. The Secretary of the Society is elected biennially from among the ordinary members resident in Bombay at the ordinary meeting held in the month of January of alternate years, or, on the occurrence of a vacancy, at any other ordinary meeting of the Society.

Committee of Management.

XVIII. The Committee of Management have the general direction of the affairs of the Society, and decide on what communications are to be published in the Transactions of the Society. They keep minutes of all their proceedings which are entered into the minute-book of the Society and read at the following ordinary meeting.

XIX. When questions of importance to the stability and interests of the Society arise, such shall be submitted by the Committee for decision to the ordinary members residing under the Government of Bombay. The majority of votes necessary to decide any questions, to be determined according to its importance, and fixed at the time, by the Committee.

XX. It shall form part of the duty of the Committee to give due consideration to all suggestions offered by members of the Society.

President and Vice-Presidents.

XXI. The President shall take the chair and conduct the business at all meetings of the Society.

XXII. In the absence of the President one of the Vice-Presidents shall take the chair, and conduct the business of the meeting; and in case neither be present, the senior member at the meeting shall preside.

Secretary.

XXIII. The Secretary is a member of the Committee of management *ex-officio*.

XXIV. It shall be his duty to enter into the minute-book of the Society, minutes of the proceedings of all meetings and transactions of the Society, and in communication with the Committee of Management to conduct the details of business and carry on the correspondence of the Society.

XXV. The Secretary shall prepare an annual statement of the receipts and disbursements of the Society, to be laid before the ordinary meeting in the month of January of each year.

XXVI. To enable the Secretary to perform these duties, a suitable establishment is entertained under the sanction of the Committee of Management, confirmed at an ordinary meeting of the Society.

Meetings.

XXVII. Ordinary Meetings of the Society are held in Bombay on the first Saturday of every month.

XXVIII. The chair being taken, the order of business shall be as follows :—

1. The Minutes of the last meeting, and those of subsequent Committee meetings to be read and confirmed.
2. The announcement and election of new members in accordance with Regulations V, VI and VII.
3. The election of Corresponding and Honorary Members.
4. The reading of letters, and the discussion of any ordinary business of the Society which may be before the meeting.
5. The announcement of presents and donations.
6. That of papers and dissertations received since the last meeting.

XXIX. After the announcement of the papers and dissertations, the President shall call upon the Secretary to read one or more of them, and shall subsequently invite the members to discuss any particular part of them which they may consider deserving of remark.

XXX. No new business shall be introduced until that which is before the meeting, has been concluded.

Papers and Dissertations.

XXXI. All papers and dissertations presented to the Society to be considered the property of the Society.

XXXII. The Transactions of the Society are published by the Secretary in communication with the Committee as often as circumstances will admit.

XXXIII. A copy of each publication is presented to the Honorary and Corresponding Members of the Society, and to every Ordinary Member, who at the time of publication is a contributor to the funds of the Society.

N. B. The Medical Board has kindly permitted that letters and communications on the business of the Society, to the address of the Secretary to the Society, may be transmitted *under cover* to the Secretary to the Medical Board. In this manner they will pass free of postage, but not otherwise.

Members are requested to pay the amount of their subscriptions to Messrs. Leckie, and Co. the Society's Agents.

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JOHN WILLIAM PARKER, 445, WEST STRAND.

HALF-A-CROWN.

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QUARTERLY JOURNAL
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SEPTEMBER, 1844.

Contributions to Vital Statistics, obtained by means of a Pneumatic Apparatus for valuing the Respiratory Powers with relation to Health. By JOHN HUTCHINSON, Esq., Surgeon, F.R.S.

[Read before the Statistical Society of London, June 17th, 1844.]

It is in the present day there is one subject pre-eminently engaging the public mind, it appears to be, the best means of preserving the public health. And if any one among the various divisions of that subject can be ranked before another on the score of utility, it should seem to be, that regarding the effects produced on individual health by particular occupations.

The earliest original contribution to this branch of knowledge which has come under my notice, is that by Ramazzini, of Padua, published in English in 1705, and which much redounds to the credit of the author. The only other book of which I am aware, is that written in the present time by our countryman Thackrah, whose labour in this cause has far surpassed that of all others. Many journals have bestowed praise on this author, but it appears to me they have all come short of the commendation which is due to his industry and accuracy.

It is generally the custom to estimate the healthiness of a trade by the mortality among the individuals employed in it; but, however correct this system may be, it is an expensive method of coming to the conclusion; since, in this way, we do not count the effect of a certain trade upon health until so many per cent. have fallen victims to it. Deducting from these a given number of cases as uncertain, this *fatal* list is still of little value until compared with other fatal lists. The object of the present paper is to make known some researches, the result of which induces me to venture a new method of determining the effect of trades upon health, by ascertaining the *presence* of disease, and the extent of deterioration in the health of a living individual.

The pathologist, in the present day, not only weighs and measures the dead subject as a whole, but carefully weighs every internal organ, and often ascertains the cubic measurement of the heart also, that he may inform himself as to the seat of disease. Here we see that *measurement* is made one of his guides in thus inquiring into the seat of disease; for after he has determined by numerous observations the natural weight or dimensions of an organ, he justly concludes that all similar organs, if differing from this standard, differ so on account of disease. Such is the grand harmony of our structure, that proportion and symmetry are as much displayed amidst the internal organs as in the external form.

And again, the physician, when inquiring into the state of his patient,

desires to know whether the natural secreting organs are acting in excess or in deficiency, and upon this he grounds his opinion as to the healthiness of the particular organs. Every organ, then, has its appropriate action, which cannot be altered to any material amount without the presence of disease; and surely this argument applies with some force to an organ whose action is of such vital importance that its suspension for a very brief period terminates our life. I mean, the "respiratory functions," the investigation of the different states of which in various conditions of life forms the subject of the present paper.

With the instruments I have constructed, and which are now before the Society, I have measured the volume of air that a man can force out of his chest, together with his power of inspiration and expiration; these observations I have connected with the state of his health, because I find this to vary according to his volume and power of expiration and inspiration.

Simple as this method appears to be, it is extraordinary that up to this time very few have been the physical experiments made upon the lungs, so as to determine with any accuracy even their absolute capacity; and we are perfectly ignorant as to how much air is necessary for our well-being; nevertheless, this knowledge is perfectly accessible, and the present observations will assist in forming that chain of inquiry.

Physiologists generally divide respiration into three or four different stages, and these again will admit of numerous subdivisions.

My object has been, first of all, to determine what quantity of air we are able to expel from the lungs by the greatest voluntary effort we are capable of exercising. Owing to the various terms used to designate the different divisions of respiration, I have found it difficult to separate this division from the chaos of physical experiments hitherto made upon the lungs. And what I have gathered from them is of little value, not being connected with any other observations upon the human frame. Another object of my inquiry has been, to determine the power of the inspiratory and expiratory muscles; so that observations upon the volume of the lungs, and the power of these two classes of muscles, form the foundation of the present research, combined with certain external measurements.

I may here mention that, for brevity's sake, I have used the term "capacity" to signify that quantity of air which an individual can force out of his chest by the greatest voluntary expiration, after the greatest voluntary inspiration.

With these introductory remarks, I now proceed to the matter of this paper.

One thousand one hundred and fifty-one individuals, of different occupations, have been carefully examined; and, by Table C, now suspended before the Society, the various classes, also the numbers composing these classes, are thus arranged:—

TABLE C.	
Sailors	121
Fire Brigade	82
Police, Metropolitan	144
Police, Thames	76
Paupers	129
Mixed Class (Artisans)	162
First Battalion Grenadier Guards	57
Royal Horse Guards (Blue)	59
Pugilists, &c.	24
Anomalous cases	3
Pressmen	39
Compositors	43
Draymen	20
Gentlemen	98
Diseased cases	60
Miscellaneous cases	13
Total	1,151

I must here pause a moment to express my thanks to certain gentlemen, who with the greatest liberality and politeness have rendered me every assistance in their power to obtain these cases, and any other facility I might require towards my object: viz., Mr. Farr; Dr. Balfour; Surgeon-Major Johnston, and Assistant Surgeon Mr. Hurthwaite, of the first battalion Grenadier Guards; Mr. Golliver, of the Royal Horse Guards; Mr. Fisher, for the police force; Dr. Boyd, for the paupers in the Marylebone infirmary; Captain Bazalgette, for the sailors; Mr. Braidwood, who twice summoned his whole brigade force for my examination; Mr. Taylor, for the printers; Dr. Taylor and Dr. Williams for the diseased cases; also to Mr. Tibson; and last, though not least, for the liberal assistance of Mr. Brent, whose acquaintance with the physical proportions of man I believe to surpass that of all other men in Europe.

Each of these 1151 individuals was submitted to the observations given in Table B, here suspended, viz.:

Number of cubic inches given by a full expiration.	} Height.
Power of inspiration.	
Power of expiration.	
Height.	
Circumference of the chest over the nipples.	} Height.
Weight.	
Pulse.	
Number of respirations per minute.	
Age.	} Height.
Temperature of the air expired into the receiver.	

The detailed accounts of these observations upon this multitude are given in full in the MS. table, where it will be seen that upwards of 10,000 facts have been gathered together.

Each individual breathed three times into the machine, because, either from timidity or inexperience, the first observation was frequently not a correct experiment, but by three observations it is possible to ascertain the point exactly. But if more observations than three be made at the same time, the number of cubic inches of air will, from fatigue, be found to decrease. Moreover, so constant is the quantity of air in the lungs, that I have frequently examined men 18 months or two years afterwards, and have never found a variation exceeding two cubic inches: and although I have blown into this instrument not less than 2000 times, I cannot exceed 247 cubic inches at 60°. The operator in a little time becomes so well acquainted with the process of taking an observation, that he can readily tell when the individual under examination has done his utmost, and also determine the correctness of the experiment. The time required to pass a person through the whole of these observations, is three minutes.

A minute description of the mechanical construction of the two principal instruments, I have already read before the Society of Arts (29th May); therefore I will not detain the present meeting upon this branch of the subject; different sections of the instruments are represented by diagrams here exhibited, and may be referred to if required. Yet I may briefly state that the three observations, viz., those of the capacity, power of inspiration, and power of expiration, are determined by two instru-

ments:—the capacity by the large brass machine, now before the Society; the power of the two classes of muscles by the other instrument on the right. The breathing machine is principally constructed as an ordinary gasometer, one vessel inverted within the other; the outer cylinder contains water, the inner receives the breath, by which it is elevated, assisted by counterbalance weights. This receiver is graduated into cubic inches; therefore to whatever height the receiver is raised by the breath, the cubic inches are determined. Fig. 1* is a front section of this instrument with the receiver partly elevated. Fig. 2 is a ground plan of the same. Figures 4 and 5 are lateral sections of the same. The instrument for valuing the respiratory power is represented by Fig. 6; the resistance is a column of mercury in a tube which, upon being elevated or depressed, moves the index on the dial, which is divided into inches and tenths, with certain words differing in meaning, fixed opposite certain figures, their position having been determined by 1200 experiments. The words and figures are given on Table A; on the left side are the figures for *inspiratory* power; on the right those for *expiratory* power.

Power of Inspiratory Muscles. Inches.		Power of Expiratory Muscles. Inches.
1.5 . . . Weak		2.0
2.0 . . . Ordinary		2.5
2.5 . . . Strong		3.5
3.5 . . . Very Strong		4.5
4.5 . . . Remarkable		5.8
5.5 . . . Very Remarkable		7.0
6.0 . . . Extraordinary		8.5
7.0 . . . Very Extraordinary		10.0

It will be observed that the power of expiration is nearly one third stronger than that of inspiration. This power is taken by the nostrils; I first used the mouth; but the tongue and cheeks possessing a strength six or seven times greater than that of the true inspiratory muscles, and the difficulty of separating these two powers, compelled me to make all the experiments by the nostrils.

The order of taking the observations enumerated on Table B was as follows. The hand of the person to be examined was placed over the abdomen, in the sitting posture; the pulse was numbered, and also the respirations per minute; this twofold operation was kept secret from the individual, or the number of his respirations would have been modified. I next took his height, weight, and circumference of his chest; then three forced and full expirations were made into the spirometer; and, lastly, his power of inspiration and of expiration was tested. I cannot here give time to explain how errors may be detected; they sometimes arise from simple mistake; sometimes from an intention to deceive; but with a little skill on the part of the operator, no deception can be successfully practised. When the two experiments, upon the inspiratory and expiratory muscles, are properly made, there is a peculiar look in the eyes and over the whole countenance. There is not the least danger to be apprehended in this operation. I have found nothing injurious occur, out of 1200 persons submitted to this test, including the diseased cases.

The whole matter of the present research may be divided into the

* All the "Figures" thus referred to, are coloured diagrams exhibited before the Society, but not here introduced.

consideration, first of the healthy cases, and secondly of the diseased cases.

It will be self-evident that until a healthy standard be determined, I have no means of detecting by measurement the inroads made upon the organs by disease: therefore I have collected as many classes of men as possible, and submitted them carefully to the test of these instruments; and I believe that I have made experiments enough to point out what is the healthy standard, and hence to deduce what may be considered as an indication of disease.

My first object was, to discover whether any relation existed between this capacity of the lungs, inspiratory and expiratory power, and any other external and physical sign; therefore I submitted the whole number of subjects to all the observations enumerated in Table B (page 195), and to my gratification I did discover a relation intimately existing between this capacity and power, and the height of the individual, as I have indicated by the bracket on that table. I shall demonstrate most clearly to this Society, that so uniform is this relation, that if I be allowed to take a man's height, I can tell what the capacity of his lungs, and his inspiratory and expiratory powers, should be, to constitute him a healthy individual.

Therefore, as height can with ease be definitely determined, and is less changeable than any other of the physical observations taken, we have at all times a simple method of ascertaining the presence of disease, first in the chest, and secondly in the head and abdomen, or trunk, of the body.

These two tables, C and B, admit of numerous interesting calculations, many of which have been gone through, and remarks will be made upon them as may be required.

The first grand point I wish especially to draw attention to, is the capacity of the lungs of what may be considered healthy individuals. Let us turn to Diag. 1, where I have drawn fourteen perpendicular lines, which are to indicate different heights: the first line on the left is to indicate all heights up to and including 5 feet: the second line includes all from 5 feet to and including 5 feet 1 inch; the next, from 5 feet 1 inch to and including 5 feet 2 inches; and so on, increasing inch by inch, up to 6 feet: all above 6 feet come under 6 feet 4. The horizontal line or curve indicates the capacity or quantity of air that 1088 individuals manifested by this "breath-meter," the difference of quantity being denoted by the elevation or depression of this curve, as it passes over the perpendicular lines. The number of cases examined under each height is given in the bottom row of figures, a point most necessary to be acquainted with, as that stamps the value of the curve as it passes over the lines for indicating heights. The row of figures above this, are the number of cubic inches obtained from the mean of so many cases as are marked in the bottom row of figures: thus, under the height 5 feet 8 inches, 172 persons have blown, and the mean of these men will be seen as 220 cubic inches: 32 of these men out of 172 were below 200 cubic inches, the rest above; so that I expect every man between 5 feet 7 inches and 5 feet 8 inches, if healthy, to blow out of his lungs about 220 cubic inches of air at 60°; but if he cannot throw out of his lungs more than 185 cubic inches, I should most decidedly suspect disease to be present; and again, if a 6 foot man,

whose capacity is marked as 255 cubic inches, could only blow 200 or 220, the healthy mark for the 5 foot 8 man, I should in like manner suspect disease. The exceptions to be made, are for *very stout and corpulent* individuals, whose capacity I find to stand the lowest. Very fat men of any stature, therefore, may blow 40 or 50 cubic inches less than the mean, and yet not be diseased in the chest. It simply requires more observations upon the corpulent than I have had an opportunity of making, to determine their capacity. So beautifully regular is the increasing capacity with the height, that the curve on Diag. 1 is nearly a perfect ascending line; and I have no doubt that if I had examined twice the number, the line would have been elevated to a perfect arithmetical progression. In confirmation of this, I will call the attention of the Society to the following table, *singularly gratifying* to me, and which I feel fully to reward my labour in working out this subject.

The three columns of figures exhibit the relation between height and "capacity." The first column contains the various heights between 5 feet and 6 feet; the second column, the series of cubic inches derived from observation under each height; and the third column, the series of cubic inches in arithmetical progression: thus—

Heights.		Series derived from Observation.		Series in Arithmetical Progression.	
Fe.	In.	Fe.	In.	Cubic Inches.	Cubic Inches.
5	0	5	1	175.0	174.
5	2	5	3	188.5	190.
5	4	5	5	206.	206.
5	6	5	7	222.	222.
5	8	5	9	237.5	238.
5	10	5	11	254.5	254.
6	0				

Hence I deduce a rule, viz. that "FOR EVERY INCH OF HEIGHT (FROM 5 FEET TO 6) 8 ADDITIONAL CUBIC INCHES OF AIR AT 60° ARE GIVEN OUT BY A FORCED EXPIRATION." Here at once is a guide for the operator, and a rule given that will enable us to compare men of different stature and different trades one with another, which may be done by referring to a table (I., page 207), where the mean capacity from whence I deduced this rule will be seen, and any comparison among thirteen classes of men may be made. In the preceding table, the similarity is remarkable between the second and third columns: if we mark out the unit figures in each, the numbers become, with one exception only, quite the same; and where this exception occurs, viz. at 5 feet 3 inches, 188.5 instead of 190, the number of persons here examined are so few compared with the numbers examined under the heights following, that this may account for the trifling difference here apparent.

The mechanical act of respiration depends essentially upon increasing the cavity of the thorax; this is accomplished principally by flattening

the arched floor of the chest (the diaphragm). It is attempted to illustrate this by Fig. 7.* C is the space allotted to the organs of respiration; the black outline is to represent the chest filled to its maximum with air after the deepest inspiration; the black line E may be considered as the floor or diaphragm; the inner and red line is to represent the chest after a forced and full expiration has been made, when, it will be observed, the arch of the diaphragm E is considerably increased, and the red line G is considerably depressed. Thus we may liken the act of respiration to the operation of a pair of common bellows. It follows, that the space existing between the red and black line, marked B B, is measured by the spirometer; hence it is certain that whatsoever disease impedes this mobility of the walls and floor of the chest, the amount of impediment will be manifested by this machine; moreover, it is *self-evident*, that as the lungs are the sole receptacle for the air we breathe, whatever disease there may be which affects their permeability for air, it will be manifested by the spirometer; and I believe that no disease can be detected in the chest that will not be found attended by a change in the bulk of air in the lungs.

If this be granted, how important is it to examine the capacity, as an adjunct to the other means of detecting disease amidst these vital organs.

I will now draw attention to the observations I have made upon diseased cases, which confirm me in this last assertion. On Diag. 1, I compare the diseased with the healthy cases. The upper line is the same as already noticed, to which is affixed the word "good." The lower line contains the diseased cases. The difference between the two classes is very marked, and must forcibly impress us that this method of detection deserves the most attentive consideration.

I am sorry that the number of diseased cases is so small: but this even speaks more favourably for the distinction between the healthy and diseased cases; for had there been more cases, the curved line would have been much less curved; whereas, with few cases, one disturbing observation is clearly seen. We here see that the mean capacity of the diseased scarcely exceeds one half of that of the healthy, if it be so much.

The full particulars of the diseased cases have been taken down in the table of observations; amongst which there will be seen 20 cases of consumption in various stages. There are 12 cases in the earliest stage of this disease. I shall here give the capacity of these as observed, compared with the mean of the healthy cases of the same stature.

Early Stage of Consumption.

Capacity of Diseased. Cubic Inches.	Capacity of Healthy. Cubic Inches.
113	220
165	173
128	220
169	193
160	204
136	219
115	173
130	204
120	219
140	246
110	220
135	204

* Exhibited before the Society.

In the more advanced stage of the disease, the difference is much more considerable: thus,—

Advanced Stage of Consumption.	
Capacity of Diseased. Cubic Inches.	Capacity of Healthy. Cubic Inches.
59	135
89	224
108	254
72	135
80	229
75	254
34.5	246
18	183

It is truly interesting to remark the broad difference here exhibited.

Not only does disease in the chest limit the natural capacity; but also an enlargement of any of the visceral organs, acting so as to prevent the arch of the diaphragm freely alternating in its curve. A moderate meal reduces the "capacity" from 4 to 6 cubic inches, and a plentiful dinner from 9 to 14 inches, according to the powers of the individual at table. The capacity of those who suffer from curvature of the spine is most remarkably small. One person was so low as 27 cubic inches, being the utmost quantity he could throw out of his chest by one full expiration.

The greatest capacity I have ever observed was that of Freeman and Randall, both measuring upwards of 6 feet 11½ inches. Freeman's capacity was 432 cubic inches, and Randall's 464 cubic inches. The lowest healthy capacity I have examined is that of Robertson, height 3 feet 9 inches, being 80 cubic inches. And it is worthy of mention that when, by arithmetical process, we reduce the capacity of Randall the giant in exact proportion to the difference of bulk between him and Robertson the dwarf, we bring it down to 79.56 cubic inches, which is within half an inch of the actual quantity blown by the latter.

The capacity of all the classes examined may be compared by referring to a table here suspended. (See Table I., p. 207.)

The relation between the capacity of the lungs and circumference of the chest appears as yet so feeble, that it is no guide to me.

I have combined this calculation of circumference and capacity, which will be seen amongst the other tables handed round; where it may be observed, that the mean of 11 men of 5 feet 8 inches, whose chests measure 35 inches in circumference, has a capacity of 235 cubic inches; while that of 10 men of the same height, whose chests are 38 inches, is only 226, being 9 cubic inches less. I may here mention, that it was in consequence of so often witnessing tall, narrow-chested men blowing so much more than broad-chested men, that I was induced to combine the height of the individual with the capacity. The only parallel remark I have seen in physiological writers upon respiration is that by Müller, who says (1st ed., vol. i., page 294)—"Herbst found that adults of large stature, when breathing tranquilly, inspired and expired from 20 to 25 cubic inches; persons of smaller stature 16 or 18 cubic inches."

I must now pass on to the other *grand* series of observations, upon the "power" of the inspiratory and expiratory muscles of the healthy in different classes, and of the diseased.

By the power of inspiration and expiration, I mean the greatest

effort that can be employed by all those muscles used in performing that function; and it will be found that if this observation be connected with the "capacity," we possess a *sure method* of detecting disease in the most important part of the human frame. The instrument with the dial face is that with which the observations have been made.

The resistance afforded to test these muscles was that of mercury; and according to the inches elevated by the respiratory muscles, in proportion was the index hand moved opposite certain figures, by which figures I denominate a certain power either of inspiration or expiration, so that, according to the value of the figure, such is the relative power required to elevate the index to that figure. Hence the resistance is perfectly the same, whether we draw out of or blow into this tube, and must therefore measure the relative difference between inspiration and expiration. By a comparison of these efforts in different classes, I estimate the health of men employed in different trades, as will be shown. Certain words are affixed to these figures, as exhibited on Table A. (page 190); the figures on the right side denote the powers of inspiration; those on the left, those of expiration. It will be observed that the figures on the right are much higher than those on the left, because the power of expiration is greater than the power of inspiration: thus a "remarkable" inspiration is rated at 4.5 inches, while the corresponding expiration is 5.8 inches.

These words are engraved on the dial, and are so fixed according to the result of 1100 observations. Diag. 2 is given to illustrate, upon the same principle as Diag. 1, the power of inspiration of 13 different classes; the perpendicular lines indicate the gradation of heights from 5 feet to 6 feet. The direction of the black curve marks the power of these 13 different classes; it will be seen to ascend gradually up to 5 feet 9 inches, from thence as gradually to descend; therefore the power of all these classes is greatest at 5 feet 9 inches. This line must not be taken as the true line of health. The line which I mark immediately above it is the one I term the "standard of health," because this dotted line is calculated from four classes of men, selected by surgeons as healthy, viz. Firemen, Metropolitan Police, Thames Police, and Royal Horse Guards (Blue).^{*} In this standard line, the men of 5 feet 7 inches elevate 3.07 inches of mercury; and those of 5 feet 8 inches, 2.96 (nearly 3 inches); whereas in the black line, the course of the mixed multitude, the men of 5 feet 7 inches and 5 feet 8 inches elevate only 2.63; and the 5 feet 9 inches men, 2.75. This depression of the black curve is in consequence of the weakness of the paupers, the gentlemen, the mixed class, and the printers, being here included. According to the dotted line, the most powerful men are found at the height of between 5 feet 7 inches and 5 feet 8 inches.

For the convenience of the members present, I have reduced the height between 5 feet and 6 feet into four divisions, with the powers of inspiration and expiration of all the 13 classes, so that any combination of comparison between the different bodies of men may be made. (For the complete table see page 208.) The conclusion to be drawn as to inspiratory power is, that a man of 5 feet 7 inches or 5 feet 8 inches, if healthy, should elevate 3 inches of mercury. The gentlemen, we may observe, stand very much below this mark, at only 2.15 inches; so

^{*} Their powers are given in Table II. (p. 208-9), as the "mean of four healthiest classes."

that I am compelled to call a gentleman a *tolerably good* gentleman of the middle stature, who can elevate 2.5 inches by his inspiratory muscles; but it is curious to remark, that at 5 feet 9 inches, 5 feet 10 inches, and 5 feet 11 inches, they stand better than the Thames police, and nearly as good as the fire brigade—the two best classes of men which have been submitted to this test. It will be seen that in this table the Grenadier Guards stand very high between 5 feet 3 inches and 5 feet 6 inches; but it must be observed, there are only four examined under this height; and the fact of their being *sifters*, whose vocation is the constant use of the respiratory muscles, causes this class to stand high at this particular height.

Let us now turn to Diag. 2, where the expiratory power is compared with the inspiratory power. The upper black curve is the expiratory power of the 13 classes; the broken highest line is the expiratory power of the four healthiest classes. There will be seen a vast difference between these two classes of muscles, which must be interesting to the physiologist. Here is exhibited the result of upwards of 1000 cases, which demonstrate that expiration is about one-third stronger than inspiration. And moreover, I confidently affirm that wherever the expiratory muscles are not stronger than the inspiratory muscles, disease is the cause of such variation.

The test upon the expiratory muscles peculiarly tries the abdominal viscera. I have frequently detected hernia (rupture) by this means: but where persons have a hernia, well supported by a truss, and have no fear, they may pass detection; this, however, has seldom occurred during the observations I have made. I have often detected those who are subject to severe head-aches and fits by these means, and frequently rupture of the drum of the ear. It is also worthy of remark, that I have found rupture of the drum of the ear manifested only in one direction; hence the expiratory force may detect it, and not the inspiratory; or the contrary may occur. Sometimes the rupture is detected by both experiments, but this is rare. I mentioned this fact to Mr. Gulliver, who said it perfectly corresponded with what he was induced to believe through other means.

I may cite a case in point, of a strong drayman, whose power of expiration naturally was manifested at .55 of an inch; but when, at my request, he stopped his ears with his fingers, his expiratory power was increased to 5.50 inches; while his inspiratory power in both cases, *i. e.* with his ears open or shut, remained at 3.70. When I thus found his expiratory power nearly 10 times less than his inspiratory, it was evident that something was disordered.

This, together with other facts, may be seen upon referring to the manuscript table of diseased cases, which I here hand round to the members.

The crossed line at the termination of the expiratory curve (Diag. 2.) marks the direction the cases would take were the Horse Guards omitted. These men being enlisted under the superintendence of Mr. Gulliver, the curve exhibits the skill of selection, mounting considerably at its termination. Had I not examined this regiment, I should, from past experience, have considered 6 feet men much weaker; I do not believe any other regiment of 6 feet men to possess such power. The inspiratory power of twelve 6 feet men in the first battalion Grenadier Guards

was only 1.92 inches, while that of 31 of the same height of the Blues was 2.71 inches.

I am induced to believe that the test upon the inspiratory muscles is a sure guide to the state of a man's health. The expiratory muscles, owing to a man's vocation, may be trained to an enormous extent, as I noticed in the *sifters*. I have remarked the same in jewellers, who use the blow-pipe much. Therefore, when a man's occupation is such as to call these muscles much into use, we must rate his expiratory power at a higher figure. I shall show this shortly by the tables here suspended.

We have seen the *capacity* of the lungs in the healthy and diseased cases compared; now I will exhibit, by Diag. 3, the like comparison of the *inspiratory power* between the same.

The upper line to which is affixed the word *good*, is the same noticed as the lower broken line in Diag. 2; the lower black line is the curve of the diseased. The weakness induced by disease in the trunk of the body is here as *broadly* indicated as that of the capacity, being about one-half: had the cases been more numerous, this curve would have been more regular, and I believe lower than it appears at present; therefore the few cases test the comparison the better. When we combine the capacity and power together, there is a certain harmony which must pervade the three observations, *provided* the individual is *healthy*. Hence, I venture to say, the instruments for estimating *capacity* and *power* will clearly test the presence of disease.

I shall now pass on to exhibit the effect of occupations upon the inspiratory power: as I believe the inspiratory power to indicate the state of the general health, the comparison will be interesting; and if it be found to agree with what other observers have mentioned, this will prove its correctness also.

Diag. 4 shows the comparison of four classes—the pugilists, the Thames police, the paupers, and the gentlemen. The black continuous line at the bottom is the path of the gentlemen; the next above, that of the paupers; it will be seen, these two classes struggle in company up to 5 feet 9 inches, from which point that of the gentlemen rapidly ascends.

The waved line represents the Thames police, a remarkably fine class of men. The sudden fall, observed at 5 feet 10 inches, and 5 feet 11 inches, is owing to the comparatively small number examined at this height. A slight cold in the head (as it is termed) of one individual, may have occasioned this.

Above all these are the pugilists, without exception the finest class of men I have examined: in fact we may consider each man of this class as a series of men; for we know not how many fall down the ladder of their fame, before they arrive at that step where I examined these. I may mention, it was not a little difficult for me to examine these people; since the correctness of the observation depends upon the air passage in the nostrils being free, and I have not unfrequently found that passage impeded by the consequences of their professional engagements: I therefore had recourse to testing with the mouth, a method always liable to error, from the power of the cheeks and tongue interfering.

According to the elevation of these lines I estimate the vital powers. I here exhibit a similar table of comparison between the standard line

of health, and that of the paupers. How far poor-house diet may be connected with this lowering of the line, I must leave for others to determine. Age, doubtless, must be taken into account; but, it appears to me, not until after fifty.

In Diag. 5, I compare three very unhealthy classes with the standard line. The continuous line at the bottom, represents the compositors, the very worst men I have examined; they even stand below the paupers, except at the heights of 5 feet 8 inches and 5 feet 9 inches. The broken line are the pressmen, a better class of men altogether, with the exception of one dip between 5 feet 8 inches and 5 feet 9 inches, but this was caused by one solitary instance, and that was at the height of 5 feet 9 inches. Nearly between these two classes will be seen the waved line indicating the course of the artisans, a very poor set of men. The double line is the standard line, above all.

Numerous other comparisons of the inspiratory powers may be made between different classes, by referring to the table (II. p. 208). I shall now pass on to the expiratory power.

Diag. 6, gives the expiratory power, and exhibits by the bottom line the diseased cases: the dotted line above that, is the curve for the gentlemen; the double line above, is for the paupers; and these two, for the most part, are closely mingled together, up to 5 feet 10 inches. It cannot be said that the paupers here are the worst. The broken line above that, are the sailors; and above them, again, the crossed line are the Thames police.

As an illustration of employment increasing the expiratory power over the inspiratory, I would just refer to the table (II. p. 208), wherein the inspiratory power of the Thames police, and that of the Metropolitan, appear as nearly equal as possible; but if we look at another of these tables, we see the expiratory power of the Thames police greatly exceeding that of the Metropolitan police. This minute distinction of power between these two classes is very satisfactory, exhibiting that the one class of men use their upper extremities more than the other. The Metropolitan, policeman deters the thief by the activity of his lower extremities; the Thames policeman, by that of his upper extremities.

Many other interesting combinations might be made from the 10,000 facts I have gathered: thus, for instance, we see, the prevalent weight of the 1151 individuals, is from 10½ to 11 stone; the next in frequency, 12 stone; the next, 12½ stone; the next, 9½ stone; the next, 13 stone; the next, 13½ and 14 stone; and the last, 7½ and 15 stone.

Table V. (p. 212) shows the number of ordinary respirations per minute, observed when in the sitting posture. It will be seen that the greatest number of individuals breathe 20 times a minute; next to this, is 16 times per minute; then, 24; these, it will be seen, are the prevailing numbers; the lowest was 9 respirations, and the highest 40 respirations, per minute. It is worthy of mention that by this table the respirations appear more generally an even number of times per minute than otherwise.

Table VI. (same page) exhibits in like manner the beats or pulsations of the heart per minute: 80 is the prevailing number; next to this, 84; next, 100; next, 92, &c.: the lowest pulsation was 48, and the highest 180, per minute. These were all taken in the sitting posture. Care was taken never to note the pulse when excited by physical ex-

ertion; but if by any other stimulant through the medium of the mind, then it was taken exactly as it appeared. I believe it always best in statistical research, to note the cases, whatever they may be, exactly as they present themselves, and not to wait until the case comes to what we wish it to be. That we may be kept steady in a research, we must note and believe what we see—not see what we believe. By these two last tables the prevailing numbers run as four beats of the heart to one respiration.

In another table* I illustrate the circumference of the chest, both of the total numbers examined, and of the several classes, by distinguishing colours. The figures at the left hand, are to signify the increasing dimensions of the chest, from above downwards, increasing by half inches; the length of the lateral lines, is to represent the different numbers under each of these measurements of the chest. It will first be seen that 37-inch chest is the prevailing size; next to this, 35-inch; and in detail it will be seen that the colouring indicates the measurement of the different classes. Thus K, the gentlemen, measure from 34 to 35 inches as their average; A, the sailors, from 37 to 37½ inches in circumference; the fire brigade, B, from 38 to 39½ inches; C, the metropolitan police, from 34 to 36 inches, and at 37 are most numerous; D, the paupers, are mostly placed between 31 and 34 inches; E, the artisans, are most numerous from 30 to 36 inches; and so on.

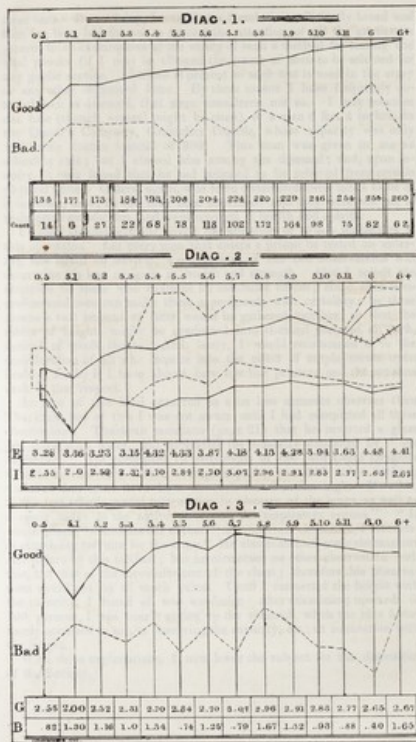
I must next turn to another diagram,* which, on the same plan, exhibits the heights; and as the relation between height, capacity, and power, is shown to be so close, a table of heights will almost give us a table of power also. The prevailing heights are 5 feet 8 inches and 5 feet 9 inches. B, the firemen, are well selected, principally measuring from 5 feet 6 inches to 5 feet 9 inches. The Metropolitan police are a taller set of men, therefore of less physical strength. On the other hand, D, the paupers, are low of stature, ranging chiefly between 5 feet 2 inches and 5 feet 6 inches. L, are the Horse Guards, which do not commence until all the rest have nearly disappeared, *i. e.* at 6 feet; they terminate at the indefinite height of 6 feet 4-.

I now draw the attention of the members to a table (IV., page 210) of the capacity compared with weight. Where height and weight correspond, there will be found a relation between weight and capacity; but, as height and weight do not always correspond, the disturbing cases of fat men here account for the relation between weight and capacity of the lungs appearing feeble. I shall in future distinguish the weight of the corpulent and spare individuals, to determine this point more clearly.

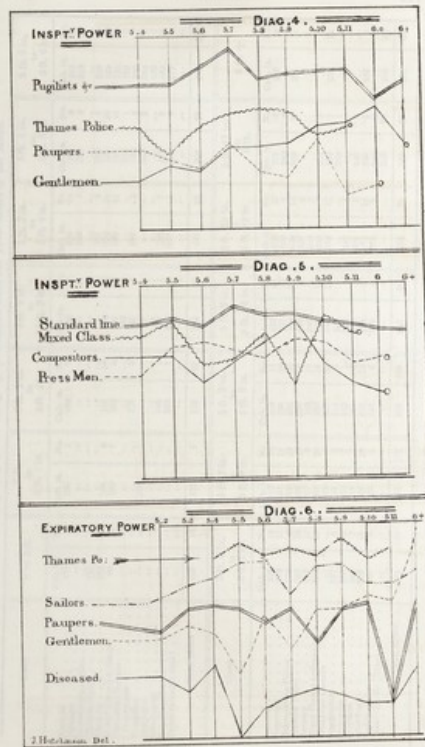
With these remarks I conclude the subject of the tables, which still contain a vast quantity of matter not even hinted at, and no less valuable than what has been touched upon.

The tables of calculations which afforded me the matter for the diagrams here exhibited, may all be examined; not one case that I ever observed has been kept back, nor has one fictitious case been added. During the time of my research I examined every person I could possibly obtain, from the scavenger, the hawker, or the street mountebank, up to the affluent gentleman: all were requested to submit themselves to

* Exhibited before the Society.



2 Green Lathes 140 Hertz 25. 3000 R.p.m.



2 Green Lathes 140 Hertz 25. 3000 R.p.m.

TABLE II.—The Mean Power of Inspiration and Expiration of all the Cases presenting the ordinary

Class.	0 to 5 ft.			5 ft. to 5 ft. 1 in.			5 ft. 1 in. to 5 ft. 2 in.		
	Insp.	Exp.	No.	Insp.	Exp.	No.	Insp.	Exp.	No.
Seamen	3-17	3-44	5	2-20	2-60	1	2-03	3-48	7
Firemen	..	..	..	..	..	..	..	..	..
Metropolitan Police	..	..	..	..	..	..	..	..	..
Thames Police	2-55	3-28	1	..	..	..	..	..	..
Mixed Class	3-00	3-74	1	2-00	3-36	1	2-52	3-25	5
Grenadier Guards	..	..	..	..	..	..	..	..	..
Pugilists, &c.	..	..	..	..	..	..	3-80	4-75	1
Draymen	..	..	..	..	..	..	1-50	2-80	1
Gentlemen	..	..	..	..	..	..	..	..	..
Horse Guards (Blue)	..	..	..	..	..	..	..	..	..
Total Mean	2-90	3-48	7	2-00	2-98	2	2-46	3-57	14
Mean of Diseased Cases	0-82	1-37	5	1-30	3-00	1	1-16	2-14	4
Mean of four Healthiest Classes	2-53	3-28	1	..	..	..	..	..	..

Class.	5 ft. 6 in. to 5 ft. 7 in.			5 ft. 7 in. to 5 ft. 8 in.			5 ft. 8 in. to 5 ft. 9 in.		
	Insp.	Exp.	No.	Insp.	Exp.	No.	Insp.	Exp.	No.
Seamen	2-63	3-56	15	2-87	4-15	14	3-11	4-19	9
Firemen	3-17	3-95	15	3-02	4-09	15	3-08	4-50	18
Metropolitan Police	3-07	4-05	4	2-89	4-07	39	2-81	4-10	46
Thames Police	2-97	4-44	16	3-08	4-31	16	3-05	4-66	11
Mixed Class	2-31	3-38	21	2-16	3-17	27	2-46	3-50	17
Grenadier Guards	..	..	..	2-68	3-83	8	2-94	3-89	19
Pugilists, &c.	4-20	6-42	2	3-65	4-61	2	3-70	4-84	1
Draymen	2-80	3-55	1	2-73	4-39	3	2-37	4-16	3
Gentlemen	2-35	2-62	12	2-35	3-30	16	2-40	3-30	16
Horse Guards (Blue)	..	..	..	..	..	..	..	..	..
Total Mean	2-93	3-99	86	2-82	4-12	140	2-88	4-12	140
Mean of Diseased Cases	0-79	1-70	4	1-67	1-88	7	1-32	1-78	8
Mean of four Healthiest Classes	3-07	4-18	33	2-96	4-13	70	2-91	4-28	75

examined in 10 different Classes, without any separation for disease; thus Average of Health or Power.

5 ft. 2 in. to 5 ft. 3 in.			5 ft. 3 in. to 5 ft. 4 in.			5 ft. 4 in. to 5 ft. 5 in.			5 ft. 5 in. to 5 ft. 6 in.		
Insp.	Exp.	No.	Insp.	Exp.	No.	Insp.	Exp.	No.	Insp.	Exp.	No.
2-40	3-74	1	2-48	3-89	9	2-68	4-23	8	2-84	4-25	15
..	..	..	2-70	4-51	2	2-21	3-82	3	2-80	3-84	19
..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	2-70	4-26	6	3-05	4-50	9	2-58	4-34	9
2-31	3-15	5	1-85	2-69	17	2-30	3-05	18	2-40	3-37	16
4-50	5-36	1	..	..	..	4-50	5-10	1	2-70	2-90	2
2-40	2-41	2	3-50	3-74	1	3-53	5-29	3	3-86	4-75	3
..	..	..	..	..	..	..	..	..	1-30	1-70	1
2-55	3-00	1	1-77	2-92	6	2-01	2-10	7	1-94	3-21	11
..	..	..	..	..	..	..	..	..	..	..	..
2-83	3-53	10	2-50	3-66	41	2-89	4-01	49	2-55	3-54	76
1-00	1-81	4	1-34	2-30	4	0-74	1-00	1	1-25	1-52	9
..	..	..	2-70	4-32	8	2-84	4-33	12	2-70	3-87	29

5 ft. 9 in. to 5 ft. 10 in.			5 ft. 10 in. to 5 ft. 11 in.			5 ft. 11 in. to 6 ft.			6 ft. to 6 ft. 1 in.		
Insp.	Exp.	No.	Insp.	Exp.	No.	Insp.	Exp.	No.	Insp.	Exp.	No.
2-66	3-84	18	2-41	3-86	12	2-61	4-15	6	2-00	4-00	1
2-69	3-33	5	2-40	3-74	1	3-65	6-81	2	2-10	2-80	1
2-92	4-00	23	2-78	3-41	12	2-33	3-23	12	2-75	3-77	8
2-54	4-27	5	2-78	4-45	3	..	..	..	..	..	..
2-41	3-67	15	2-07	2-45	7	2-14	3-08	11	2-77	4-10	2
2-23	3-49	18	2-56	3-76	11	1-92	3-17	12	2-46	3-82	14
3-78	4-38	2	3-77	4-89	4	3-25	4-93	2	3-52	4-64	2
4-50	5-43	3	3-21	4-30	6	2-02	3-13	2	3-15	5-00	1
2-74	3-59	7	2-84	3-49	12	3-12	4-94	5	2-38	3-70	4
..	..	..	..	..	..	2-71	4-84	31	2-68	4-66	27
2-94	4-00	96	2-72	3-81	68	2-68	4-29	83	2-64	4-05	60
0-93	1-60	3	0-88	1-59	3	0-40	2-25	1	1-65	4-02	1
2-83	3-94	33	2-77	3-63	16	2-65	4-48	45	2-67	4-41	36

TABLE III.—Mean of the Respiratory Power of the

Class.	0 to 5 ft.			5 ft. to 5 ft. 1 in.			5 ft. 1 in. to 5 ft. 2 in.		
	Insp.	Exp.	No.	Insp.	Exp.	No.	Insp.	Exp.	No.
Paupers, Mean . .	1.79	2.45	7	1.46	1.93	3	2.52	2.96	9
Compositors, Mean .	..	..	..	..	..	..	2.32	2.96	3
Pressmen, Mean . .	..	..	..	2.20	5.00	1	..	..	..
Total Mean of Mean of Printers . . .	..	..	..	2.20	5.00	1	2.32	2.96	3

Class.	5 ft. 6 in. to 5 ft. 7 in.			5 ft. 7 in. to 5 ft. 8 in.			5 ft. 8 in. to 5 ft. 9 in.		
	Insp.	Exp.	No.	Insp.	Exp.	No.	Insp.	Exp.	No.
Paupers, Mean . .	2.45	3.33	10	1.96	2.71	8	1.87	3.33	9
Compositors, Mean .	2.05	3.10	5	2.43	3.22	7	2.83	3.41	8
Pressmen, Mean . .	2.10	2.95	3	2.62	3.58	8	1.65	2.05	1
Total Mean of Mean of Printers . . .	2.07	3.02	8	2.02	3.40	15	2.24	2.73	9

TABLE IV.—The Mean capacity of the Chest,

Class.	7 to 7½		7½ to 8		8 to 8½		8½ to 9		9 to 9½		9½ to 10		10 to 10½		10½ to 11	
	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Seamen . . .	208	8	132	1	196	4	203	2	206	11	232	7	234	26		
Firemen . . .	..	..	..	..	..	..	..	..	206	2	199	4	213	5		
Metropolitan Police .	..	..	..	..	..	..	..	..	199	5	212	10	227	24		
Thames Police . . .	..	..	..	..	..	..	..	..	158	1	209	4	208	5	240	11
Paupers . . .	..	..	173	2	178	8	163	14	141	14	176	27	192	19		
Mixed Class (Artisans) .	164	1	160	6	173	8	199	11	202	23	199	25	220	19		
Grenadier Guards . .	..	..	..	..	..	..	186	2	..	..	209	4	234	4		
Regiment . . .	..	..	..	..	..	..	211	2	198	1	..	211	2	195	1	
Pressmen . . .	..	..	..	..	..	..	199	5	210	1	194	5	213	7		
Compositors . . .	..	..	..	..	..	..	174	7	206	5	185	6	227	6		
Draymen . . .	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
Horse Guards (Blue) .	..	..	..	..	..	..	..	..	..	..	..	..	..	230	1	
Gentlemen . . .	149	1	171	3	184	3	193	4	192	11	199	10	220	16		
Total Mean . . .	173	10	159	12	186	32	189	47	196	76	202	105	220	139		

Paupers and the Printers, (Compositors and Pressmen).

5 ft. 2 in. to 5 ft. 3 in.			5 ft. 3 in. to 5 ft. 4 in.			5 ft. 4 in. to 5 ft. 5 in.			5 ft. 5 in. to 5 ft. 6 in.		
Insp.	Exp.	No.	Insp.	Exp.	No.	Insp.	Exp.	No.	Insp.	Exp.	No.
2.68	3.30	10	2.30	3.38	21	2.17	3.30	20	1.93	3.13	19
1.65	2.52	1	2.13	3.23	5	2.17	2.91	4	1.65	2.85	7
3.35	4.20	1	..	..	..	2.81	4.17	3	2.04	3.27	8
2.50	3.36	2	2.13	3.23	5	2.49	3.54	7	1.84	3.06	15

5 ft. 9 in. to 5 ft. 10 in.			5 ft. 10 in. to 5 ft. 11 in.			5 ft. 11 in. to 6 ft.			6 ft. +		
Insp.	Exp.	No.	Insp.	Exp.	No.	Insp.	Exp.	No.	Insp.	Exp.	No.
2.55	3.46	1	1.47	1.67	2	1.61	3.70	4	..	..	..
2.00	2.39	2	..	..	..	1.50	1.91	1	..	..	..
2.95	3.93	3	2.62	3.72	2	..	..	..	..	..	..
2.47	3.16	5	2.62	3.72	2	1.50	1.91	1	..	..	..

compared with the Weight of the Body (stone of 14 lb.).

10½ to 11	11 to 11½		11½ to 12		12 to 12½		12½ to 13		13 to 13½		13½ to 14		14 to 14½		14½ to 15	
No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
228	15	257	20	235	9	254	8	271	5	290	1	205	1	..	..	..
226	11	235	11	226	18	223	10	219	7	233	3	212	5	224	1	570
236	23	237	29	244	23	255	18	248	8	284	3	237	2	..	..	..
234	23	245	11	236	9	198	3	196	4	..	..	258	2	203	1	212
178	12	183	10	210	7	176	5	..	..	174	3	..	..	256	1	..
217	20	233	10	249	14	237	8	269	6	227	3	226	6	237	1	..
222	11	234	8	247	19	241	18	251	10	267	4	228	2	307	1	..
260	1	225	3	265	3	..	..	297	2	279	3	194	2	190	1	..
216	8	237	3	..	..	..	..	186	1	..	..	..	..	..	..	..
226	5	207	3	230	2	212	1	216	1	219	1	..	..	..	..	..
..	..	192	1	234	4	236	3	254	5	..	..	272	2	227	2	231
238	1	262	5	261	8	267	13	260	10	286	6	252	7	273	6	318
224	17	228	14	218	4	246	4	233	8	224	4	237	3	202	2	220
225	147	228	128	239	120	231	91	245	66	242	33	233	32	246	16	310

TABLE V.—Number of Respirations per Minute, observed when in the Sitting Posture, in 1,086 Cases considered to be Healthy.

No. of Res- pirations per Min.	No. of Cases.	No. of Res- pirations per Min.	No. of Cases.	No. of Res- pirations per Min.	No. of Cases.	No. of Res- pirations per Min.	No. of Cases.
9	1	18	81	27	2	36	1
10	2	19	11	28	26	37	..
11	1	20	384	29	2	38	..
12	16	21	31	30	5	39	..
13	10	22	67	31	..	40	1
14	12	23	11	32	6		
15	9	24	133	33	..		
16	157	25	15	34	1		
17	71	26	4	35	..		
						Total	1,086

TABLE VI.—Number of Pulsations per Minute, taken in the Sitting Posture, in 1,086 Cases considered to be Healthy.

Pulse per Min.	No. of Cases.	Pulse per Min.	No. of Cases.	Pulse per Min.	No. of Cases.	Pulse per Min.	No. of Cases.
48	1	69	3	87	1	108	9
52	1	70	14	88	71	110	1
53	2	72	74	89	15	112	15
56	2	73	50	90	19	113	3
57	2	74	2	92	66	116	10
58	1	75	2	93	2	118	2
59	1	76	72	94	3	120	16
60	22	78	12	95	9	124	2
61	1	79	2	96	47	128	2
62	3	80	226	97	1	130	1
64	15	81	..	98	2	132	1
65	2	82	6	100	163	133	1
66	6	84	118	102	2	140	1
67	2	85	1	104	27	144	1
68	3	86	4	106	1	180	1

Pulse per Min.	No. of Cases.	Pulse per Min.	No. of Cases.	Pulse per Min.	No. of Cases.
48	1	53	62	68	3
52	1	56	69	73	3
58	2	63	74	79	4
59	1	67	75	86	1
61	1	70	76	87	1
65	2	72	77	88	1
66	6	73	78	89	1
67	2	74	79	90	1
68	3	75	80	91	1
		76	81	92	1
		77	82	93	1
		78	83	94	1
		79	84	95	1
		80	85	96	1
		81	86	97	1
		82	87	98	1
		83	88	99	1
		84	89	100	1
		85	90	101	1
		86	91	102	1
		87	92	103	1
		88	93	104	1
		89	94	105	1
		90	95	106	1
		91	96	107	1
		92	97	108	1
		93	98	109	1
		94	99	110	1
		95	100	111	1
		96	101	112	1
		97	102	113	1
		98	103	114	1
		99	104	115	1
		100	105	116	1
		101	106	117	1
		102	107	118	1
		103	108	119	1
		104	109	120	1
		105	110	121	1
		106	111	122	1
		107	112	123	1
		108	113	124	1
		109	114	125	1
		110	115	126	1
		111	116	127	1
		112	117	128	1
		113	118	129	1
		114	119	130	1
		115	120	131	1
		116	121	132	1
		117	122	133	1
		118	123	134	1
		119	124	135	1
		120	125	136	1
		121	126	137	1
		122	127	138	1
		123	128	139	1
		124	129	140	1
		125	130	141	1
		126	131	142	1
		127	132	143	1
		128	133	144	1
		129	134	145	1
		130	135	146	1
		131	136	147	1
		132	137	148	1
		133	138	149	1
		134	139	150	1
		135	140	151	1
		136	141	152	1
		137	142	153	1
		138	143	154	1
		139	144	155	1
		140	145	156	1
		141	146	157	1
		142	147	158	1
		143	148	159	1
		144	149	160	1
		145	150	161	1
		146	151	162	1
		147	152	163	1
		148	153	164	1
		149	154	165	1
		150	155	166	1
		151	156	167	1
		152	157	168	1
		153	158	169	1
		154	159	170	1
		155	160	171	1
		156	161	172	1
		157	162	173	1
		158	163	174	1
		159	164	175	1
		160	165	176	1
		161	166	177	1
		162	167	178	1
		163	168	179	1
		164	169	180	1

Report on the Infant Industrial Schools of Tuscany. By Signor ENRICO MAYR, of Milan.

[Read before the Statistical Section of the British Association at Cork, Aug. 21st, 1843.]

THE first infant schools, or, as they are there called, asylums, established in Tuscany, were opened simultaneously in Leghorn and Pisa in 1833. A third was soon after opened in Florence, and the example then was generally followed. They are supported wholly by voluntary contributions, and consequently their increase soon reached its furthest limit. There are now twenty of these infant schools, with 2000 children. The annual expenditure comes to about 1*l.* sterling a child, house rent, servant's wages, teacher's salary, and soup, being all included. The management of these schools generally rests with committees of ladies, who take by turn the duty of inspection: the remarks written in the inspectors' book become the subject of deliberation at the monthly meetings of the committee. The infant asylums of Tuscany are intended for the poor, and are entirely gratuitous. They are generally divided into two classes, having each a separate room, and a separate mistress. The first class contains children from eighteen months or two years to four or five years old. The second class contains children from four or five to seven or eight. A play-ground is attached to every asylum, and the children perform easy gymnastic exercises, which, however, do not interfere with their own choice of amusements. The introduction of manual works in the infant asylums in Italy, constitutes one of the chief differences between them and similar institutions in France or England, and experiments are now making to continue the habits of early industry thus acquired, by procuring some work in the primary schools. A committee of tradesmen and artisans forms part of the society for infant schools at Florence, and they are to provide the children with some easy work, and facilitate afterwards their being employed in the exercise of different arts and trades. Linear drawing and the rudiments of geometry and mechanics are taught in the superior classes, but confining the instruction to that which can be of use in the exercise of every mechanical profession, without taking any one particularly in view. It is anxiously desired that the manual work of the children should be of a nature to be carried on individually, so that the social element of family life should continue undisturbed among them, and the infant population should be preserved as long as possible from the infection of factories. Instruction is much less than education the object of these infant asylums; these are made as much as possible conducive to moral training, and this by the most simple and gentle means of a maternal guidance. In the school room the children pass through a series of exercises calculated to develop their mental and bodily faculties without tiring them. They are never kept sitting for more than a quarter of an hour at a time. The religious instruction of the children is directed by the curate of the parish in which the asylum is established. The mistresses of the asylums keep a journal, in which the moral history of the institution may be said to be contained, and from which a number of most interesting facts have been extracted, elucidating the workings of human intelligence and human affection, at an age which has not, until now, been sufficiently studied by the moral philosopher. Though the Tuscan infant asylums are of so recent a date, yet their effects are already, and in a remarkable

degree, perceptible. The improvement in the health of the children received in the Tuscan asylums, is a most striking fact. The study of this fact on the part of our medical committees, has led to most important observations, not only with respect to the infants themselves, but extended to their families, and indeed to the whole of the poor population of our towns, and to the various districts of the towns themselves. The cases of death in our asylums is between 2 and 3 per cent., whilst the general mortality of children between two and six is in Florence 16 per cent. The same results have been observed in Lombardy, where infant asylums are more numerous than in Tuscany. A thorough reform of every system of education, going through every species of schools, will be necessary, in order to put them on a par with the high educational character of our infant schools. The moral results, likewise, are not confined to the infants themselves, but are extended to their families. A great proportion of the children received at the infant asylums in Florence, are found to come from the Foundling Hospital; indeed, out of 600 children four hundred belong to that class. They are children whose parents were forced by extreme destitution to abandon them; but as soon as our infant asylums were known to exist, parental affection resumed its rights in the hearts of those hundreds of parents, and a dishonouring brand was wiped away from the head of those hundreds of children, who found again the joy of their family, and were restored to their name and their civil condition. In the three years anterior to the opening of the infant asylums, the average number of children taken out of the Foundling Hospital was 176; but in 1833, when the asylums were first established, the number withdrawn was 214, and in 1837 it increased to 404. Few facts more pregnant than this with important consequences, have ever been brought to light in the moral statistics of any country. The author, in conclusion, pointed out the superior efficacy of the elevating and kindly treatment of men above the harsh and repressive. "Who," he observes, "has not seen, in the bad direction of public instruction, or in the mismanagement of public charities, a necessity for the increase of coercive institutions, which yet prove insufficient for the repression of crime; and has not learned to conclude that there may be a system of instruction which teaches no virtue, a system of charity which relieves no misery, and a system of punishment which puts a stop to no crime?"

Second Report of the Committee of the Statistical Society of London on Hospital Statistics.

In December, 1840, a committee was appointed by the Council of the Statistical Society "to consider the best means of obtaining periodical enumerations of the patients in the London Hospitals." The first step which the Committee took, on entering upon its duties, was to obtain an enumeration of the patients and other persons resident in the various hospitals of the metropolis during the first week of January, 1842. The results of this first enumeration, together with other tables of interest, will be found in the fifth volume of the *Journal of the Statistical Society*, p. 168. A second enumeration was made on the 9th of January, 1843, and returns were obtained from all the general hospitals.

The number of patients in these hospitals at the date of the second enumeration is shown in the following Table.

TABLE I.

	Males.	Females.	Total.
Bartholomew's . . .	250	239	489
Guy's	257	193	450
St. Thomas's . . .	253	163	416
London	211	111	322
St. George's . . .	173	103	276
Middlesex	130	121	251
Westminster . . .	62	62	124
University College .	54	33	107
King's College . .	60	35	95
Charing Cross . . .	51	63	114
Grand total . . .	1,491	1,143	2,634

This number is somewhat in excess of that obtained by the Census Commissioners on the night of the 6-7th of June, 1841; when the patients enumerated were, males 1482, females 1081; total 2563.

The males and females are nearly in the same proportion in both returns, there being, in round numbers, about 15 males to 11 females. As might be anticipated, the mortality of males bears a much higher ratio to the mortality of females, than the hospital population of the one sex to that of the other. The hospital population being as 15 to 11, and the mortality as 13 to 7, (1260 to 708, see Table VII.)

The returns obtained from the ten general hospitals present a total of 2582 cases in which the name of the disease is specified, making with 52 unspecified cases the above total of 2634. The ages also are specified in all but 10 cases. The diseases and ages are jointly enumerated in Tables II., III., and IV., in the first two of which the sexes are given separately.

The returns obtained from the hospitals comprise some other particulars of interest. The average duration of a patient's stay in an hospital, for instance, may become an element in calculations of expense, and in the case of some diseases may even become a consideration of importance. A table, therefore, has been prepared, showing the length of time that the several patients had been in hospital at the time of the enumeration. (See Table V.)

If we assume that the actual stay in the hospital was the mean between the two extremes at the head of each column, we shall have, as the average stay in hospital of the 2626 patients whose stay is accurately stated, about 46 days, or six weeks and a-half.

In Table VI. the diseases and their duration up to the date of enumeration are stated. The table may furnish some useful elements of calculation, and of comparison with Table VII., in which the mortality of the London hospitals for the year 1842 is given in detail.

Table VII., which has been placed at the disposal of the Society by the kindness of the Registrar-General, possesses considerable interest. It comprises the deaths occurring in the general hospitals which have sent in their enumerations, and supplies important data for comparison with the preceding tables.

One of the most interesting facts displayed by this table is the great number of deaths from consumption that take place in the hospitals

of London in spite of the strict rules which in most of the subscription hospitals forbid their admission, and which are for the most part very rigidly enforced. Of 1968 deaths from all causes, no less than 322 were from consumption, being between one-sixth and one-seventh of the total mortality of hospitals, but less than 5 per cent. of the total mortality of the metropolis from that cause. It will be seen that the number of deaths of females from this disease in hospitals is less than half that of males, a fact which corresponds with the greater prevalence of consumption in the male inhabitants of large towns. It is necessary, however, to correct this statement as to the disproportionate mortality of men by the fact already alluded to; that the male population of hospitals is larger than the female in the proportion of 15 to 11. It is not a little remarkable, moreover, that in the face of this disproportion in the deaths from consumption, the enumerated cases of the disease amount to 28 males, and 34 females. At the time of the enumeration, therefore, there were more females in the London hospitals labouring under consumption than males, and yet the mortality of males is more than double that of females. The age of death in this as in other diseases is a very important and interesting heading in this table.

Mortality in the Hospitals at different Ages.

Ages . . .	0-3	3-5	5-10	10-15	15-20	20-30	30-40	40-50	50-60	60-70	70+
Deaths in the year 1842 . . .	37	29	84	64	100	364	376	369	256	136	81
Resident Patients according to one enumeration . . .	19	28	91	135	371	799	498	365	396	95	29
Annual Mortality per cent.	579	109	86	47	27	46	74	101	114	144	279

To determine the average number of patients resident, more than one enumeration should be taken; but the relative numbers at the respective ages probably do not vary very much; and the facts before us bring out some interesting results, and may suggest others of still greater importance. If we assume that the London hospitals contained, through the year 1842, on an average, 799 patients aged 20 and under 30 years, then, as 376 deaths occurred at that age, the annual mortality must have been at the rate of 46 per cent. The deaths of patients between the ages 40-50, were 369; the average number of patients was 365; and the annual mortality 110 per cent. The mortality is highest in infancy, descends to 27 per cent. at the ages 15-20, and rises progressively again as age advances, to 279 per cent.

This is not the mortality of cases, but the mortality in a given time, out of a given number constantly sick. It will be rendered, perhaps, more intelligible, by supposing the patients lodged in eleven different hospitals, and that each hospital contains 100 beds always occupied, fresh patients taking the place of those removed by death, recovery, or discharge. The table shows that, in the hospital for 100 children under three years of age, 370 deaths would occur annually; that in the hospital for young persons between the ages 15-20, only 27 would die annually; that the hospital for persons aged 40-50 would have 101 annual deaths; and so on, for other ages. Admitting that the treatment was equally efficient at all ages, there are at the three periods of life,

20-30, 30-40, 40-50, differences caused by age alone in the mortality of the sick, expressed by the numbers, 46, 74, and 101. It is impossible, therefore, in a practical point of view, to determine the relative value of different methods of treatment without reference to the law of mortality at different ages.

The tables show also the influence of age on the rate of mortality, among persons labouring under the diseases distinguished in the returns. Compare, for instance, the number of consumptive patients, and the number of deaths from consumption at the several ages, with the same facts for heart disease.

Phthisis.

Ages . . .	Under 20	20-30	30-40	40-50	50-70	All Ages.
Deaths in the Year 1842	32	91	88	62	48	321
Consumption Patients resident, according to the Society's enumeration	4	28	21	6	3	62

Heart Disease.

Ages . . .	Under 20	20-30	30-40	40-50	50-70	All Ages.
Deaths in the Year 1842	9	29	25	34	22	120
Patients suffering from Heart Disease, according to the enumeration	10	17	12	11	5	48

Discrepancies of a trifling amount which appear in Tables II., III., IV., V., and VI., as regards the numbers assigned in each to the same diseases, are explained (in addition to the liability to error) by the uncertainty in classification which arises in a few instances from *complications* of disease, and in others from records which are vague or imperfect. Besides, the form which has been employed was drawn up for the *causes of death*, and is not equally adapted for *diseases of the living*.

The tables which are here brought together, must be regarded rather in the light of materials placed in a convenient relation to each other for the purposes of comparison, than as leading to any broad inference, or as being in themselves sufficient for the establishment of any important truths. Such materials often derive an unexpected value from some inquiry which does not spring directly out of them. It is in this way that the labours of the Hospital Statistics Committee may be expected to prove useful. In bringing those labours to a close, the Committee have to offer their best acknowledgments to those hospital physicians and surgeons who have assisted them; and they trust that, by showing the possibility of combining the valuable information afforded by the several public hospitals, they may have paved the way for some future arrangements by which the knowledge to be derived from these valuable schools of experience may be recorded, collected, and digested.

TABLE II.—*Classification according to Age and Disease.*

DISEASES.	MALES.																	Total.
	1	3	5	10	15	20	25	30	35	40	45	50	55	60	70	?		
Small Pox	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Measles	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Scarlatina	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	
Erysipelas	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Croup	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Diphtheria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Tubercles	..	..	..	1	..	..	..	..	1	..	1	..	..	..	..	..	3	
Dysentery	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Diarrhoea	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Infantia	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	
Scarlatina	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Epidemic Fever	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Cholera	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Carcinoma	..	..	1	..	1	..	3	3	5	5	2	..	1	..	..	..	26	
Cystitis	..	..	..	..	..	..	43	29	10	5	3	..	..	..	..	..	143	
Syphilis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Hydrophobia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
..	..	..	2	5	22	56	50	29	13	9	4	2	2	1	..	2	197	
Cephalitis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Hydrocephalus	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Alopecia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Paralysis	..	1	..	..	1	..	5	4	4	6	6	3	..	1	..	1	29	
Pharyngitis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Tracheitis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Debilis Tenuis	..	..	..	..	..	1	..	..	..	..	..	1	..	..	..	..	4	
Chorea	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Epilepsy and Hysteria	..	..	..	4	2	3	1	..	1	2	..	..	..	1	..	..	19	
Eur (disease of)	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Eye (disease of)	..	..	..	..	16	10	9	..	5	2	10	3	..	..	..	..	68	
Brain, &c. (disease of)	..	..	..	..	..	..	1	2	2	6	1	..	3	..	1	..	16	
..	..	1	1	8	11	15	14	19	18	11	1	1	3	6	..	2	121	
Argemitis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Arteritis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Rheumatis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Paronychia	..	..	..	1	3	..	6	4	8	6	6	3	2	3	1	..	43	
Paronychia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Paronychia	..	..	..	1	..	2	..	1	2	..	3	3	..	..	..	..	14	
Hydrothorax	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Hydrothorax	..	..	..	..	..	..	..	..	..	..	2	1	1	1	..	..	13	
Concomitant	..	..	..	..	..	..	1	8	9	6	1	1	..	..	..	..	..	
Lung, &c. (disease of)	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	
..	..	..	1	2	5	19	19	17	17	10	10	9	3	4	1	..	118	
Pericarditis	..	..	..	1	1	3	1	2	..	..	1	..	..	..	..	..	9	
Aneurism	..	..	..	..	..	..	..	1	..	..	..	1	..	..	..	..	9	
Brain, &c. (disease of)	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
..	..	..	3	2	6	9	7	1	5	3	1	3	1	..	..	..	34	
Testitis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Gastritis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Peritonitis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Peritonitis	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	1	
Tales Mastectomia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Acromioclavicular	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Acromioclavicular	..	..	..	..	..	1	1	2	..	..	..	2	..	..	..	..	..	
Acromioclavicular	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Hernia	..	..	..	..	..	1	..	..	..	..	1	1	..	1	..	..	4	
Colic or flux	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Intestine	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Intestine	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Intestine	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Stomach, &c. (disease of)	..	..	..	..	1	6	1	1	3	4	1	..	2	..	..	..	27	
Stomach, &c. (disease of)	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Hepatitis	..	..	..	..	1	..	..	..	..	..	..	1	..	..	..	..	5	
Hepatitis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		

TABLE II.—continued

MALES.																
DISEASES.	1	3	5	10	15	20	25	30	35	40	45	50	55	60	70	Total
Nephritis	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1
Ischuria	..	..	..	..	..	..	1	3	..	..	..	..	..	..	..	9
Dysuria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
Stricture	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
Stone	1	..	2	..	..	4	4	8	..	5	4	3	4	1	..	41
Hydronephrosis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
Kidney, &c. (disease of)	..	..	..	..	..	3	4	3	1	4	3	1	1	..	..	33
	1	3	1	2	5	10	8	13	11	16	6	6	2	11	2	119
Testis, &c. (disease of)	..	..	..	2	9	..	4	2	3	..	2	1	..	2	8	39
Arthritis	..	..	..	1	2	1	..	..	..	..	..	..	..	..	..	1
Gonorrhea	..	..	5	12	9	15	13	14	9	3	9	7	10	3	..	101
Joint, &c. (disease of)	..	..	2	16	15	37	19	9	14	9	7	12	3	6	1	147
	..	..	3	16	11	38	25	24	30	36	17	18	3	8	..	238
Carbuncle	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
Furuncle	1	..	1	1	2	6	1	1	1	16	2	2	..	1	1	39
Prigo	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	7
Itch	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3
Scabies	..	3	3	6	1	4	1	1	1	1	1	1	1	1	1	31
Skin, &c. (disease of)	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
	1	3	4	7	8	22	15	19	11	17	11	9	3	8	5	145
Inflammation	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Hemorrhage	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Dropsy	1	..	..	..	..	..	..	..	1	9	4	3	..	..	..	13
Albumen	..	..	..	3	3	4	2	1	1	3	1	..	..	..	..	19
Metastasis	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	3
Scrofula	1	..	1	8	3	..	3	..	..	..	..	..	..	..	..	15
Parasite	..	1	2	..	..	..	..	..	..	..	..	..	..	..	..	11
Tumor	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Ulcer	..	..	..	..	..	..	..	..	..	1	1	2	1	1	..	6
Amphym	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Phimosis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Malformation	..	..	1	1	2	..	..	..	..	..	..	..	..	..	..	4
Enlargement of the Glands	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..
	1	6	11	11	11	18	13	5	6	11	9	7	3	6	..	98
Wounds	..	..	2	5	7	6	5	7	8	5	4	5	4	3	1	61
Burns and Scalds	1	4	4	4	4	2	2	1	1	..	..	..	..	..	1	29
Frost-bites, Contusions and Exhaustions	1	4	9	12	23	39	22	38	16	37	24	14	9	13	4	236
	2	8	15	18	34	38	29	36	24	42	28	18	13	6	..	317
Cases not specified	1	1	1	1	1	7	5	..	..	2	2	1	..	..	3	34
Total	6	18	48	82	149	255	197	173	166	138	111	88	50	65	18	1,000

TABLE III.—*Classification according to Age and Disease.*

FEMALES.																
DISEASES.	1	3	5	10	15	20	25	30	35	40	45	50	55	60	70 ?	Total.
Small Pox	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Measles	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Scarlatina	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	3
Erysipelas	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Croup	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Whooping Cough	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Iron-burn	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1
Scald	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Cholera	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Infantura	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Infantura	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	3
Scarlet Fever	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Scarlet Fever	..	..	..	..	6	6	5	..	..	..	..	..	..	..	..	1
Erysipelas	..	..	..	..	..	..	4	3	1	..	..	..	..	..	..	9
Erysipelas	..	..	..	..	66	56	10	3	..	..	1	1	..	..	..	146
Hydrophobia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Hydrophobia	..	..	1	3	73	39	33	34	4	10	1	1	1	..	..	3 183
Cephalitis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Hydrocephalus	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Abscess	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Paralysis	..	..	1	1	1	..	1	2	5	..	..	4	1	..	1	32
Paralysis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Inflamed Testes	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Inflamed Testes	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	1	8	12	11	7	..	..	..	..	..	..	..	39
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	1	..	..	..	1	..	..	1	..	1	..	..	5
Epilepsy and Hysteria	..	..	..	..	3	5	1	..	..	..	..	..	..	1	..	10
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	1	1	9	14	22	22	18	10	9	8	1	4	2	2	2	145
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	1	1	..	..	1	..	..	..	..	..	..	..	3
Epilepsy and Hysteria	..	..	..	..	1	3	2	1	2	2	4	2	..	..	..	21
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	1	1	1	..	1	..	..	6
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	1	1	..	..	4	2	3	1	1	1	1	..	24
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	1	1	9	9	14	14	5	7	6	7	..	3	3	1	..	77
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	1	1	2	1	..	..	..	..	..	..	..	..	..	5
Epilepsy and Hysteria	..	..	..	..	..	5	9	4	5	2	1	..	..	..	..	28
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	1	1	6	10	5	3	2	5	1	..	..	..	..	34
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsy and Hysteria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	

TABLE III.—continued

[illegible]

TABLE IV.—*Classification according to Age and Disease.*

[illegible]

TABLE IV.—continued

DISEASES.	MALES AND FEMALES.																All Ages.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
Prionocilia	..	..	2	2	5	2	2	1	..	1	..	..	..	..	..	14	
American	..	..	..	..	..	1	3	3	..	6	2	..	..	..	..	16	
Henzl, &c. (disease of) . .	..	..	2	1	7	3	3	3	..	6	2	..	..	..	..	49	
..	..	..	4	3	12	12	11	4	7	8	2	2	1	..	..	..	
Nephritis	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	3	
Induritis	..	..	..	..	1	..	1	1	..	..	..	..	..	..	..	3	
Dactylitis	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	10	
Cystitis	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	2	
Stasis	1	2	1	2	1	1	1	1	1	1	1	1	1	1	1	15	
Stricture	..	..	..	..	..	..	..	..	..	6	3	3	..	..	..	18	
Kolozay, &c. (disease of) .	..	..	..	..	5	6	5	1	4	3	1	4	..	..	3	25	
..	1	2	1	2	8	13	10	15	12	13	6	8	2	11	2	106	
Childbirth	..	..	..	1	15	15	9	2	..	..	..	..	..	..	..	51	
Peritonitis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	
Ovarian dropsy	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	2	
Tennis, &c. (disease of) . .	..	..	..	2	2	..	12	..	..	..	..	..	..	..	..	20	
..	..	..	3	21	22	29	15	5	7	6	3	1	2	..	..	116	
Arthritis	..	..	..	..	..	..	7	4	..	..	..	..	..	..	..	21	
Rheumatism	..	..	..	6	29	29	34	25	29	13	18	9	12	4	3	193	
Jaletis, &c. (disease of) . .	..	..	4	25	26	43	37	33	48	19	24	4	6	1	..	233	
..	..	..	4	29	32	56	56	64	62	30	29	23	13	9	3	664	
Carbuncle	..	..	..	..	..	..	2	..	..	..	..	..	..	1	..	4	
Phlegmon	1	..	1	1	1	7	1	1	1	1	1	1	1	1	1	20	
Abscess	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	12	
Fistula	..	..	..	..	1	1	4	..	..	..	11	4	1	4	1	24	
Skin, &c. (disease of) . . .	..	..	3	8	10	8	11	8	8	4	2	1	1	..	..	72	
..	1	3	10	14	28	41	33	34	21	21	15	16	9	14	6	357	
Inflammation	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	1	
Hemorrhage	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	
Dropsy	1	..	1	..	1	1	..	..	..	..	4	2	..	1	..	29	
Ascites	..	..	..	..	1	1	3	1	..	..	..	..	..	..	..	11	
Mortification	..	..	..	..	..	1	1	1	2	2	..	..	4	..	..	11	
Elarged Glands	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	
Serofia	..	2	8	10	10	2	6	1	1	1	..	..	..	..	..	40	
Scrophulous	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	
Carcinoma	..	1	1	..	1	1	3	3	6	1	6	6	..	..	..	30	
Tumor	..	1	..	..	1	1	..	1	3	2	1	1	..	..	..	12	
Ulcer	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	
Alopecia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	
Scald	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8	
Malignancies	..	..	1	2	3	..	..	..	..	..	..	..	..	..	..	8	
..	1	2	14	16	30	22	30	11	12	30	12	5	13	..	..	186	
Wounds	..	9	1	5	8	6	6	8	8	6	4	5	5	2	..	67	
Burns and Scalds	..	1	5	10	16	37	26	31	33	29	43	35	20	24	10	338	
Fractures, Contusions, &c.	..	1	5	10	16	37	26	31	33	29	43	35	20	24	10	338	
..	4	14	23	23	40	38	40	44	38	51	56	31	15	27	13	422	
Diseases not specified . .	1	1	3	1	1	11	8	6	9	1	3	5	2	..	..	69	
Total	10	28	98	135	371	443	356	378	310	514	351	133	73	95	29	10	265

TABLE VII.—Deaths in the London Hospitals, 1842;

Age.	0		1		3		5		10		15		20	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
Causes of Death.														
All Causes	6	3	89	8	14	18	41	43	27	27	32	48	308	186
Specific Causes	6	3	19	8	14	18	41	43	27	27	32	48	308	186
I. Zymotic (or Epidemic, Endemic, and Contagious) Diseases	1	1	1	1	1	3	3	7	4	5	10	24	18	18
II. Sporadic Diseases—														
of circumscribed or variable Seat	1	1	1	1	1	1	1	1	1	1	1	1	1	1
of the Nervous System	1	1	1	1	1	1	1	1	1	1	1	1	1	1
of the Respiratory Organs	1	1	1	1	1	1	1	1	1	1	1	1	1	1
of the Digestive Organs	1	1	1	1	1	1	1	1	1	1	1	1	1	1
of the Urinary Organs	1	1	1	1	1	1	1	1	1	1	1	1	1	1
of the Organs of Circulation	1	1	1	1	1	1	1	1	1	1	1	1	1	1
of the Organs of Generation	1	1	1	1	1	1	1	1	1	1	1	1	1	1
of the Organs of Locomotion	1	1	1	1	1	1	1	1	1	1	1	1	1	1
of the Integumentary System	1	1	1	1	1	1	1	1	1	1	1	1	1	1
III. Old Age	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XII. External Causes—Falling, Asphyxia, Injuries	2	2	16	5	10	10	21	35	18	10	8	10	29	11
I. Small Pox	1	1	1	1	1	1	1	1	1	1	1	1	1	1
II. Measles	1	1	1	1	1	1	1	1	1	1	1	1	1	1
III. Scarlatina	1	1	1	1	1	1	1	1	1	1	1	1	1	1
IV. Hooping Cough	1	1	1	1	1	1	1	1	1	1	1	1	1	1
V. Whooping Cough	1	1	1	1	1	1	1	1	1	1	1	1	1	1
VI. Diphtheria	1	1	1	1	1	1	1	1	1	1	1	1	1	1
VII. Typhoid	1	1	1	1	1	1	1	1	1	1	1	1	1	1
VIII. Typhus	1	1	1	1	1	1	1	1	1	1	1	1	1	1
IX. Erysipelas	1	1	1	1	1	1	1	1	1	1	1	1	1	1
X. Syphilis	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XI. Hydrophobia	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XII. Inflammation	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XIII. Hemorrhage	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XIV. Dropsy	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XV. Abscess	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XVI. Mortification	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XVII. Purpura	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XVIII. Scrophula	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XIX. Cancer	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XX. Tumor	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XXI. Gout	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XXII. Atrophy	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XXIII. Cachexia	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XXIV. Malnutrition	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XXV. Sudden Death	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XXVI. Cephalitis	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XXVII. Hydrocephalus	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XXVIII. Apoplexy	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XXIX. Paralysis	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XXX. Convulsions	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XXXI. Tetanus	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XXXII. Chorea	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XXXIII. Epilepsy	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XXXIV. Insanity	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XXXV. Delirium Tremens	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XXXVI. Brain, &c. (Disease of)	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XXXVII. Laryngitis	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XXXVIII. Quinsy	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XXXIX. Bronchitis	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XL. Pleurisy	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XLI. Peritonitis	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XLII. Pneumonia	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XLIII. Hydrothorax	1	1	1	1	1	1	1	1	1	1	1	1	1	1
XLIV. Asthma	1	1	1	1	1	1	1	1	1	1	1	1	1	1

comprising the Sex, Age, and Cause of Death.

	30	40	50	60	70	80	90	100	(?)	Total.	Total Males	Total Females	Total Deaths	Total Population			
M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.			
271	184	265	183	164	92	92	45	44	24	4	8	1	1	1,230	678	1,908	45,400
271	184	265	183	164	92	92	45	44	24	4	8	1	1	1,230	678	1,908	45,400
23	8	16	3	6	7	4	3	1	1	1	1	1	1	90	56	146	7,696
41	23	36	16	26	34	19	9	5	5	1	1	1	1	174	143	317	5,345
27	5	30	7	16	5	7	3	1	1	1	1	1	1	144	102	246	4,200
30	9	26	10	18	11	9	5	3	1	1	1	1	1	134	83	217	3,900
15	7	13	13	13	4	6	2	2	3	1	1	1	1	67	34	101	2,396
10	6	10	12	12	4	1	1	1	1	1	1	1	1	48	25	73	1,590
1	1	1	1	1	1	1	1	1	1	1	1	1	1	6	5	11	323
1	1	1	1	1	1	1	1	1	1	1	1	1	1	5	2	7	3,346
35	9	48	11	27	16	18	10	14	11	1	4	1	1	339	145	484	1,967
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1</														

TABLE VII.—Deaths in the London Hospitals, 1842:

Age.								
	0	1	3	5	10	15	20	
Cause of Death.	M.	F.	M.	F.	M.	F.	M.	F.
43. Phthisis (or Consumption)	1	2	1	3	15	10	55	96
50. Lung, &c. (Disease of)	1	1	1	1	1	1	1	5
V. 51. Peritonitis	1	1	1	1	1	1	1	1
52. Abscess	1	1	1	1	1	1	1	1
53. Heart, &c. (Disease of)	1	1	1	1	1	1	1	1
VI. 54. Typhoid	1	1	1	1	1	1	1	1
55. Gastritis	1	1	1	1	1	1	1	1
56. Enteritis	1	1	1	1	1	1	1	1
57. Peritonitis	1	1	1	1	1	1	1	1
58. Typhus Mesentericus	1	1	1	1	1	1	1	1
59. Worms	1	1	1	1	1	1	1	1
60. Ascites	1	1	1	1	1	1	1	1
61. Ulceration	1	1	1	1	1	1	1	1
62. Hemorrhage	1	1	1	1	1	1	1	1
63. Cuts, or lacerations	1	1	1	1	1	1	1	1
64. Intermittent	1	1	1	1	1	1	1	1
65. Stricture	1	1	1	1	1	1	1	1
66. Hemorrhoids	1	1	1	1	1	1	1	1
67. Stomach, &c. (Disease of)	1	1	1	1	1	1	1	1
68. Pancreas (Disease of)	1	1	1	1	1	1	1	1
69. Hepatitis	1	1	1	1	1	1	1	1
70. Jaundice	1	1	1	1	1	1	1	1
71. Liver (Disease of)	1	1	1	1	1	1	1	1
72. Spleen (Disease of)	1	1	1	1	1	1	1	1
VII. 73. Nephritis	1	1	1	1	1	1	1	1
74. Ischuria	1	1	1	1	1	1	1	1
75. Diabetes	1	1	1	1	1	1	1	1
76. Cystitis	1	1	1	1	1	1	1	1
77. Stone	1	1	1	1	1	1	1	1
78. Stricture	1	1	1	1	1	1	1	1
79. Kidneys, &c. (Disease of)	1	1	1	1	1	1	1	1
VIII. 80. Childbirth	1	1	1	1	1	1	1	1
81. Puerperia	1	1	1	1	1	1	1	1
82. Ovarian Dropsy	1	1	1	1	1	1	1	1
83. Organs of Generation	1	1	1	1	1	1	1	1
IX. 84. Arthritis	1	1	1	1	1	1	1	1
85. Rheumatism	1	1	1	1	1	1	1	1
86. Gout, &c. (Disease of)	1	1	1	1	1	1	1	1
X. 87. Carbuncle	1	1	1	1	1	1	1	1
88. Phlegmon	1	1	1	1	1	1	1	1
89. Ulcer	1	1	1	1	1	1	1	1
90. Fistula	1	1	1	1	1	1	1	1
91. Skin, &c. (Disease of)	1	1	1	1	1	1	1	1
XI. 92. Old Age	1	1	1	1	1	1	1	1
XII. 93. Intemperance	1	1	1	1	1	1	1	1
94. Scarcity	1	1	1	1	1	1	1	1
95. Violent Deaths	1	1	1	1	1	1	1	1
Causes not specified	1	1	1	1	1	1	1	1

Note.—This Table contains the Deaths in the following Hospitals, viz. St. George's, Charing Cross,

comprising the Sex, Age, and Cause of Death.—continued.

30	40	50	60	70	80	90	100	(?)	Total.	Males.	Females.	Total Deaths in Hospitals.
M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	
62	25	46	16	34	3	8	2	1	224	97	321	7,145
3	1	5	1	5	1	1	4	1	20	6	26	767
2	1	1	1	1	1	1	1	1	2	3	5	31
1	2	3	1	1	1	1	1	1	5	4	9	21
19	6	20	14	8	5	6	3	1	78	42	120	969
1	1	1	1	1	1	1	1	1	1	1	1	914
1	1	1	1	1	1	1	1	1	3	7	10	996
2	1	1	1	1	1	1	1	1	6	2	8	64
1	1	1	1	1	1	1	1	1	1	1	1	205
1	1	1	1	1	1	1	1	1	1	1	1	17
1	1	1	1	1	1	1	1	1	1	1	1	31
1	1	1	1	1	1	1	1	1	1	1	1	78
1	1	1	1	1	1	1	1	1	1	1	1	93
1	1	1	1	1	1	1	1	1	1	1	1	153
1	1	1	1	1	1	1	1	1	1	1	1	21
1	1	1	1	1	1	1	1	1	1	1	1	23
1	1	1	1	1	1	1	1	1	1	1	1	193
1	1	1	1	1	1	1	1	1	1	1	1	51
1	1	1	1	1	1	1	1	1	1	1	1	166
1	1	1	1	1	1	1	1	1	1	1	1	282
1	1	1	1	1	1	1	1	1	1	1	1	9
1	1	1	1	1	1	1	1	1	1	1	1	19
1	1	1	1	1	1	1	1	1	1	1	1	29
1	1	1	1	1	1	1	1	1	1	1	1	19
1	1	1	1	1	1	1	1	1	1	1	1	20
1	1	1	1	1	1	1	1	1	1	1	1	49
1	1	1	1	1	1	1	1	1	1	1	1	37
1	1	1	1	1	1	1	1	1	1	1	1	201
1	1	1	1	1	1	1	1	1	1	1	1	11
1	1	1	1	1	1	1	1	1	1	1	1	14
1	1	1	1	1	1	1	1	1	1	1	1	99
1	1	1	1	1	1	1	1	1	1	1	1	119
1	1	1	1	1	1	1	1	1	1	1	1	141
1	1	1	1	1	1	1	1	1	1	1	1	5
1	1	1	1	1	1	1	1	1	1	1	1	3
1	1	1	1	1	1	1	1	1	1	1	1	14
1	1	1	1	1	1	1	1	1	1	1	1	39
1	1	1	1	1	1	1	1	1	1	1	1	3,366
1	1	1	1	1	1	1	1	1	1	1	1	22
1	1	1	1	1	1	1	1	1	1	1	1	29
1	1	1	1	1	1	1	1	1	1	1	1	1,223
1	1	1	1	1	1	1	1	1	1	1	1	318

Middlesex, North London, Westminster, St. Bartholomew's, London, Guy's, and St. Thomas's.

A Third Contribution to a Knowledge of the Influence of Employments upon Health. By WILLIAM AUGUSTUS GUY, M.B. Cantab., Professor of Forensic Medicine, King's College, and Physician to King's College Hospital, Hon. Sec., &c.

[Read before the Statistical Society of London, May 20th, 1844.]

In the last two numbers of the Journal of the Statistical Society, the influence of employments upon health was illustrated by means of probabilities confessedly open to objection, and still standing in need of confirmation. The ratio of cases of pulmonary consumption to those of all other diseases occurring among the out-patients of a public hospital (the first test employed) was obviously insufficient, inasmuch as that ratio will depend upon the comparative frequency of many diseases of a trivial nature, which may vary with the several employments. This being the case, it has seemed advisable to confirm the probability derived from this source by another probability open to a different class of objections. Such is the ratio of cases of death by consumption to those due to all other causes, as gleaned from the sanitary registers for the year 1839; which registers have been already employed in the latter part of the author's last communication to the Society.

These registers, as has been already stated, are open to the objection that the causes of death are often imperfectly registered. Without intending to lessen the force of this objection, as applying to the greater number of diseases, there is reason to believe that the cases registered as death by consumption, pulmonary consumption, decline, phthisis, &c., above the age of 15, form nearer approximations to the actual facts than almost any other class of diseases, and that, for purposes of comparison, they may be used with some degree of confidence.

The first object of the present Essay is to ascertain whether, and to what extent, the ratio which cases entered under these titles bear to all other diseases, corresponds with the ratio already obtained from the books of the King's College Hospital; for if a close correspondence shall be discovered, it will add great strength to the probability already deduced from the last-named source. Another object is to illustrate a question of considerable interest and importance, for which the hospital registers did not furnish the requisite materials, viz.: whether the several classes of society, the gentry, tradesmen, and working men, are equally liable to attacks of pulmonary consumption? The answer to this question will lead to a consideration of the causes of the unequal prevalence of the disease among the three classes; and this will suggest a further inquiry as to the actual amount of pulmonary consumption in this country; and will originate an attempt to determine the actual waste of human life due to this cause.

It is proposed in this communication to follow as closely as possible the order observed in the Essays already laid before the Society.

The following table shows, for in-door and out-door employments, the percentage proportion of deaths from pulmonary consumption at different ages, and under 30 and 40 years respectively, the ratio which such cases bear to the deaths from all other causes, and the total number of cases on which the calculations are founded:—

TABLE I.

Nature of Occupation.	15 to 20	20 to 30	30 to 40	40 to 50	50 to 60	60 to 70	Under 30	Under 40	Ratio of Deaths from Consumption to those from all other diseases.	No. of Deaths.	
										Consumption.	Other Diseases.
In-door....	9.14	23.88	24.78	21.22	13.35	5.81	0.62	23.02	1 to 2.08	1291	2587
Out-door...	4.97	20.92	23.04	24.79	14.21	6.92	0.22	23.00	1 to 3.56	1027	2021

The following table contrasts the same classes of employment after all exceptional occupations have been excluded:—

TABLE II.

Nature of Occupation.	15 to 20	20 to 30	30 to 40	40 to 50	50 to 60	60 to 70	Under 30	Under 40	Ratio.	No. of Deaths.	
										Consumption.	Other Diseases.
In-door....	9.37	27.96	23.98	20.22	11.46	4.12	0.44	27.32	1 to 1.98	920	1844
Out-door...	4.73	20.90	20.92	24.48	14.09	7.08	0.21	24.79	1 to 2.56	960	2423

The correspondence between these two tables and Tables IV., V., XIII., and XV. of the first essay is even greater than might have been anticipated. The ratio obtained from the hospital books, and those derived from the mortuary registers, agree in displaying the greater liability to attacks of consumption of persons employed within-doors. On comparing Table V. of the former essay, with Table II. of the present, it will be seen that the ratios are, for in-door occupations, 1 to 3.81 and 1 to 1.98 respectively; and for out-door occupations, 1 to 4.13 and 1 to 2.56 respectively. In Table IV. of the first essay, which contrasts in-door and out-door employments previous to the elimination of certain exceptional occupations, the ratios were the same for the two classes of employment, while in Table I. of the present essay the ratios are 1 to 2.08 and 1 to 2.56. The deaths, then, present a stronger contrast between in-door and out-door employments than the facts extracted from the hospital books; but the two classes of facts strongly confirm each other.

There is also an entire agreement between Tables XIII. and XV. of the former essay and Tables I. and II. of the present, in respect of the distribution of the cases and deaths from consumption according to age. The cases of consumption registered in the hospital books, as occurring under 40 years of age, in men following in-door and out-door employments respectively, were in round numbers 51 and 63 (Table XIII.), or 83 and 62 (Table XV.); and in the present essay the numbers are 60 and 54 (Table I.), or 61 and 53 (Table II.). So that here also the two classes of employment occupy the same relative place, and indicate the same comparative liability to consumption, whether the hospital books or the mortuary registers are used as the mean of comparison. Both agree in representing pulmonary consumption to be both more frequent, and of earlier occurrence, in men following in-door employments, than in those working in the open air.

The next inquiry entered into in the first essay, was the influence of different degrees of exertion in promoting pulmonary consumption, and

in hastening the period of its attack. This point was illustrated by Tables VI. and XVII. of that essay. The following table shows, for occupations requiring different degrees of exertion, the per centage proportion dying of pulmonary consumption at each period of life, and under 30 and 40 years of age, the ratio of deaths from that disease, and the number of facts upon which the table is founded:—

TABLE III.

Nature of Occupation.	15 to 20	20 to 30	30 to 40	40 to 50	50 to 60	60 to 70	70 to 80	Under 30	Under 40	Ratio.	No. of Deaths.	
	20	30	40	50	60	70	80	30	40		Consumption	Other Diseases.
In-door: Requiring little exertion . . .	11-43	22-51	20-40	19-07	10-48	8-56	1-29	44-06	64-48	1 to 1-78	368	684
Requiring more exertion . . .	8-37	23-9	23-21	23-21	13-68	7-90	0-73	32-28	55-43	1 to 2-30	418	881
Requiring great exertion . . .	8-22	23-29	23-29	13-70	21-91	8-23	1-37	31-51	54-40	1 to 2-10	73	118
With varied exercise . . .	6-01	25-08	20-08	16-54	9-03	10-53	2-25	31-57	61-65	1 to 2-27	183	302
Out-door: Requiring moderate exertion . . .	8-29	23-89	24-78	20-40	10-71	8-33	0-60	32-72	59-50	1 to 2-21	168	272
Requiring great exertion . . .	3-00	17-41	28-24	26-62	16-97	6-75	0-53	20-96	49-20	1 to 2-27	563	1279

In the case of in-door occupations, there is the same general agreement between the results of the foregoing table and those of the first essay, which has just been noticed in comparing in-door with out-door occupations.

The ratios obtained from the hospital books were, for the first three classes of employment, 1 to 3-06, 1 to 4-44, and 1 to 5-06; those deduced from the mortuary registers are, 1 to 1-76, 1 to 2-20, and 1 to 2-10. In both cases the sedentary class of occupations holds the same place, and presents the highest ratio; but employments requiring great exertion hold the second instead of the third place in the mortuary registers. The difference, however, which causes this change of place is so slight as scarcely to deserve attention, and may probably be explained by the small number of deaths entered under this head.

The age at which pulmonary consumption proves fatal in the three classes of in-door employment corresponds with the age of attack, as obtained from the hospital books. The numbers under 30 and 40 years of age respectively follow the same order as in Table XVII. of the first essay.

In the class of employments with varied exercise, the proportion of deaths from consumption under 40 years of age does not bear the same relation to the other classes as does the proportion of attacks of consumption. The proportion of deaths under 40 ranks next to that obtained for the sedentary class of occupations, while the proportion of attacks under 40 is higher than that which prevails among persons following sedentary occupations. Though the position of these two classes is different, the two together occupy the same place, in respect of the other two classes of in-door occupation. It will be observed, that the proportion of deaths under 30 does not preserve the same relative position as the proportion under 40 years of age.

On referring to the employments carried on in the open air, it will be seen that the ratio of deaths is somewhat higher in the class requiring moderate exertion, while the ratio of attacks of the disease is higher in the class requiring greater exertion. The per centage proportion of deaths, however, occurring under 30 and 40 correspond with the ratio of attacks as displayed in Table XVII. of the first essay. There is a great excess of both in those employments requiring the lesser degree of exertion. It follows, then, that the correspondence between the results of the foregoing table and those of the first essay, though not exact, is very considerable; and in the case of employments carried on within doors, it is so close as to give strong confirmation to the general principle laid down in the two former essays, that the tendency to consumption varies inversely as the amount of exertion.

It would have been interesting to extend the comparisons already instituted, to the effect of intemperance, of exposure to dust, &c., in promoting pulmonary consumption, and in hastening the period of its attack; but the small number of facts, and the necessary imperfection of the registers themselves, would render such a comparison of little use.

One comparison still remains to be made, which has no parallel in the first communication addressed to the Society, viz.: that of the deaths from pulmonary consumption occurring among the three classes of gentlemen, tradesmen, and artisans. This comparison is made in the following table:—

TABLE IV.

Condition.	15 to 20	20 to 30	30 to 40	40 to 50	50 to 60	60 to 70	70 to 80	Under 30	Under 40	Average Age at Death.	Ratio.	No. of Deaths.	
	20	30	40	50	60	70	80	30	40			Consumption	Other Diseases.
Gentlemen, &c. . .	10-84	18-47	27-11	19-27	11-96	6-03	2-01	29-51	56-42	29	1 to 2-00	166	835
Tradesmen . . .	8-46	24-24	26-38	20-11	12-79	6-35	1-06	32-90	59-78	28	1 to 2-40	169	401
Artisans, &c. . .	7-25	23-65	26-58	23-79	13-34	6-26	0-43	30-79	57-18	26½	1 to 2-29	2318	5304

This table corresponds very closely with Table XIX. of the second essay, in which a comparison was made between the deaths at the several ages in the three classes. The ratios of death from consumption follow the same order as the average age at death, being lowest where the average age is highest, and the reverse. Thus the average age at death of the class of gentlemen is 58-61, and the ratio of deaths from consumption is 1 to 5; in the case of the tradesmen, the average age is 48-84, and the ratio of deaths from consumption 1 to 2-60; while in the class of artisans, the average age is 48-06, and the proportion of deaths from consumption 1 to 2-29.

Again, the class of gentry presents a smaller proportional number of deaths under 30 and 40 than either of the other classes. It is also well worthy of observation, that the per centage proportion of deaths from consumption under 30 and 40 is higher in the class of tradesmen than in that of the artisan and labourer, although the ratio of cases of consumption is greater in the latter class. This is doubtless accounted for by the fact already established, that the strong exertion which a considerable proportion of the labouring class employed within doors use in

their occupations, and the large number employed out of doors, has the effect of retarding the attack of pulmonary consumption. A glance at the following table will convince us of the justice of this explanation.

TABLE V.

Nature of Occupation.	Under 30.	Under 40.
In-door, sedentary . . .	44.06	66.48
In-door	37.53	61.51
Tradesmen	32.80	59.78
Out-door	24.79	53.44
In-door, requiring great exertion	31.51	54.80

The tradesman, it will be seen, occupies the intermediate place between the in-door and the out-door labourer, between the artisan using little exertion and the artisan using much exertion. It is obvious, therefore, that the class of artisans owes the slight advantage which it enjoys over the tradesmen in respect of the time of death from consumption, to the comparatively healthy effects of strong exertion within doors, and of employment in the open air, which falls to the lot of a part of that class. Another point attracts attention in Table IV., viz., the great proportion of deaths from consumption occurring in the class of gentry from 15 to 20 years of age. Does not this show that the liability to the disease is greater in this class than in the two others; and does it not tend to strengthen the position, that the excess of deaths from consumption in the other classes is due to the unfavourable circumstances in which they are placed?

The ratio of deaths from consumption in the class of gentry, low as it is, would have been still lower if the medical men who are included in it were omitted. The number of cases of pulmonary consumption occurring in members of that profession is very remarkable, and it is a subject of regret with the author that they were not made a separate class.

If we assume that the numbers and proportions in the table are fair representations of the absolute and relative mortality from consumption in the three classes of society in London, and that it is possible, by due attention to the health of our tradesmen and artisans, to place them in as favourable a position as that which the gentry occupy in this respect; if, in other words, the ratio of consumptive cases, instead of being 1 to 2.60 in the case of tradesmen, and 1 to 2.29 in the case of artisans, were in both cases 1 to 5, there would be a saving in the metropolis alone in a single year of no less than 1123 lives.

Again, if we assume the approximate average age at death from consumption in the three classes to be the true age, we must add to these lives, unnecessarily sacrificed, 1937 years of life wasted.

It should also be borne in mind that, taking one case with another, every death from consumption is preceded by two years of lingering illness; and that in a large proportion of cases the fatal attack of the disease is not the first, and that it is often the last of a series.

This rough estimate of the annual waste of life from consumption in the metropolis is formed from the deaths comprised in the tables, which

fall short of those actually occurring, inasmuch as all the deaths in work-houses, unless the employment happen to be stated, are omitted. In order to ascertain more nearly the actual number of deaths from this cause, and the probable waste of life, I propose to calculate the number of deaths occurring in the metropolis, and in England and Wales, from the data furnished by the report of the Registrar General.

Estimate of the number of cases of Pulmonary Consumption occurring annually in the Metropolis, and in England and Wales.

It has already been stated that the number of cases entered in the mortuary registers as pulmonary consumption, or under synonymous titles, between the ages of 15 and 50, is probably a near approximation to the true number; for the number of other diseases, accompanied by slow decay, occurring between these two ages is comparatively small, and certainly bears a much less proportion to true cases of pulmonary consumption than those entered as such, either before 15 or after 60. On referring to the mortuary registers of the metropolis for 1840-41,* it will be seen that no less than 3120 deaths from consumption are entered under 15, and as many as 747 after 60; while the number between 15 and 60 is 10,698; now it must be obvious that these are not deaths from pulmonary consumption; for the deaths from that disease, under 15 and above 60, do not bear any such proportion to the deaths from the same cause between 15 and 60. How then is this error to be corrected? and how is the true number of deaths from pulmonary consumption to be estimated? The easiest and simplest method is to start with the assumption that the cases entered as consumption, between 15 and 60, are cases of true pulmonary consumption, and then, having ascertained the proportion which the number of deaths from this disease, under 15 and above 50, bears to the number between 15 and 60, to calculate the number that ought to have been entered on the mortuary registers.

In the absence of any accurate tables of the relative number of cases of pulmonary consumption at these three periods† of life, I avail myself of the tables of deaths occurring in the London hospitals during 1840, and published in the Annual Report of the Registrar General for 1842, p. 292. These cases are correctly reported, and on the authority, in most instances, of an examination of the body after death. Before proceeding to make use of these data, it is necessary to premise, that it is not the absolute number of deaths from pulmonary consumption in the London hospitals, which it is proposed to make use of, but merely the relative numbers at different ages.

The number of deaths from pulmonary consumption, occurring in the London hospitals during the year 1840, was 412, which were thus distributed—

Under 15	4
15 to 60	396
60 and upwards .	12

The number of deaths, then, occurring under 15 years of age is only one in 99 of those occurring between 15 and 60, while the number of

* Fourth Annual Report of the Registrar General, 1842, p. 330.

† The tables given by Sir James Clerk, in his work on Consumption, do not comprise the first period under 15.

those occurring after 60 is one in 33. Assuming for the present that these are the real proportions, it will be easy to calculate the deaths occurring in the metropolis, and in England and Wales.

The deaths from consumption, between 15 and 60, registered in the metropolis, during the two years 1840 and 1841, were 10,688, or, for one year, 5344: the total number, therefore, according to the above suppositions, will be—

From 15 to 60	. 5344
Under 15	. . 54
Above 60	. . 162

Total for the metropolis during one year . 5560

This is about one-eighth of the deaths at all ages, and somewhat less than one-fourth of the deaths of all above 15 years of age.

Now the deaths in the metropolis from all causes, during 1841-42, were 90,556, or, for one year, 45,278; and assuming that the mortality from pulmonary consumption, in England and Wales, bears the same proportion to the total mortality, as it does in the metropolis, we have the proportions—

5560 : 45,278 :: 42,223 : 343,847

—343,847 being the number of deaths from all causes in England and Wales during 1841. This number falls short of the number entered in the mortuary registers, under the general title of consumption, by 17,369 deaths.

This calculation assumes that the relative mortality for the whole kingdom, from pulmonary consumption, is that of the metropolis; an assumption obviously incorrect, and greatly exaggerating the actual mortality from that cause. In order to arrive at a truer estimate of the mortality, it may be fairly assumed that the mortality from pulmonary consumption, for England and Wales, bears the same relation to the mortality of the metropolis, as does the mortality from all causes. This will give the following proportions,—

42,223 : 35,566 :: 2,605 : 2,219

The number of deaths from pulmonary consumption, occurring every year in England and Wales, may therefore be stated, in round numbers, at about 36,000, being rather less than one-ninth of the mortality from all causes at all ages, and 1 in less than 6 of the total deaths occurring above 15 years of age.

It must be understood that this estimate is put forth merely as a rough approximation, and not as a precise calculation. The materials for a more just estimate are still wanting.

Having thus obtained a rough approximation to the number of deaths from pulmonary consumption, occurring in the metropolis and in England and Wales respectively, I resume the consideration of the waste of life due to this cause. The 5560 deaths include males and females, and the first step in the inquiry is to ascertain how many of them belong to each sex. For this purpose, I avail myself of the Hospital Reports for 1840, in which the sex, age, and cause of death are registered, and I find that in 100 deaths from all causes, there are in males 19 deaths from

consumption, and in females 15; and as there is no obvious cause of this disparity, except the relative frequency of the disease in the two sexes, I assume this to be the true ratio. From this ratio it is easy to calculate the number of deaths from consumption occurring in the two sexes; they are in males 3107 and in females 2453. The number of deaths from pulmonary consumption, comprised in the foregoing tables, as occurring in males of all ranks during the year 1839, is 2673; a number falling short of the above estimate by 434, which probably represents the deaths from pulmonary consumption occurring in workhouses in 1839 in men whose employments were not mentioned. The total deaths of adult paupers during that year was 3062, and if we assume that the deaths were equally divided between the two sexes, we shall have 1531 deaths occurring in males; and, on the supposition that the deaths from consumption formed one-fourth of the total deaths, 383 deaths from that disease. Now 383 added to 2673 gives 3056 instead of 3107, the number according to the foregoing estimate. The slight difference still existing may probably be accounted for by the excess of deaths of men whose employments were not stated over men dying in workhouses whose previous employments were stated. This latter class was a very large one.

The estimated number of 3107 deaths may probably be regarded as a very close approximation to the number of males of all ages and classes dying of pulmonary consumption every year in the metropolis; and if the distribution according to rank be assumed to be that of Table IV, we shall have the 3107 deaths from consumption divided as follows:—gentry and professional men 193; tradesmen 219; and artisans, &c. 2695; the deaths from all other diseases for the three classes being 971, 569, and 6171. Now if the deaths from pulmonary consumption in the classes of tradesmen and artisans, bore the same proportion to all other causes of death as they do in the class of gentry, we should have, in the place of 3107 deaths from that disease, only 1541, being a saving of 1566 lives, and, on the supposition that the average age of death is that of Table IV, of 20.4 years of life; moreover, for each of the 1566 lives prematurely sacrificed, we must reckon at the very least 3132 years of lingering illness during the very prime of life. If the same calculation corrected by the fraction $\frac{1}{3}$, which represents their relative liability to consumption, were applied to the deaths of females, it would raise the estimated annual waste of life to 2212, with an additional loss of 2845 years of life.

In all these calculations it is assumed to be possible, to place the classes of tradesmen and artisans in the same favourable circumstances as the gentry. Can this be done? It would be a great stretch of imagination to suppose that it could be done at once. In all great ameliorations time is an essential element—time for the reformation of bad habits—time for the widening of streets, the enlarging of houses, the re-constructing of workshops, the shortening of hours of labour, for drainage and ventilation, for the more abundant supply of water, for public baths, for the increase of open spaces for exercise and recreation. Habits of intemperance will not suddenly grow into disease, nor will a desire for pure air be created in a day. As in the case of temperance, so in that of ventilation, the example must be set by the higher classes, before the contagion can be expected to spread to the lower. So long as the rich

shall be content to endure the stifling atmosphere of crowded places of assembly, whether public or private, and to sleep in rooms from which fresh air is sedulously excluded, the poor may be expected to remain indifferent to the foul air of their workshops, and to submit without a murmur to the manifold inconveniences of their places of residence. It is only, then, after the lapse of years that the condition of the tradesman and artisan can be expected to be so improved as to reduce their present fearful mortality from consumption to the low level of the more forward classes. Much, however, may be done at once. Some provision at least may be made for the ventilation of houses and workshops, and for the shortening of hours of labour. Such a provision would save, in the metropolis alone, many hundreds of lives every year. This is not a matter of conjecture, or a loose estimate merely, but admits of demonstration.

It has already been shown (Table II.) that the ratio which deaths by consumption bear to those from all other diseases, is higher in the case of men employed within-doors than in those working in the open air, being in the one case 1 to 1.98, and in the other 1 to 2.56. Now it is well known that, as a general rule, men employed in-doors earn higher wages than those who work out of doors, and that therefore they have the means of procuring better lodgings, clothing, and food. In all these things they have the advantage. They differ in this, that the in-door labourer, while he shares, though in a less degree, the household inconveniences of the out-door labourer, is confined for many hours of each day in heated and ill-ventilated apartments. A large proportion of men so occupied have as much exercise as men employed in the open air; the occupations of the remainder are of a more or less sedentary nature. Those whose employments require more or less exertion, differ from out-door labourers only in the air they breathe; and those who lead a sedentary life, partly in this, and partly in the absence of exercise. The experience of the wealthier classes addicted to sedentary pursuits, shows that such pursuits are not unfavourable to health and longevity. Hence there is good reason to believe that the in-door labourer owes his ill-health, not so much to the sedentary nature of his employment, as to the foul and heated air which he is constrained to breathe. If this reasoning be valid, it will be easy to show what number of deaths occurring among the in-door labourers might be prevented. A simple calculation, based on Table II., shows that the excess of deaths from consumption in the 2774 in-door labourers over the deaths from the same disease in an equal number of out-door labourers, is 150. Out of 980 deaths from consumption, therefore, no less than 150, or about one-sixth, may fairly be assumed to fall victims to the foul air of the workshop. If the entire estimated number of deaths from pulmonary consumption occurring among artisans, be divided between the two classes of in-door and out-door labourers, we shall have the number raised to 214; and the addition of lives prematurely sacrificed, and females, would swell this number to 400 a-year.

The estimates which have been thus formed of the waste of life in the metropolis, will have to be more than doubled to give the waste for the whole of England and Wales. A simple calculation founded on the number of deaths from consumption taking place in 25 town districts,*

* Registrar-General's Report, for 1843, p. 159.

on the supposition that the waste is in the same proportion in those districts as in the metropolis, gives us as the number thus sacrificed 4882, of which number 1000 deaths seem to be fairly traceable to the unwholesome condition of workshops and factories, and the remainder to the state of their dwellings, added to habits of intemperance, and the privations to which they are occasionally exposed.

What part of this waste is to be attributed to causes over which the poor have virtually no control, and what part to their own habits of life, it is of course impossible to state; but after making a liberal allowance for the effects of intemperance, and the occasional use of scanty or unwholesome food, there can be no room to doubt that a fearful waste of human life at present takes place, and that much of this may be prevented by the improvement of dwellings and workshops. Such improvement would doubtless bring with it, as a necessary consequence, a great improvement in the habits of the labouring class; for it has been clearly proved, and is, in fact, a necessary consequence, that all causes of exhaustion are indirectly causes of intemperance. Some experience of the poor, and inquiries expressly directed to this point, have convinced me that they are led into this baneful habit not so much by a love of intemperance and of its treacherous pleasures, as by the opinion that spirituous liquors are necessary to the support of their strength. Those who use strong exertion in their employments drink because they think that without spirituous liquors they could not do their work; but those who lead sedentary employments are often compelled to drink that they may neutralize the debilitating effect of an atmosphere which in extreme cases may be, with little exaggeration, described as combining the temperature of an oven with the foul air of a sewer. If they had pure air, they would soon cease to regard spirituous liquors as necessary to their existence, and the habits which grew out of a supposed necessity, might be fairly left to the correcting influence of experience and example. If those evils were once corrected over which the labouring class have no control, they would not be slow to perfect the work of a wise and far-seeing legislation.

Hitherto the attention of the public has been directed chiefly to the waste of human life, and the consequent misery and expense caused by fevers due to the bad drainage of towns and streets, and the defective construction of the houses of the poor; but those who have so successfully laboured to rouse the public to a sense of these fearful evils, and of the responsibilities growing out of them, have been ignorant of, or have disregarded the more silent and stealthy ravages of a disease which is as surely the result of foul air, overcrowding, and confinement, as fever itself of deficient drainage and unwholesome habitations. If the condition of the dwellings of our poorer classes is justly chargeable with the fevers to which they are constantly falling victims, to the state of our workshops and our long hours of work is as certainly to be attributed a large proportion of the cases of consumption which form so fearful an item in our mortuary registers. If the entire population of this country could be surrounded by influences as wholesome as those to which the higher classes owe their better health, longer life, and comparative immunity from consumption, the number of cases of pulmonary consumption would be greatly reduced, and some thousands of the most valuable part of our population might be saved. This rough estimate may be

TABLE VI.

Nature of Occupations.	Ratio of Deaths from Consumption (all other Diseases) to Deaths from all other Diseases.	Per Centage of Deaths from Consumption (all other Diseases) to Deaths from all other Diseases.	Per Centage proportion of Deaths from Consumption.			Per Centage proportion of Deaths from Consumption.			Per Centage proportion of Deaths from Consumption.		
			Under 20.	20-40.	Above 40.	Under 20.	20-40.	Above 40.	Under 20.	20-40.	Above 40.
Indoor	1 to 3-95	10-98	65-71	27-33	41-53	21-86	39-98	3-74	0-23	6-71	98
Overseer	1 to 3-54	20-38	42-39	34-79	33-44	16-86	34-98	3-99	0-33	6-91	99
Indoor	1 to 1-15	31-08	61-27	44-06	66-48	44-34	49-29	3-71	0-19	48-96	98
Requiring little exertion	1 to 3-95	32-41	60-81	39-36	33-49	39-71	30-79	3-77	0-29	68-06	101
Requiring more exertion	1 to 4-44	40-63	67-58	31-51	44-60	37-61	32-41	1-33	0-27	47-75	99
Requiring great exertion	1 to 5-04	48-63	67-58	31-51	44-60	37-61	32-41	1-33	0-27	47-75	99
With varied exertion	1 to 3-33	47-39	67-27	31-37	41-05	34-56	41-86	0-53	0-23	43-86	99
One door	1 to 4-05	32-96	53-46	32-73	59-56	44-34	39-58	3-16	0-54	47-70	99
Requiring moderate exertion	1 to 4-05	32-96	53-46	32-73	59-56	44-34	39-58	3-16	0-54	47-70	99
Requiring greater exertion	1 to 4-05	32-96	53-46	32-73	59-56	44-34	39-58	3-16	0-54	47-70	99

TABLE VII.

Conditions.	Per Centage proportion of Deaths.			Average Age.	Greatest Age.	Per Centage proportion of Deaths.		
	Under 20.	20-40.	Above 40.			Under 20.	20-40.	Above 40.
Gentlemen, &c.	9-10	20-10	0-80	58-61	98	1 to 5-00	29-51	56-62
Tradesmen, &c.	10-00	20-10	0-80	58-61	98	1 to 5-00	29-51	56-62
Artisans, &c.	10-00	20-10	0-80	58-61	98	1 to 5-00	29-51	56-62

very far from the truth; but it is better to err in this way than, by confining ourselves to the establishment of dry abstract principles, however interesting or important, to let pass an opportunity of forcibly drawing the attention of the public to a great evil, equally commanding and admitting of a remedy.

In all investigations of this nature there is much room for error. Some standards of comparison essential to accuracy are at present wanting. Causes and effects are so mixed up that it is impossible to separate them. The disease which by destroying the adult puts a younger man into his place, also alters the distribution of the population, so as to swell the number of its own victims; and thus all attempts at perfect accuracy are rendered abortive. Approximations, confessedly imperfect, and estimates necessarily rude, must hold the place of those accurate results which force conviction. The author would therefore again guard against misconception. He has not dared to characterise his results as certain or accurate, but merely as approximations to truth, and probabilities more or less strongly confirming one another. His estimates are open to correction, and await that correction at the hands of himself or others; but he trusts that, in the absence of that certainty of which he is in search, the probabilities he has established will serve the purpose of attracting attention to a part of the great subject of public health which has hitherto received comparatively little attention; and, in conclusion, he may be allowed to express his own conviction, that the evils which have been pointed out are not exaggerated.

Two tables are subjoined, which form a useful summary of the chief probabilities thrown together in the three communications, of which this is the last.

On the Progress of the Population of Russia. By MAJOR GRAHAM, Registrar-General.
General Register Office, June, 1844.

SIR,

I ENCLOSE an abstract of a Return which I have recently received of the population, marriages, births, and deaths, in the principal provinces of the Russian empire. I am indebted to the liberality of Count Nesselrode for this Return; which was procured at the instance of Lord Aberdeen, by Lord Stuart de Rothesay, and forwarded to me by Sir James Graham.

I have obtained from other countries similar Returns, to compare with those made under the Registration Act in England. I submit this to the Members of the Statistical Society, as I believe that no Return of the kind has been published before out of Russia; and it appears to me to possess an unusual degree of interest, not only from its novelty, but from the extent of the population, and the varieties of climate and circumstances in which the people of the several provinces are placed.

The Return is for the year 1842, and the abstracts of marriages, births, and deaths, had not been received from Georgia, Kourak, the Trans-Caucasian, or the Caspian provinces: neither have we included in the Return Finland, Poland, the Don Cossacks, the Cossacks in the country of the Black Sea, and of the Oural; the provinces of Iakoutsk, Kamschatka, Okhotsk, or Russian America. The population of the Russian empire exceeds 60,000,000; of which the Returns from 53

provinces specify 52,682,711; and give the marriages, births, and deaths among 49,525,420 persons (24,559,414 males, and 24,966,006 females) in the European (and partly Asiatic) provinces,—in Tobolsk, Tomsk, Irkutsk, and Baikal,—four provinces of Siberia. The marriages returned were 501,850; the births 2,205,422; the deaths 1,856,183.

The excess of births over deaths was 349,239. This would indicate an increase of 0·7 per cent. (or 7 per 1000) annually.

	Males.	Females.	Total.
Population	24,559,414	24,966,006	49,525,420
Married	501,850	501,850	1,003,700
Births	1,127,122	1,078,300	2,205,422
Deaths	931,635	924,548	1,856,183

The proportion of marriages, births, and deaths, to the population, is shown in the annexed Table (A). I think it very probable that the Returns of births and deaths include still-born children, which are generally registered on the Continent, but have not hitherto been registered in England. As the Returns stand, the births were 4·45 per cent., the deaths 3·75 per cent., of the population. A correction for the still-born would reduce the births to about 4·2, the deaths to 3·5 per cent.

In Russia 1 in 99 persons marries yearly; in England the proportion of marriages is much less, 1 in 128. The births in Russia are more than 8 per cent. on the female population. The mortality in Russia was 1 in 27; and as the population is increasing, we know that the mean duration of life is somewhat lower than 27 years. The mortality in England is 1 in 45 annually, and the expectation of life 41 years.

The comparison would seem to indicate that in Russia marriages are earlier than in England—that more persons marry—that the number of children borne by a given number of women is greater in a given time—that fewer children attain maturity—and that, notwithstanding the rigorous climate, and the causes of insalubrity, the excess of births over deaths adds 300,000 or 400,000 persons every year to the part of the population embraced in the Returns.

The area of the Russian empire is estimated at 7,700,000 English square miles. The area of the 49 European provinces, for which the population of 49,102,697 was returned, is 1,731,324 English square miles; the density is therefore 28 persons to an English square mile, and 38 to a geographical square mile. The density of England and Wales was 276 persons to an English, 366 to a geographical, square mile, in 1841. The area of the two provinces of Siberia,—Tobolsk and Tomsk,—is said by Mr. Koeppen in an official statement (quoted by McCulloch) to be equivalent to 1,887,569 English square miles. The population of these provinces was 1,315,461 in 1842; and the mean density was therefore less than 1 person to every square mile,—it was 7 to 10 square miles. In the rest of the empire around the arctic region, to which our Return does not extend, there is, according to Mr. Koeppen's statement, not more than 1 person to 4 English square miles.

Russia, as is well known, is divided into vicerealties, provinces (or oblasts), and districts. The Return in my possession gives the population, marriages, births, and deaths, in each district and province. The abstract which I enclose carries the subdivision no further than provinces.

The Table (B) of the proportion of marriages, births, and deaths, in each province to 100 females living, shows that in some parts of Russia the mortality is less than in some counties of England; but, as a general rule, the mortality was greater than in England. It was greatest in the southern provinces,—from Nijgorod to Ekaterinoslav on the Sea of Azov, including the most fertile of the corn districts, Kharkoff, Penza, Pultava, Viatka, Nijgorod, Saratoff, Riazan, Ekaterinoslav, Orel, Tamboff. The annual mortality was from 4·3 to 5·3 per cent. in these provinces, which lie in the basin of the Dnieper, Don, and Volga; with the general aspect of the country looking south, and towards the Black Sea, the Caucasus, and the Caspian.

The mortality of the northern parts of Russia is generally below 3 per cent. annually; this was the case in Archangel, Minsk, Courland, Esthonia, Oloneitz, Pakoff, Vologda, Kalouga, Grodno, Vitepsk, Novgorod, Moghileff. The rivers of those regions flow north or north-west into the Arctic Ocean, the White Sea, and the Baltic. In Wilna and Livonia, the mortality was 3·3 and 3·2, slightly above 3 per cent; in Petersburg (province) 3·8 per cent: with these exceptions, the mortality of the parts sloping towards the north or north-west, was a fourth or a fifth less than in the southern provinces.

In Tomsk and Irkutsk, two vast provinces of Siberia, the mortality was so low as 2·4 per cent.; in Tobolsk, however, it was 3·6 per cent.

These remarks refer to females, but the mortality of males and females is nearly the same in Russia.

This Return, I may remark, has evidently been drawn up with great care and accuracy. It gives us a high opinion of the administrative talent and energy with which the Government is carried on.

Those acquainted practically with these matters will be aware how arduous an undertaking it must be to procure a census, and periodical Returns of the marriages, births, and deaths, from such a vast population, so thinly scattered over the face of the country, that in some provinces there is not one inhabitant to a square mile of territory.

The mere fact of registering the marriages, births, and deaths, is also a proof of the deep interest with which the Russian Government regards, and endeavours to promote, the physical interests of the population under its charge.

I am, Sir,

Your obedient Servant,

GEORGE GRAHAM,

Registrar-General.

Joseph Fletcher, Esq.,
&c. &c.

TABLE A.
Rate of Increase of the Population of Russia; and Proportion of Marriages,
Births, and Deaths, to the Population, in England and Russia, compared.

	Annual rate of increase, -7 per cent.—Males, +81; Females, +62.								
	One Marriage to			One Birth to			One Death to		
	Males	Females	Males and Females	Males	Females	Males and Females	Males	Females	Males and Females
Russia (1842) . . .	49	50	99	11	11	22	26	27	27
England (1838-41) .	63	65	128	15	16	31	43	47	45

	To 100 Males			To 100 Females			To 100 Persons		
	Marriages	Births	Deaths	Marriages	Births	Deaths	Marriages	Births	Deaths
Russia* . . .	2.643	8.986	3.793	2.010	8.834	3.703	1.013	4.453	3.748
England . . .	1.599	6.539	2.308	1.528	6.250	2.131	.781	3.197	2.219

* The still-born are probably included in the Russian returns of births and deaths. Applying a correction derived from the Prussian returns, in which the numbers still-born are specified, the corrected mortality of Russia will be 3.590, the births 4.295, per cent. annually.

Note.—The return does not state the ages of the living, the ages at death, nor the causes of death; but it is very probable that all these particulars will ultimately be procured. Professor Schubert's volume, "Das Russische Reich," in his "Handbuch der Allgemeinen Staatskunde von Europa," contains a tolerably good account of the progress of statistics in Russia. The first census (Revision) was taken in 1723, in connexion with a poll-tax, and was to be repeated every 10 years; but it embraced only 5,794,928 males subject to the tax. The church registers were instituted by Peter the Great, in 1722; but their organization was only completed in the time of Catharine II. "From the time of Catharine," says Schubert, "two abstracts were made: (1) the one for the Senate, classed in governments and provinces, first introduced in 1768 by Count Sievers in the governments of Novgorod and Tver. It embraces all the religious sects, but has not *Adheres bene made public* ("und also bis jetzt noch nicht öffentlich bekannt gemacht"). (2) The other return, for the Holy Synod, is made in 36 eparchies, which only comprise the members of the Greek Catholic Church (Griechisch Katholischen Kirchen). A summary of this return is published every year."† Schubert's calculations are all founded on the ecclesiastical returns. It appears, therefore, that Russia has had for many years two systems of registration in operation (as England has at the present time),—the registers of the established Greek Church,—and the civil registers, which are made for the Imperial Government, and of which the return is Table C, is a detailed abstract.

† Schubert, vol. i. p. 147.

TABLE B.—Density of the Population, and Proportion of Marriages,
Births, and Deaths, in the several Provinces of Russia.

		Average Popu- lation, as a basis for the Rate (of 100 to 1 degree).	To 100 Females Living.		
			Marriages	Births	Deaths (of Females).
Northern Provinces.	1. Archangel . . .	9	1.546	8.100	2.222
	2. Olonets . . .	6	1.911	9.412	2.692
	3. Vologda . . .	7	1.841	9.306	2.801
	4. Petersburg . . .	41	1.755	9.739	3.770
	5. Novgorod . . .	21	1.828	9.102	2.972
	6. Pskoff . . .	43	1.565	9.112	2.765
	7. Smolensk . . .	70	2.247	9.823	3.269
	8. Moscow . . .	159	2.135	9.019	4.010
	9. Tver . . .	74	1.930	9.301	3.030
	10. Jaroslaff . . .	79	1.440	8.188	3.367
Great Russia.	11. Kostroma . . .	43	1.592	7.626	3.290
	12. Nijgorod . . .	79	1.950	8.758	4.684
	13. Wladimir . . .	85	1.821	8.332	3.941
	14. Riazan . . .	109	2.517	8.296	4.450
	15. Tamboff . . .	90	1.930	7.283	4.279
	16. Tuola . . .	139	3.223	8.411	4.171
	17. Kaluga . . .	109	2.138	7.812	2.866
	18. Orel . . .	117	2.421	9.311	4.320
	19. Koursk . . .	142	..	..	..
	20. Esthonia . . .	56	1.657	7.586	2.627
Baltic Provinces.	21. Livonia . . .	59	1.738	8.158	3.048
	22. Courland . . .	67	1.772	6.692	2.453
	23. Vitepsk . . .	59	1.128	8.532	2.928
	24. Moghileff . . .	63	2.129	9.263	2.983
	25. Minsk . . .	33	1.550	6.800	2.360
	26. Wilna . . .	69	1.940	8.911	3.345
	27. Grodno . . .	82	2.330	9.078	2.922
	28. Bielowostok . . .	103	1.572	7.773	3.025
	29. Volhynia . . .	92	1.689	8.764	3.764
	30. Podolia . . .	164	1.991	8.445	3.701
White Russia.	31. Kieff . . .	124	1.878	7.823	3.613
	32. Tchernigoff . . .	94	2.091	8.842	3.839
	33. Poltava . . .	85	2.339	8.041	4.737
	34. Kharkoff . . .	51	2.223	8.906	3.050
	35. Veronejs . . .	71	2.240	9.553	3.918
	36. Don Cossacks . . .	16	..	..	..
	37. Ekaterinow . . .	43	2.217	9.775	4.435
	38. Cherson . . .	49	1.539	8.898	3.294
	39. Crimea . . .	16	1.735	12.298	3.422
	40. Bessarabia . . .	54	2.614	11.003	2.980
Wolga and Caspian Provinces.	41. Kazan . . .	71	1.903	7.377	3.310
	42. Penza . . .	91	2.111	8.225	4.738
	43. Simbirsk . . .	68	1.976	9.055	3.693
	44. Saratoff . . .	30	2.025	9.099	4.610
	45. Astrakan . . .	3	1.858	8.750	2.990
	46. Caucasus, &c. . .	5	3.031	14.317	5.026
	47. Orenbourg . . .	16	2.665	9.804	3.533
	48. Perm . . .	34	1.817	9.668	3.744
	49. Viatska . . .	38	2.102	10.777	4.725
	50. Tobolsk . . .	..	1.772	10.138	3.574
Oural Provinces.	51. Tomsk . . .	..	1.461	7.580	2.295
	52. Irkutsk . . .	..	1.482	6.905	2.417
	53-5. Jakoutsk, Kama- chatka, (Khokotak) . . .	..	..	..	..
	54. Eniseisk . . .	..	1.392	9.735	3.307
	55. Eniseisk . . .	..	..	..	..
ENGLAND		316	1.528	6.250*	2.131

* It will be recollected that the English Return of Births is defective, and that the still-born are probably registered in Russia.

TABLE C.—Population, Marriages, Births, and Deaths, of the several Provinces or Governments in Russia, 1842.

	Area in square miles, and the Degree of the	Population.		Marriages.		Births.		Deaths.		Difference between Births and Deaths.	
		Males.	Females.	Total.		Males.	Females.	Total.		Males.	Females.
Northern Provinces:—											
1. Archangel . . .	92,362	107,445	111,784	229,229	1,774	4,781	4,516	9,297	2,618	2,551	5,169
2. Vologda . . .	37,664	117,715	121,855	239,570	2,348	5,792	5,771	11,563	2,638	2,607	2,554
3. Vologda . . .	110,660	367,901	414,341	782,242	7,628	19,875	18,673	38,548	11,250	11,902	9,625
Great Russia:—											
4. Petersburg . . .	11,369	226,437	235,364	461,801	4,531	11,784	11,595	23,379	10,133	8,812	10,645
5. Novgorod . . .	33,720	310,421	309,862	620,283	7,053	17,744	17,403	35,147	10,602	22,029	5,605
6. Pskov . . .	16,720	350,574	369,450	720,024	5,677	17,321	16,515	33,836	10,307	10,118	30,555
7. Smolensk . . .	15,254	322,392	341,448	663,840	12,164	37,183	35,996	73,179	17,811	17,408	35,569
8. Moscow . . .	8,867	1,017,317	1,017,317	2,034,634	15,647	47,947	47,947	95,894	15,647	15,647	0
9. Tver . . .	12,912	632,453	679,476	1,311,929	12,933	32,437	30,906	63,343	21,190	20,309	41,499
10. Yaroslavl . . .	12,912	431,893	461,868	893,761	8,091	23,459	22,547	46,006	17,219	16,516	16,135
11. Kostroma . . .	23,008	469,683	519,490	989,173	11,178	30,423	28,109	58,532	16,491	15,457	30,075
12. Vladimir . . .	13,296	545,371	583,431	1,128,802	10,622	28,717	27,011	55,728	22,465	22,911	43,456
13. Riazan . . .	11,312	620,533	669,449	1,290,482	13,343	36,667	34,403	71,070	27,124	25,893	7,002
14. Tula . . .	18,432	527,329	581,374	1,108,703	15,147	38,545	36,147	74,692	22,498	21,851	6,841
15. Tambov . . .	8,655	471,683	471,683	943,366	10,092	19,215	17,786	37,001	13,667	13,429	36,596
16. Penza . . .	12,680	605,730	714,848	1,320,578	17,305	33,596	32,863	66,459	30,548	29,579	61,447
17. Saratov . . .	15,794	901,683	907,127	1,808,750	17,305	33,596	32,863	66,459	30,548	29,579	61,447
18. Orel . . .	5,640	135,524	147,522	283,046	5,440	5,733	5,438	11,171	4,679	3,869	7,948
19. Kursk . . .	13,416	376,100	406,028	782,128	7,068	17,120	16,653	33,773	12,342	12,396	24,738
Little Russia:—											
20. Ekaterinoslav . . .	17,640	237,307	272,122	509,429	8,824	9,536	8,951	18,487	6,856	6,079	10,863
21. Lvov . . .	17,640	237,307	272,122	509,429	8,824	9,536	8,951	18,487	6,856	6,079	10,863
22. Galicia . . .	17,640	237,307	272,122	509,429	8,824	9,536	8,951	18,487	6,856	6,079	10,863
Other Provinces:—											
23. Vitebsk . . .	12,448	363,770	375,602	739,372	4,232	16,247	15,770	32,017	11,206	10,888	22,184
24. Minsk . . .	37,128	521,693	521,693	1,043,386	9,880	19,637	17,411	37,048	12,494	12,202	25,253
25. Minsk . . .	37,128	521,693	521,693	1,043,386	9,880	19,637	17,411	37,048	12,494	12,202	25,253
Other Provinces:—											
26. Vilna . . .	18,476	650,417	682,770	1,333,187	12,277	29,170	27,216	56,386	22,136	21,459	43,303
27. Grodno . . .	9,120	401,113	344,533	745,646	5,067	16,184	15,523	31,707	10,682	10,468	21,239
28. Białystok . . .	2,452	123,153	132,011	255,164	2,458	5,391	4,923	10,314	4,085	4,017	9,102
Other Provinces:—											
29. Volhynia . . .	17,668	711,674	699,463	1,411,137	11,814	31,150	30,153	61,303	27,049	26,224	53,377
30. Podolia . . .	9,216	762,317	753,371	1,515,688	15,033	33,823	32,453	66,276	25,695	25,601	52,996
31. Kyiv . . .	14,808	770,725	815,867	1,586,592	14,808	33,823	32,453	66,276	25,695	25,601	52,996
32. Tchernigov . . .	14,808	770,725	815,867	1,586,592	14,808	33,823	32,453	66,276	25,695	25,601	52,996
33. Poltava . . .	16,992	892,184	915,867	1,808,051	14,131	30,422	29,553	59,975	25,403	25,189	52,392
34. Khar'kov . . .	12,448	363,770	375,602	739,372	4,232	16,247	15,770	32,017	11,206	10,888	22,184
35. Chernomorsk . . .	2,452	123,153	132,011	255,164	2,458	5,391	4,923	10,314	4,085	4,017	9,102
New Russia:—											
36. Ekaterinoslav . . .	16,992	403,145	409,331	812,476	8,943	10,880	10,445	21,325	17,715	17,886	35,601
37. Cherkassk . . .	17,668	711,674	699,463	1,411,137	11,814	31,150	30,153	61,303	27,049	26,224	53,377
38. Cherkassk . . .	17,668	711,674	699,463	1,411,137	11,814	31,150	30,153	61,303	27,049	26,224	53,377
39. Bessarabia . . .	12,704	381,688	323,561	705,249	8,437	18,157	17,411	35,568	10,255	9,641	19,896
Other Provinces:—											
40. Kazan . . .	17,668	403,145	409,331	812,476	12,477	25,068	23,312	48,380	21,510	21,704	43,214
41. Perm . . .	10,784	482,501	503,707	986,208	10,784	25,068	23,312	48,380	21,510	21,704	43,214
42. Simbirsk . . .	18,216	625,817	622,512	1,248,329	12,303	25,438	23,682	49,120	22,801	23,865	46,666
43. Samara . . .	15,794	901,683	907,127	1,808,810	15,794	901,683	907,127	1,808,810	15,794	901,683	907,127
44. Gorkum, &c. . .	28,848	83,384	71,371	154,755	2,163	5,132	5,086	10,218	4,079	3,857	7,666

* The area, as estimated by Mr. Keppeler, an officer in the Russian service, is given by McCulloch in German square miles, which have here been converted into geographical square miles by multiplying the original numbers by $\sqrt{10} = 3.16227766$. No attempt is made to give the area in German square miles.

* The area, as estimated by Mr. Kerguelen, an officer in the Russian service, is given by McCallum in German square miles, which have here been converted into geographical square miles by multiplying the original numbers by 16 (= 4²). There are 15 German miles to the degree (= 4 × 15) = 60 geographical miles.

† No entries.

<i>Ukraine:—</i>											
21. Vitepsk . . .	12,418	363,719	375,662	739,382	8,221	19,240	18,446	37,686	17,770	32,017	11,206
22. Minsk . . .	13,844	431,096	414,382	845,478	8,821	20,607	19,358	39,965	18,386	17,200	11,306
23. Minsk . . .	31,128	921,883	921,219	1,843,102	9,689	18,637	17,411	36,048	14,951	12,365	2,585
<i>Lithuania:—</i>											
25. Wilna . . .	17,668	650,417	632,740	1,283,157	9,226	19,174	17,416	36,590	22,136	21,169	43,205
26. Grodno . . .	18,195	401,313	344,733	746,046	8,025	16,180	15,623	31,803	12,462	10,300	2,460
27. Gdansk . . .	12,704	322,133	322,811	644,944	4,958	9,531	4,752	19,285	4,065	4,017	5,162
<i>Poland:—</i>											
28. Posen . . .	17,668	711,674	699,463	1,411,137	11,814	31,150	30,153	61,303	27,049	26,224	53,377
29. Volhynia . . .	17,668	711,674	699,463	1,411,137	11,814	31,150	30,153	61,303	27,049	26,224	53,377
30. Podolia . . .	17,668	711,674	699,463	1,411,137	11,814	31,150	30,153	61,303	27,049	26,224	53,377
31. Kurland . . .	12,704	322,133	322,811	644,944	4,958	9,531	4,752	19,285	4,065	4,017	5,162
32. Kovno . . .	17,668	711,674	699,463	1,411,137	11,814	31,150	30,153	61,303	27,049	26,224	53,377
33. Palung . . .	16,992	892,184	815,867	1,708,051	14,931	34,334	32,690	65,013	26,403	25,992	54,021
34. Kurland . . .	17,668	711,674	699,463	1,411,137	11,814	31,150	30,153	61,303	27,049	26,224	53,377
35. Vitepsk . . .	12,418	363,719	375,662	739,382	8,221	19,240	18,446	37,686	17,770	32,017	11,206
36. Das Gumb . . .	17,668	711,674	699,463	1,411,137	11,814	31,150	30,153	61,303	27,049	26,224	53,377
<i>New Russia:—</i>											
37. Ekaterinoslav . . .	18,776	402,145	403,321	805,466	8,943	19,880	19,343	39,223	17,715	17,886	35,601
38. Cherkassk . . .	17,668	711,674	699,463	1,411,137	11,814	31,150	30,153	61,303	27,049	26,224	53,377
39. Cherkassk . . .	17,668	711,674	699,463	1,411,137	11,814	31,150	30,153	61,303	27,049	26,224	53,377
40. Bessarabia . . .	12,704	381,688	323,561	705,249	8,437	18,157	17,411	35,568	10,255	9,641	19,896
<i>Wolga & Caspian Provinces:—</i>											
41. Kazan . . .	17,668	403,145	409,331	812,476	12,477	25,068	23,312	48,380	21,510	21,704	43,214
42. Perm . . .	10,784	482,501	503,707	986,208	10,784	25,068	23,312	48,380	21,510	21,704	43,214
43. Simbirsk . . .	18,216	625,817	622,512	1,248,329	12,303	25,438	23,682	49,120	22,801	23,865	46,666
44. Samara . . .	15,794	901,683	907,127	1,808,810	15,794	901,683	907,127	1,808,810	15,794	901,683	907,127
45. Saratov . . .	45,365	74,183	66,498	140,681	1,123	2,938	2,893	5,831	2,248	2,000	4,248
46. Astrakhan . . .	28,848	83,384	71,371	154,755	2,163	5,132	5,086	10,218	4,079	3,857	7,666
47. Astrakhan, &c. . .	28,848	83,384	71,371	154,755	2,163	5,132	5,086	10,218	4,079	3,857	7,666

† No entries.

TABLE C.—Population, Marriages, Births, and Deaths, of the several Provinces or Governments in Russia.—continued.

	Area included in the Province or Government	Population.		Marriages.		Births.		Deaths.		Difference between Births and Deaths.
		Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.
<i>Governments:</i>										
47. Orenburg	104,560	883,974	853,651	1,737,625	22,754	42,116	64,870	28,540	38,163	9,623
48. Perm	43,336	224,988	256,679	481,667	13,740	36,587	50,327	17,154	28,331	11,177
49. Viatka	37,952	716,373	804,613	1,520,986	16,516	43,292	59,808	37,151	58,020	20,869
<i>Governments:</i>										
50. Tobolsk	1,421,068	397,369	398,624	795,993	7,065	80,496	87,561	15,355	14,245	1,110
51. Tomsk	374,014	245,514	519,528	3,580	9,487	9,135	18,622	6,395	5,881	514
52. Irkutsk	257,569	239,077	496,646	3,512	8,009	7,900	15,909	6,276	5,779	497
53. Krasnoyarsk	No returns.									
54. Kamschatka	No returns.									
55. Okhotsk	No returns.									
56. Kamchatka	No returns.									
<i>Trans-Caucasian Provinces:</i>										
57. Georgia, Imeritia	54,096	..	..	..	1,413	5,275	4,862	4,916	3,358	1,558
<i>Caucasian Provinces:</i>										
Kartli-Kakheti (township).	..	..	..	..	..	..	..	..	..	..
Immeretia (township).	..	..	..	..	..	..	..	..	..	..
Abkhazeti (township).	..	..	..	..	..	..	..	..	..	..
Odesa (township).	..	..	..	..	..	..	..	..	..	..
Tiflis (township).	..	..	..	..	..	..	..	..	..	..
Yeghory (township and district).	..	..	..	..	..	..	..	..	..	..
Black Sea—Caucasian country	No returns received.									
Caucasus—Caucasian country	No returns received.									

* (37.) The sex not distinguished in 3 of 11 districts.

† No returns.

Statistical Report on the Physical and Moral Condition of the Working Classes in the Parish of St. Michael, Blackrock, near Cork. By NORTH LUDLOW BEAMISH, F.R.S., President of the Cork Scientific and Literary Society.

[Read before the Statistical Section of the British Association at Cork, August, 1843.]

THE parish of St. Michael comprehends the district generally known under the name of the "Peninsula of Blackrock;" being bounded on the north and east sides by the river Lee; on the south, by the tributary stream of Tramore, which forms, with the confluence of the tide, the "Douglas Channel;" and on the west, by the town parishes of St. Nicholas and St. Finn Bars, the former meeting it about one mile from the city of Cork. It contains 1,929 acres, or three square miles, nine acres. The whole population in April, 1843, was 2,630, consisting of 457 families, living in 413 houses; 61 houses are uninhabited, and 9 are in progress of building. Of the population, 2,187 are Roman Catholics, and 443 Protestants, including dissenters, being a proportion of nearly 5 to 1 in a district much inhabited by Protestant gentry. The Catholic males number 1,042, females, 1,145; Protestant males, 197, females, 246;—800 males and 900 females are over 14 years of age; 439 males and 491 females are under that age. Ninety families are living in one room to each family; 260 in two rooms, and 207 in three or more rooms to each family; the average number of persons to a bed is three.

The whole number of the gentry is 372, leaving that of the working classes, 2,258; of these, 1,125 are males, and 1,133 females, which may be thus classified:—

Males.		Females.	
Carpenters	15	Gingle drivers*	13
Masons	14	Lime-burners	18
Slaters	12	Brick-makers	36
Tailors	10	Fabermen	111
Shoemakers	14	Male servants	79
Smiths	9	Launders	212
Copers	3	Aged and infirm	46
Cabinet-makers	2	Children	426
Gardeners	32		
Farmers	53		
Total Males 1125		Total Females 1133	

In the above enumeration are not included the inmates of the Ursuline convent, numbering 50 nuns, 80 boarders, and 20 servants; Mr. Rudkin's academy for young gentlemen, containing 26 Protestant males; and Miss Bergin's seminary for young ladies, containing 16 Protestant females.

One hundred and thirteen of the working classes hold land, varying from a quarter of an acre to seven acres each. They pay an average yearly rent of 3d. per acre, exclusive of poor rate and county rate; the

* Generally owners.

former of which may be averaged at 1*s.* 10*d.*, and the latter at 5*s.* 10*d.* per acre annually. Those holding under leases are also subject to the payment of tithe, which averages 2*s.* an acre; but this is not now very strictly enforced in the parish from the small holder, the landlord being at present immediately responsible to the minister. The soil is generally excellent, and capable of bearing the finest wheat crops. The course of tillage is potatoes and wheat alternately; the former being manured, but so indifferently, and the general preparation of the land being so imperfectly performed by the working farmer, that the potato crop seldom yields more than seven tons, or the wheat more than six barrels of 20 stone, or about 34 English quarters per acre, being not more than two-thirds of the produce of the same description of land under a proper system of tillage. Great ignorance, or an indolent adherence to old habits, is exhibited in the application of manure, which is often left for days previous to use exposed, in small heaps, to the action of the atmosphere, and consequently to the loss of its most fertilizing qualities by evaporation. Many of the labouring class hire small portions of manured land from the gentry, for the purpose of speculating in early potatoes, which, if productive, and at the ordinary average price, yield them a fair profit. Such portions of land, varying from a quarter to two or three acres, let at the rate of 10*l.* to 12*l.* an acre, which, although apparently high, often yields a profit of 6*l.* to 8*l.* per acre. But of late years the produce of potato ground has been very uncertain; and when the crop fails, either the poor tenant becomes a severe loser, or fails to make good his agreement with the proprietor; generally, the emergency is met by abatements on the part of the landlord.

The number of men and boys able to work, and dependent upon work for subsistence, is 653. Of these, 370 are employed, and 283 unemployed. A great portion of the latter subsist on the earnings of some member of the family who is employed; others support themselves in a temporary manner by pledging or selling part of their effects; and others, on the alms of the benevolent. The workhouse is the last resource; and, at the present time, although 283 males and 308 females, or more than one-fourth of the working population, are without the means of earning their livelihood, in consequence of the want of employment, only three persons belonging to the parish are in the workhouse.

Wages.—Tradesmen's wages average 20*s.* per week; labouring men receive 5*s.* 10*d.*, women, 3*s.*, and children, 2*s.* per week; but many able-bodied men work for 5*s.* a week. For particular kinds of labour, such as quarrying, the wages are 1*s.* per week; and lime-burners receive 10*s.*, in consideration of being employed by night. From the superabundance of labour, wages do not, as formerly, rise in time of harvest, and good reapers can be had at the present moment (August, 1843), at the ordinary wages of 1*s.* a-day.

Food, Clothing, &c.—The food of the poorest labourer consists of potatoes and milk, or potatoes and salt-fish, the cost of which is about 9*d.* per head per week, or 4*s.* 8*d.* per week for a family of six. A considerable number, however, use meat and bread occasionally; 1,200, or more than one-half, once a-week; and 700, twice a-week. The average cost of food for the whole is 1*s.* 7*d.* per head per week, or 9*s.* 6*d.* per week for a family of six persons. The precarious condition and improvidence of the fishermen is much to be deplored. According to a

late Act of Parliament, they are prevented from fishing nearly one-half the year; and they are often unsuccessful at other periods; yet, while employed, they use bread and tea, the common labourer living on potatoes and milk, and they seldom put by anything to meet emergencies. Only three Blackrock fishermen have deposits in the savings' bank; these average 7*l.* each.

The cost of clothing annually is 18*s.* per head for a family of six; of coal, 9*d.* per week, for the same number: 1,200 men, and 800 women, or nearly nine-tenths of the working population, wear shoes and stockings; 320 have one or more pigs; 290 families only of the whole population have pig-sties. Of the 413 inhabited houses, only 230 are provided with privies; and the want of sewers, drains, water-shoots, and appropriate receptacles for carrying away the dirt and drainage from the houses of the labouring poor, is a great impediment to their cleanliness. One of the greatest wants which they experience is the want of water, as well for drinking as for domestic purposes. There are two public pumps of hard water, about a mile apart, but the water in one of these is of a very indifferent quality; at times, scarcely available for any domestic purpose, and the poor of this part of the parish are frequently obliged to send across the river to the opposite bank, at a distance of a mile, and at a great sacrifice of time and labour.

Three hundred and thirty-six of the working classes receive assistance from the loan bank, the average amount of each loan being 2*l.* 10*s.*; 38 have deposits in the savings' bank, averaging 10*l.* each; 300 have articles pledged, the amount of the united pledges of each individual averaging 2*l.*; 300 are in arrear of rent, at an average of 3*l.* The whole amount of arrear is 900*l.*

Education.—190 Roman Catholic males attend the Blackrock national school.

165 Roman Catholic females, Mrs. Murphy's free school in Ballintemple.

181 Roman Catholic females, the Convent free school.

80 Roman Catholic females, Mrs. Meade's school at Ballinlough.

37 Protestant males and females attend the Protestant free school in Ballintemple.

26 Protestant males, Mr. Rudkin's academy.

16 Protestant females, Miss Bergin's seminary.

Thus two-thirds of the children under 14 years of age are in progress of education. An average yearly sum of 3*l.* each is paid for the education of 142 of the children.

Of the 437 families into which the population is divided, and 87 of which only are gentry, 435 families possess books, and 236 the Bible.

The moral condition of the working classes is extremely good; the only crimes committed are petty larcenies, and there are only two illegitimate children in the parish. Habits of intemperance, as regards intoxicating liquors, are little known, nor can this favourable feature be attributed altogether to the temperance or total abstinence movement—unless, perhaps, by the influence of example; for out of the whole working population of 2,258, only 160 males, and 60 females, or less than one-tenth of the whole, have taken the temperance pledge.

The large proportion of unemployed persons, particularly females, in

this district, is much to be deplored. It may be mainly attributed to the large proportion of land under pasture, in the demences of the gentry, which thus limits the field work to little more than one fourth of the area of the district. There is no manufactory or public work, with the exception of small lime-works and brick-making, which employ but a very limited number of persons; the quarries and lime-kilns about 36 throughout the year; and the brick-making, about 90, of all ages, for three months.

As no registry of deaths is kept in the parish, no statistical statement can be made, or accurate conclusions drawn, as to the mortality of the working population. In the Catholic community there are generally five persons to a family; one baptism to every five families, and one marriage to every five baptisms, annually.

Sanitary Condition.—There is no endemic disease peculiar to the district. A light and dry soil thinly covers a limestone rock, the strata of which crop up at a high angle, in some places nearly perpendicular, causing a perfect drainage of the surface. In a few places, the soil rests upon hills of diluvial sand and gravel, which equally drain the surface. A few pools in hollows of the limestone, and two or three small springs, offer nothing to create marsh or boggy surface. Free, therefore, from miasmatic influence, intermittent fever or ague is almost unknown,—only six cases having received dispensary attendance during the last seven years.

Phthisis or consumption cannot be considered frequent, an annual average of only three cases of this disease fully developed, and an annual average of six cases of spitting of blood, appearing in the dispensary journal for the same period.

The total number of medical cases for the last seven years was 7,924, being an annual average of 1,132; surgical, 2,094, or an average of 299 annually. The total number of cases of all descriptions for the same period was 10,468, giving an annual average of 1,495½, or more than half the population.

A serious visitation of typhus fever took place in the first year of the septennial period (1836), the number of cases among the poor amounting to 353, or about one-seventh of the whole. This gradually subsided in the following years to 110, 85, 102, 63, 37, and 46.

In the years 1832 and 1834, the district was severely afflicted with cholera, after which it nearly disappeared: in the latter part of 1837, and beginning of 1838, it returned, but from the judicious treatment adopted by the dispensary physician, Dr. Haines, was followed by few fatal results.

On comparing the pulmonary with abdominal affections in this district, the singular fact is observable, that while the pulmonary affections exceeded the abdominal in each of the first six years (1836 to 1842,) the order is reversed in the seventh year. This may be referred to the altered condition of the climate, the past summer having been unusually dry and warm, which conclusion appears to be strengthened by the fact, that the actual as well as relative proportion of pulmonary affections throughout the year was diminished, while, notwithstanding the plentiful potato crop, the actual and relative proportion of abdominal disorders among the poor was augmented.

Statistics of Fires in London.

In the number of this Journal for September, 1838 (vol. i. p. 283), an account was given of the formation and organization of "The London Fire-engine Establishment," which not only created for the first time an effective system for extinguishing or arresting actual conflagration, but also originated a regular accumulation of data respecting the most prevalent accidental causes of fire, calculated to afford important suggestions as to the means, yet more desirable, of preventing the occurrence of this formidable species of individual disaster and public danger. As regards the primary object of the combination, the more prompt extinction of fires actually broken out, the paper in question shows to what extent it had been attained in the course of the first five years during which the establishment was in operation, from 1833 to 1837, from the data furnished by the registry which it regularly keeps of the number, extent, &c. of fires in every year; the most important fact thus indicated being, a considerable diminution of the proportion which the number of fires wherein the premises were either wholly consumed or seriously damaged, bore to the total number of cases.

As regards the causes of fires, the first class of facts furnished by the records of the Establishment is that which relates to the respective degrees of liability to such accident attaching to the nature of the premises or their occupancy. The paper in this journal already referred to, presents a list of those descriptions of occupation of premises in which fires had occurred most frequently during the same period of five years, stating the number that had happened in each kind of occupation; from whence naturally follow certain deductions as to the comparative chances of fire necessarily attending particular trades and occupations.

A still more important kind of data supplied by the same systematic registration, consists in the specification of the ascertained cause of each individual fire. Herein the prompt attendance and the diligent endeavours constantly used by the firemen of the Establishment to trace out the particular occasion of each conflagration had already been so satisfactory in their result, that the same period of five years had sufficed to reduce the cases in which the cause was undiscovered to a very small proportion. Accordingly, the paper in question presents a tabular statement of the several causes which had led to fires, and the number of instances under each head, so far as the same could be ascertained, in each year from 1833 to 1837; from whence is shown the relative frequency of the several causes, whether arising from negligence, from necessary nature of occupation, or from inevitable accident.

And finally, a third statement in the same paper, combining the materials of the two former, exhibits the several causes of fires in the different classes of buildings and trades furnishing the greatest number of fires, specifying the numbers in each class assignable to each cause respectively; thus affording means to discover those peculiar circumstances in a given trade which subject it to this kind of danger.

Again, the quarterly number of the Journal of December last (vol. vi. p. 361) presents a continuation of the results of the operations and the observations of the Metropolitan Fire-engine Establishment, in the shape of extracts from the Report of Mr. Braidwood, superintendent of

the Metropolitan Fire Brigade, to the managing Committee of the Establishment, on the fires which occurred in the year 1842, including an abstract statement of the fires during each of the ten years previous thereto. Here, again, the leading fact regarding the increase in the proportion of the Establishment apparatus required for the purpose of extinguishing the fires of the last ten years is that of the whole number of configurations. The other most remarkable fact presented by this tabular view is, that the proportion of cases of fire in which *gas* was found to be used in the premises, had increased in the same ten years from *one* to *three*—fourths of the whole number of cases. It is, however, which of itself is not taken to indicate anything beyond the rapid progress of the substitution of gas-lights for the old modes of artificial lighting.

substitution of gas-lights for the old modes of artificial lighting.

We now extract from the Appendix to the same Report a particular statement of the fires which took place in London during the course of the same ten years. The former of the two papers alluded to referred to, having confined its list of the causes of the premises to those classes in which more than one fire had occurred during the five years, the present table, by mentioning every class in which any fires whatever have occurred, exhibits upwards of a hundred several descriptions of occupancy which do not appear in the former statement. In like manner, the account of the causes of fire in the several classes of buildings wherein, in the former paper, been limited to those classes (18 in number) wherein more than 20 fires had occurred during the five years, is discovered, in each several description of occupancy, the causes of the fires which have occurred, since the completion of the latter statement, extending to upwards of a hundred and eighty.

Since, in the latter statement extends over ten years in lieu of five years, the complete organization of the Establishment, it presents the means of carrying out the deductions of the preceding paper with greater fulness, precision, and certainty.

The following table, then, based on the experience of ten complete years, supplies all the further data on this subject which it will be requisite to place on record in the pages of this journal, excepting only a brief statement of the gross result of each succeeding year's operations.

brief statement of the gross result of such successive years. In our large towns for a period when the municipal arrangements were undergoing so severe a scrutiny as that to which we have just subjected, it would be well that the subject of fire police should not wholly escape attention, with reference not only to supplies of water easily accessible, but also to express arrangements by which the services of some police officer of experience in these cases shall always be available for the direction of proceedings, where no such complete establishment exists as that of the London Fire Brigade. The supply of water for such purposes is too often left to the mere good-nature of private companies; and the loss of life and property through the pure helplessness of alarm, of surprise, and of ignorance regarding the progress of such casualties, is very great. While there is a competition among some of our largest corporate towns for the best chief of their fire departments, it would, therefore, not be amiss, were they to appoint a committee to consider the subject, and to make suggestions in the spirit of this spirit of rivalry in good administration to providing that each of their several police forces shall contain at least one person of skill in these matters; and Mr. Braidwood's is a normal school, in which they may always rely on finding men of character and experience.

List of Fires which took place in London in Ten Years, commencing 1st January, 1833, ending 31st December, 1842.

TRADES.	Trade unemployed	Gender unemployed	English unemployed	Gas.	No. Gas.	Total.
Apothecaries and Dealers in Drugs, but no drugs carried on.	1	10	8	13	6	19
Arch-makers	..	..	..	..	..	Trade 6; gas 3; unknown 10.
Asphalt-workers	..	1	..	..	2	Trade 1.
Bacon-makers	..	..	..	..	2	Trade 2.
Bagnons	..	8	21	2	27	Curtain 19; gas 1; intoxication 4; candle 1; un- known 4.
Bacon-dyers	..	..	..	3	3	Trade 3.
Bakers	7	46	87	108	32	Trade 88; gas 14; fine 1; candle 2; fire on hearth 1; unknown 34.
(See Bleichit)	..	..	..	1	2	Trade 1.
(Maffin)	..	..	..	..	..	Trade 1.
Barge and Boat Builders	..	5	6	..	11	Incendiarium 1; trade 9; unknown 1
Bath-makers	..	..	..	..	6	Trade 2; unknown 6.
Bath-makers	..	2	4	..	6	Trade 2; unknown 6.
Beer-shops	..	9	20	24	..	32
Bleaching-machinery	..	1	1	1	3	Pipe stove 1; heater 1; copper laddy set 1; unknown 13.
Blacksmiths, Blacksmiths and Smiths.	..	40	39	55	24	75 Gas 22; stove 2; trade 7; candle 6; incen- diarium 1; accidents 1; child 1; heater 1; line over-hauling 1; unknown 27.
Bottle Manufacturers	..	..	..	..	..	Trade 5; fine 1; unknown 4.
Brewers	..	8	5	6	2	Trade 1.
Black-makers	..	..	..	..	..	Trade 1.
Brokers and Dealers in Old Clothes	3	23	22	..	27	49 Incendiarium 1; line over-hauling 1; fine 4; trade 3; certain 4; fire on hearth 1; gas 3; candle 4; hor- se 1; stove 1; children 2; unknown 23.
Butchers	..	1	1	1	1	Time over-hauling 1; fine of copper, 1; unknown 2.
Builder	..	..	..	..	..	Trade 3; fine 5; candle 5; stove 1; gas 1; un- known 35.
Cabinet-makers	15	39	39	18	66	Trade 2.
Cass-dyers	..	..	..	..	2	..

List of Fires which took place in London in Ten Years, from 1833 to 1842.—continued.

[illegible][illegible]

Last of Fires which took place in London in Ten Years, from 1833 to 1842.—continued.

[illegible]

Leifon-match-makers	35	27	5	63	Trade 60; curtain 1; unknown 2.
Leifon-match-makers	1	4	1	6	Trade 1; unknown 2.
Margine Manufacturers	1	1	1	23	Spoke 1; trade 2; candle 1; curtain 1; smoking to- bacco 1; gas 1; ironadunas 1; unknown 5.
Martin Steers (Dalen in)	7	14	5	18	Steam-engine 1; trade 1; unknown 2.
Mittens-makers	2	2	1	9	Trade 1; unknown 2.
Mast and Black Makers	1	3	4	3	Trade 5.
Millen	3	4	1	9	Trade 4; flue 1; refusing to admit firemen 1; un- known 4.
Musical Instrument Makers	6	4	1	10	Trade 1.
Musical-makers	1	1	1	3	Trade 3.
Nagella Manufacturers	1	1	1	3	Trade 3.
Nagella Manufacturers	1	1	1	3	Trade 3.
Oil and Presero Merchants	28	02	44	87	Trade 33; gas 4; flue 2; candle 14; gasowder 1; spontaneous combustion 1; curtain 1; friction 1; sling over-bearing 1; bottles 1; carbenasas 1; un- known 35.
Oil and Columns, not Column-makers	1	1	1	1	Trade 1; unknown 1.
Oil Refiners	1	1	1	1	Trade 2; unknown 1.
Painted Baton Makers	1	1	1	1	Trade 1; flue 1; unknown 2.
Painters, Plumbers, and Glaziers	1	1	1	13	Trade 4; unknown 1; unknown 8.
Panomas	1	5	4	2	Curtain 1; illumination 1.
Paper-makers	1	1	1	2	Flue 1; unknown 1.
Paper-mills	1	1	1	1	Flue 1; unknown 2.
Paper-stainers	1	5	2	6	Trade 3; candle oil; flures on the flue instead of water 1; unknown 1.
Perfhumers	3	6	16	17	Gas 3; flue 2; curtain 1; unknown 11.
Perfumers	1	6	1	1	Unknown 1.
Picture-dealers	1	1	1	1	Trade 3; unknown 1.
Picture-makers	1	1	1	1	Trade 2; unknown 1.
Playing-card-makers	1	1	1	1	Trade 2; gas 1.
Post-bottlers	1	1	1	1	Store 1; trade 1.
Porties	1	1	1	1	

List of Fires which took place in London in Ten Years, from 1833 to 1842.—continued.

TRADES	Trade	Sheds	Wagons	Ox.	No. Ox.	Track.	CAUSES.
Printers and Engravers	3	10	23	22	14	36	Ypocrites 3; dogs 3; fire 4; trade 11; gas 6; steam- engines 1; saws 1; sawmills 2; unknown 8.
Printers (Copper-plate)	8	7	4	11	15	45	Trade 3; gas 9; gas 1; candle 1; unknown 8.
Printers (Iron-plate)	1	3	0	0	4	8	Trade 1; lime over-heating 1; unknown 2.
Printers (Type)	2	0	0	0	0	2	Trade 2; iron 2.
Public Buildings	5	13	12	11	23	53	Fire 7; ironmilling 1; lime hours 1; timber under- burnt 1; fireworks 1; thawing water-pipe 1; illo- menation 1; gas 1; stone 1; gas 5; sparks 1; un- known 4.
Private	304	1,604	444	1,491	1,935	5,376	Knives 4; gun 1; curtain 855; fire 346; children 55; mills 1; saws 1; sawmills 1; steam 1; iron 1; im- miration 21; candle 123; fireworks 5; timber under- burnt 2; chaffing-pan 1; intoxication 1; bug-bear- ing 1; hot air stove 1; steam 1; steam 1; steam 1; boiling 1; hot air stove 1; steam 1; steam 1; steam 1; boiling 1; hot air stove 1; steam 1; steam 1; steam 1; cask 1; steam 2; copper 1; boiler 1; steam 1; steam 1; bessons 5; sewing 1; copper 1; boiler 1; steam 1; swarming bed 1; plumbers 1; heating 1; making candle 1; steam 1; steam 1; steam 1; steam 1; steam 1; children playing with fire 6; fainting 1; cat 2; death- bed 2; copper 1; fire 1; wax-cup 1; unknown 377.
Public Places (not Theatres)	1	10	2	19	1	31	Fireworks 4; overhauling 5; stove 1; candle 3; Trade 6; unknown 4.
Regimentals	2	1	1	1	0	4	Trade 1; unknown 1.
Railways	1	0	0	0	0	1	Trade 1.
Ribbon-drawers	8	0	0	13	14	35	Trade 9; smoking tobacco 1; fireworks 1; unknown 2.
Sack-makers	2	2	0	0	0	4	Trade 2; old fire 1; unknown 1.
Sail-makers	1	0	0	0	0	1	Unknown 1.
Sail-drawers	1	1	1	0	0	3	Unknown 1.

Star Ships and Officers, no hazardous goods.	19	83	223	224	101	325	Gas 93; stove 12; trade 6; flue 42; cauld 21; pipe 1; overhauling 1; steam by steam 1; fire on north 2; accident 6; incand 1; steam 1; work ext 1; spark 1; incand 1; carbide 1; working on Sunday 1; stove badly set 2; copper 1; cutting 1; unknown 125.
Saltpetre-refiners	..	1	..	1	..	1	Trade 1
Saw Mills	..	3	6	8	7	15	Trade 5; steam-fence 2; steam-engine 1; tape overhauling 3; fettling 1; drying-stove 1; cauld 1; Incand 2.
Schools of Industry	..	..	2	..	3	37	Incand 2.
Ships	..	..	18	2	..	3	Rags overhauling 1; stove 6; steam 1; line overhauling 6; stove-pipe 2; cooking 3; boiling-pitch 1; work on Sunday 1; steam 1; heating 3; signals 1; workmen 1; unknown 6.
Ship-builders	..	..	..	1	1	1	Incand 1.
Ship-fitters	..	..	1	..	12	16	Trade 3; unknown 4.
Ship (Steam)	..	..	6	10	..	1	Trade 3; steam-engine 2; cooking 1; carbide 1; unknown 1.
Ship (Stern) Builders	..	..	..	..	1	1	Trade 1.
Shed	..	..	..	..	1	1	Cauld 1; trade 2; unknown 1.
Shed Manufacturers	..	..	..	..	1	1	Stove 1.
Shed Mills	..	..	..	..	1	1	Stove 1.
Shed Mills	..	..	..	..	9	9	Fire in soil 1; trade 3; cauld 1; flue 1; cauld 1.
Soot Merchants	..	..	1	8	..	1	Flue in soil 1.
Spice Merchants	..	..	..	..	1	1	Flue in soil 1.
Stables	..	11	43	59	9	164	Flue 6; cauld 25; repair 2; dung overhauling 6; heating pitch 1; laboratory adjoining 1; accident 9; work on Sunday 1; steam 1; work ext 1; oil-cloves 1; charcoal 1; steam 1; flue 1; flue 1; oil-cloves 2; defect in wall 1; pipe stove 1; unknown 50.
Starch-makers	..	..	..	..	..	3	Trade 2; unknown 1.
Sugar-refiners	..	..	3	..	..	3	Trade 2; unknown 1.
Sugar-refiners	..	2	4	1	10	11	Trade 2; packing 1; trade 3; unknown 5.
Stave-boned-makers	..	..	1	4	3	5	Trade 2; unknown 3.
Steam Mills	..	1	..	2	1	1	Trade 1.

List of Fires which took place in London in Ten Years, from 1833 to 1842.—continued.

TRADES.	Trade years	Small boats	Boats	Gas,	No Gas,	Totals.
Tailors	1	19	22	23	19	42
Tailors	..	..	..	..	..	..
Tanners	8	4	..	12	12	12
Tallow Chandlers, Melbers, Wax Chandlers, and Soap-boilers	6	11	20	9	28	37
Terrapine-makers	2	1	..	..	3	3
Theatres	..	..	..	..	..	..
Thimble, Braziers, and Smiths	4	15	36	19	56	55
Type-foundries	..	..	..	1	..	1
Tobacco Manufacturers	..	..	..	6	10	16
Toys	..	..	..	..	..	..
Trepanners	2	..	..	1	..	3
Turn-outmen	..	..	..	..	..	..
Varnish-makers	12	87	219	274	441	315
Wagon-makers	..	..	..	..	..	..
Watch-makers	..	..	..	..	..	..
Wholesale Grocers	..	..	..	..	..	..
Wine-merchants	..	..	..	..	..	..
Under repair, and building	..	..	..	..	..	..

[illegible]

(Signed) JAMES BRAIDWOOD, Superintendent.

MISCELLANEOUS.

South Australia.—The colony of South Australia embraces the territory comprised between the 132nd and 141st degrees of east longitude, and extends from the sea coast on the southward to the 26th degree of south latitude. Of the greater portion of this extensive country nothing is as yet known. The peninsula formed by St. Vincent's and Spencer's Gulfs on the west, and Lake Alexander and the Murray on the east, (the western boundary extending from Cape Jervis in latitude about 36° 20' to the head of Spencer's Gulf in latitude about 32½°, and the eastern boundary extending from Cape Jervis to the great bend of the Murray in latitude 34°),—Yorke's Peninsula, between Spencer's and St. Vincent's Gulfs,—and the peninsula of Eyre, the boundaries of which extend from Sleaford Bay, in a northerly and easterly direction as far as the head of Spencer's Gulf, and in a northerly and westerly direction as far as Sleaford Bay,—are the only portions of the province which have as yet been explored, and the latter of these is still only very imperfectly known.

The settlement of the colony has not, excepting a few hundred persons at Port Lincoln, yet extended beyond the peninsula formed by the Murray and the gulf; nor, considering the vast extent of available country still unappropriated, is it likely to do so for some years. From Adelaide as far as Lake Alexandrina on the east, and Encounter Bay and Cape Jervis on the south, lies a fine extent of country, consisting alternately of rich alluvial valleys, and mountain ranges of grassy forest. The only rivers of any consequence that empty themselves into the sea, which forms the western boundary of this country, are the Sturt and the Onkaparinga rivers, and several smaller streams. On the east the Bremer, Angas, Finniss, Inman, Hindmarsh, and other streams, discharge into the Lake and Encounter Bay.

The census of 1842 exhibits a return of 14,625 souls; but as no returns have been made for many remote districts, and as no allowance has, notwithstanding, been made for omissions, it is believed that the actual population of the province is not at this time under 16,000 souls.

Taking the above return as the basis of our calculations, the male population of the province is nearly as one and a half to one of the females, a state of things which accounts in some degree for the scarcity of female servants. Taking the present population of the province at 16,000, and the land selected in the province at 320,000 acres, an allowance of 20 acres of land must be made for every man, woman, and child in the province, independent of the thousands of acres which are at present grazed upon, although not selected, or even surveyed.

Upon the calculation of 20 acres of land for every man, woman, and child in the province, there is at the present moment sufficient land surveyed to accommodate a population of 32,000 souls; that is, a population twice its present amount.

The number of children in the province under seven years of age are not given in the above census, but they may be set down at 3,000, and, in the past year, the births may be calculated at rather more than three times the amount of the deaths.

The farmers have found great difficulty in getting in the harvest this

year, from want of hands; and as 200 additional shepherds will be wanted almost immediately, there are not a sufficient number of labourers in the colony for the requirements of the ensuing year, by nearly 1,000. It is hoped, therefore, that the friends of the colony in England will impress upon the Colonial Office the necessity for the speedy renewal of emigration.

Turnpike Trusts.—From the Report of the Commissioners appointed to inquire into the subject, it appears that for every 200 miles of turnpike road, there are, on an average, ten surveyors; whereas, if the highways and turnpike trusts were consolidated, one properly qualified surveyor might perform much better the service with which the ten are charged. There are, it appears, 1,116 turnpike trusts, comprehending about 22,000 miles. The officers employed consist of 1,120 treasurers, 1,135 clerks, and 1,300 surveyors: total 3,555. The annual cost of the repair of the turnpike roads is 51s. per mile, making a total expenditure of 1,122,000s. per annum. The debts amounted to upwards of 9,000,000s., and they appeared to be rapidly increasing. The average expense of the management of the highway and turnpike roads is estimated at 10s. per mile per annum; but it is calculated that if the management of the turnpikes and highways were consolidated, they might be better managed at an expense of from 30s. to 2s. per mile per annum. On comparing the actual expense of the repairs of roads under a scientific management of the highways with the common cost, it appears probable that by management on an extended and appropriate scale, upwards of 500,000s. per annum might be saved on that branch of administration alone.

The Committee of the House of Commons, which sat in 1834, examined some of the most able engineers in the country; and a Commission subsequently appointed, at the head of which were the Duke of Richmond and the Marquis of Salisbury, coincided in recommending the adoption of the principle of consolidation as the only means of retrieving that branch of administration.—*Report on the Sanitary Condition of the Labouring Population of Great Britain*, p. 325.

Private and Joint-Stock Banks.

An Account of the Number of Private and Joint-Stock Banks registered in each Year from 1820 to 1842, both inclusive.

Year.	Number of Private Banks.	Number of Joint-Stock Banks.	Year.	Number of Private Banks.	Number of Joint-Stock Banks.
1820 to 1821	521	..	1831 to 1832	424	25
1821 to 1822	526	..	1832 to 1833	416	35
1822 to 1823	547	..	1833 to 1834	416	47
1823 to 1824	547	..	1834 to 1835	411	55
1824 to 1825	544	..	1835 to 1836	407	160
1825 to 1826	554	..	1836 to 1837	351	167
1826 to 1827	465	6	1837 to 1838	341	104
1827 to 1828	456	7	1838 to 1839	332	108
1828 to 1829	460	11	1839 to 1840	332	113
1829 to 1830	439	15	1840 to 1841	321	115
1830 to 1831	436	19	1841 to 1842	311	118

[Parl. Paper, No. 85, Session 1843.]

Slave Trade Police.—A Return of the Number of Ships of War, of all Classes, employed for the Suppression of the Slave Trade in the Year 1842; stating the Number of Guns and of Men.

CLASS.	Number of Ships.	Number of Guns.	Number of Men.
3rd rate	1	72	620
4th rate	4	202	1,900
5th rate	2	88	720
6th rate	5	130	1,085
Sloop	19	310	2,550
Steam-vessel	8	26	686
Gun-brig	19	117	993
Total	58	945	8,554

This Return is made for the 1st of July, as an average of the force employed for the whole of the year 1842; but although the above number of vessels were furnished with Slave-Trade Instructions, yet they were only employed in cruising against Slave Vessels as the other duties of the stations on which they were respectively employed would permit.

Yeomanry Cavalry.—This is a force almost exclusively confined to England. The Irish Yeomanry were disbanded on the 31st of March, 1834; and in Scotland there are only the Ayrshire corps and that of the Upper Ward of Lanarkshire; the former containing 6, and the latter 4 troops, with 38 officers and 750 men, maintained at an expense of 4,190*l.* 1*s.* 6*d.* But in England there are 53 corps, comprising 228 troops: 9 of these corps, comprising 11 troops, serve gratuitously, and do not make any returns of their effective strength to the War Office; but the other 44 comprise in their 217 troops 12,684 men, and their cost to the government, in 1841, was 78,179*l.* 4*s.* 7*d.*, making the total cost of the English and Scotch Yeomanry 82,369*l.* 6*s.* 1*d.*, including 272*l.* 18*s.* for the pay and travelling expenses of officers employed to inspect them.—(*Parl. Pap., Sess.* 1842, No. 300)

Religious Instruction, Ireland.—Prefixed to a recent return to an order of the House of Commons (1843, No. 588) is a summary, from which it appears that the total number of schools in operation in Ireland under the National Board of Commissioners of Education was, on the 30th of April, 1843, no fewer than 2,751, of which 2,614 have made returns of the course of religious instruction pursued in them during the four months preceding. In 492 of these National Schools the Holy Scriptures were read, daily or occasionally, without the selected "Scripture Lessons;" in 592 both the Holy Scriptures and the "Scripture Lessons" were read: making a total of 1,084 in which the Holy Scriptures have been read daily or occasionally. The number of schools in which the "Scripture Lessons" published by the Commissioners have alone been read was 855, making 1,447 in which these lessons were used; while the number in which neither the Scriptures nor the "Scripture Lessons" were read was 815. By another return of the same session (520) it appears, that 137 were on sites belonging or attached to Roman Catholic religious edifices.

Tenth Report of the Manchester Statistical Society, established in 1833.—October, 1843.

THE Annual Meeting of the Society was held in the Chamber of Commerce, when Officers for the ensuing Session were appointed.

The thanks of the Society were voted to the Directors of the Chamber of Commerce, for their kindness in allowing the use of their room for the Meetings of the Society.

At subsequent Meetings, during the Session, the following communications were made:—

On the Medical Inspection of Towns and the Registration of the Causes of Death.—Mr. P. H. Holland.

On Early Marriages in Oriental Countries as being no evidence of Early Puberty.—Mr. Robertson.

A Committee was appointed to report on the Expenditure of the Public Charities in Manchester during the last five years, which has not yet reported.

In pursuance of a Resolution of the Society passed at the Meeting of the 9th of May, the Secretaries advertised for an Agent to undertake a new inquiry into the state of Education in the Boroughs of Manchester and Salford, but owing to the excited state of the public mind upon this subject, it was considered desirable to postpone entering upon the inquiry.

The Committee on the Registration of Births, Deaths, and Marriages, for the Districts of Manchester and Salford, have been actively engaged in abstracting and classifying the entries in the Registrar's books, and from the continuance of their labours a most valuable mass of information is in process of collection and arrangement.

During the past Session, three Ordinary Members have been elected.

PROCEEDINGS OF THE STATISTICAL SOCIETY OF LONDON.

Eighth Ordinary Meeting, June 17, 1844.

Lieut.-Colonel SYKES, V.P., in the Chair.

The following gentlemen were elected:—

Thomas Hodgkin, M.D. William Humphry Freeland, Esq.
Alfred Rhodes Bristow, Esq.

The following gentlemen were proposed as candidates for admission into the Society:—

Julius Jeffreys, Esq. Gregory Sealé Walter, Esq.
B. Smith, Esq., M.P. A. A. Knox, Esq.

A paper, by Mr. Hutchinson, was read, entitled "Contributions to Vital Statistics, obtained by means of a Pneumatic Apparatus for valuing the Respiratory Powers with relation to Health."—See p. 193.

BILLS OF MORTALITY.

The quarterly returns are obtained from 115 districts, sub-divided into 576 Sub-districts. Thirty-four districts are placed under the metropolis, and the remaining 81 districts comprise, with some agricultural districts, the principal towns and cities of England. The population was 6,578,912 in 1841.

The deaths registered in the last quarter (ending June 30th) amounted to 38,925, which is less by 7116 than the deaths in the previous quarter, and 1283 less than the average of the corresponding Spring quarter in the 5 years (1838-42). Allowing for the increase of the town population, the mortality was 10 per cent. below the average of the season.

The reduction in the mortality has been unequally distributed over the kingdom; but as a general rule, it has been most remarkable in the large manufacturing districts.

	Average of 5 previous Spring quarters, 1838-42.	Deaths in the Quarter ending June 30, 1844.
Manchester	1543	1260
Salford	519	417
Ashton and Oldham	1377	993
Leeds	1107	936
Sheffield	577	464
Stockport	630	418
Liverpool	1744	1547

Birmingham remained the same; and in a few of the other manufacturing districts, to be shortly mentioned, the mortality was above their average.

Small-pox and Scarlatina have been epidemic in the metropolis; and towards the end of the quarter, 51 persons (chiefly children) died of the former, 78 of the latter disease in one week. The deaths in the quarter from small-pox were 425. 107 of the number were reported by the informants to have been vaccinated; but the evidence of this would necessarily be, in many cases, uncertain and imperfect. Influenza has declined; and since the mean temperature has risen above 60 degrees, bowel complaints have become more prevalent.

The epidemics most frequently mentioned in the country districts are scarlatina, measles, small-pox, hooping-cough, and typhus.

The quarterly meteorological table has been compiled from the weekly tables supplied by the astronomer royal. The mean temperature (35° 0') was 1° 9' above the average of the season; the highest temperature of the air (observed) was 83° 3', the lowest 34°; the thermometer once rose in the sun to 111° 5', and fell on the grass so low as 21° 6'. The mean dew point was 47° 2'. The quarter has been remarkable for the small quantity of rain which fell. The rain collected in 13 weeks was only 2.31 inches, and of this 1.55 inches fell upon the last week of June.

The results of some meteorological observations by M. P. Moyle and Lovell Squire, Esq., are given in another page. The publication of the results of a series of simultaneous meteorological observations, made on an uniform plan in different parts of the kingdom, could not fail to be highly interesting.

Districts in which the mortality was *greater* than the average mortality of the Spring quarter in the same districts.—The south districts of the Metropolis, *Parish Island*, *Northampton*, *Bellford*, *Clifton*, *Stroud*, *Haverford*, *Kildermister*, *West Derby*, *Wigan*, *Bradford*, *Mortimer-Tyffl*.

Districts in which the mortality was *lower* than the average mortality of the Spring quarter in the same districts.—*Brighton*, *Oxford*, *Norwich*, *Dorchester*, *Bristol*, *Worcester*, *Wolverhampton*, *Stockport*, *Manchester*, *Great Bampton* (Cheshire), *Liverpool*, *Preston*, *Bury*, *Bolton*, *Prescott*, *Manchester*, *Salford*, *Ashton*, *Sheffield*, *Huddersfield*, *Leeds*, *York*, *Sunderland*, *Tynemouth*, *Newcastle-on-Tyne*, *Painpool*, *Newtown*, *Anglesey*.

MORTALITY OF THE COUNTRY.

Quarterly Table of the Mortality in 115 of the Districts of England (including the principal Towns) showing the Number of Deaths registered in the Six Years, the Average Number of Deaths in the Five Springs, 1838-42, and the Number of Deaths in the Spring Quarter of 1844, ending 30th June.—(Continued from p. 183.)

DISTRICTS.	Popula- tion 1841.	Annual Deaths Registered.					1838-42 Quarterly-Average Of Five Years.	Deaths in the Spring Quarter, ending June 30, 1844.
		1838	1839	1840	1841	1842		
<i>Metropolis.*</i>								
West Districts	291,208	9,114	6,338	6,336	6,599	6,896	7,214	1,728
North Districts	265,203	8,948	7,900	8,594	8,361	8,508	8,112	2,994
Central Districts	274,720	10,844	9,751	9,108	9,333	9,547	9,289	2,105
East Districts	303,947	11,534	10,339	10,063	10,084	9,947	10,265	2,440
South Districts	479,469	13,210	11,568	12,329	11,878	11,918	12,373	3,944
Total	1,315,104	50,546	46,100	47,030	46,069	46,114	49,332	11,343
<i>South Eastern Districts.</i>								
Medway	33,210	737	736	780	640	815	774	181
Brighton	46,747	916	839	890	1,102	1,126	1,117	251
Isle of Wight	42,847	655	636	737	801	781	763	182
Portsmouth	53,806	1,184	1,190	1,140	1,211	1,132	1,242	297
Winchester	23,944	421	479	506	416	469	471	116
Windsor	36,562	381	387	462	393	394	314	97
<i>South Midland Districts.</i>								
St. Albans	17,061	378	310	331	300	349	291	83
Wycombe	34,126	788	692	854	751	679	718	197
Oxford	19,791	369	407	406	450	414	393	100
Northampton	28,153	609	667	670	621	622	677	168
Bellford	31,707	676	678	743	714	694	762	171
Canterbury	34,453	563	547	670	639	465	507	144
<i>Eastern Districts.</i>								
Colchester	17,790	533	437	488	381	417	393	113
Ipswich	25,054	694	630	593	599	594	551	156
Sewick	61,846	1,213	1,332	1,252	1,365	1,242	1,293	306
Yarmouth	24,031	417	440	504	493	516	510	118
<i>South Western Districts.</i>								
Devon	82,130	426	519	481	419	449	633	115
Dorchester	23,380	469	362	412	456	437	524	107
Exeter	31,253	700	646	608	599	754	836	192
St. Thomas	47,103	824	819	808	859	898	808	214
Plymouth	36,927	862	670	743	730	1,141	898	196
Reading	48,059	914	909	1,011	895	1,232	945	249
Perth	50,180	765	848	976	1,016	1,128	996	256
Bath	69,532	1,267	1,062	1,074	1,298	1,094	493	436
<i>Western Districts.</i>								
Bristol	64,598	1,842	1,675	2,309	1,895	1,771	1,749	476
Clifton	66,533	1,528	1,150	1,709	1,519	1,510	1,595	362
Stroud	38,920	581	603	700	728	796	808	192
Cheltenham	40,251	869	736	855	890	1,078	894	217
Haverford	32,446	774	667	738	686	862	816	198
Strawbury	21,859	568	514	559	589	596	534	127
Worcester	27,100	602	717	636	614	631	641	171
Kildermister	39,409	591	523	678	542	601	597	149
Walsley	36,028	1,767	1,801	2,022	2,226	2,038	1,729	455
Wolverhampton	89,722	1,556	1,809	2,217	2,123	2,119	1,883	506
Walsingham	32,669	710	729	831	751	864	842	203
Birmingham	138,127	3,539	3,639	3,767	3,673	3,679	3,840	901
Ashton	36,828	1,090	1,058	1,119	1,113	1,093	1,091	279
Coventry	31,621	684	724	616	905	590	838	191

* The deaths in the Metropolis for the years 1840-1-2 have been derived from the weekly tables, the Returns for each year comprising 52 weeks, or 364 days. The last quarter in the metropolis ended June 29, 1844. The returns from other places are for the years ending December 31, and the quarter ending June 30.

† Walsingham District is included in the returns for the Metropolis.

A Quarterly Table of the Mortality, &c.—continued.

DISTRICTS.	Population 1841.	Total Number Registered.							1838-42.		Deaths in the Spring Season 1842.	
		1838	1839	1840	1841	1842	1843	Quarterly Average*				
								Of Five Years.	Of Five Years.			
North Midland Division.												
Leicester	50,802	1,179	1,291	1,739	1,858	1,437	1,555	566	596	596	188	
Lancaster	36,110	620	731	817	890	750	780	194	194	194	80	
Nottingham	80,060	1,369	1,460	1,794	1,529	1,429	1,583	365	315	327	127	
Sheff. & Rotherham	59,234	1,045	1,078	1,549	1,163	1,243	1,316	321	309	309	130	
Derby	35,015	769	832	955	914	999	992	217	208	209	80	
North Eastern Division.												
Manchester	85,672	2,410	2,801	2,874	2,448	2,673	2,903	588	630	630	418	
Stockport	56,618	1,815	1,828	1,745	1,619	1,683	1,551	299	279	279	118	
Oldham & Rochdale (including Chorley)	49,085	1,040	1,237	1,384	1,295	1,186	1,091	305	315	327	127	
Liverpool	223,064	6,027	6,745	6,740	7,506	7,497	7,458	1,753	1,744	1,847	547	
South Liverpool (including Liverpool)	88,652	1,635	1,746	2,206	2,298	2,063	2,318	509	455	520	200	
Preston	75,091	1,612	1,910	2,140	1,808	1,665	2,031	465	492	461	181	
Blackburn	77,189	1,796	1,812	2,657	2,058	2,056	1,938	483	502	504	204	
Bury	60,977	1,460	1,601	1,868	1,578	1,538	1,645	395	405	405	165	
Wigan	77,189	1,901	1,950	1,790	2,064	1,947	1,831	466	466	466	186	
Oldham & Rochdale (including Chorley)	97,519	2,435	2,887	2,960	2,572	2,490	2,236	605	672	616	246	
Wigan	66,623	1,453	1,912	1,344	1,561	1,588	1,532	434	447	445	185	
Blackburn	45,720	916	1,056	1,188	977	967	1,008	239	249	249	109	
Chorlton	85,236	2,140	2,438	2,009	2,431	2,267	2,099	501	501	501	201	
Rochester	102,408	6,706	6,774	6,639	8,221	6,311	6,283	1,597	1,643	1,598	643	
Southampton	79,228	2,397	2,468	1,968	1,973	1,973	2,008	520	519	519	219	
Andover	175,964	4,488	4,898	4,873	4,290	4,786	4,931	1,196	1,357	1,393	543	
West Division.												
Shedfield	55,676	2,429	2,703	2,940	2,221	2,182	2,169	560	577	564	224	
Huddersfield	107,577	1,847	2,080	2,383	2,131	1,996	2,154	514	600	572	214	
Halifax	109,175	3,029	3,492	3,354	3,027	3,272	3,480	866	908	908	368	
Sheff. & Rotherham	59,234	1,045	1,078	1,549	1,163	1,243	1,316	321	309	309	130	
Leeds	168,067	4,209	4,388	4,498	4,960	4,615	4,299	1,117	1,167	1,066	466	
Sheff. & Rotherham	41,565	811	865	916	807	872	820	211	211	211	81	
York	47,719	876	1,217	1,200	1,039	1,133	1,048	214	202	202	82	
North Western Division.												
Sunderland	56,590	1,479	1,494	1,612	1,819	1,267	1,747	399	374	397	157	
Gatehead	28,747	881	968	1,038	998	900	984	238	251	251	96	
South Shields	31,118	1,118	1,198	1,240	1,404	1,227	1,299	215	248	248	93	
Newcastle-on-Tyne	71,650	1,908	1,717	1,861	1,817	1,736	1,797	417	407	417	157	
Clyde	36,064	855	730	961	925	840	762	193	193	193	79	
Cockermouth	33,476	734	718	638	674	597	690	173	160	166	66	
Kendal	34,294	777	823	821	681	674	714	166	184	181	88	
Welsh Division.												
Aberystwyth	50,834	1,150	1,096	1,374	1,458	1,100	1,116	315	357	357	139	
Port-Panfili	29,607	651	615	565	648	545	514	147	170	170	69	
Merthyr Tydfil	56,964	1,316	1,461	1,615	1,453	1,376	1,450	360	360	360	140	
Newtown	25,568	827	668	619	630	600	677	159	144	144	117	
Cardiff	35,468	827	668	619	630	600	677	159	144	144	117	
Holywell	49,787	997	791	664	600	500	919	215	117	127	211	
Anglesey	39,165	643	569	632	697	634	579	154	173	148	63	
Total entire Kingdom												
England	6,603,980	109,281	116,505	119,664	114,064	115,834	113,769	29,450	29,187	27,654	10,854	
Wales & Monmouthshire	1,073,913	23,867	25,000	26,383	25,131	23,996	25,154	6,406	6,908	6,572	2,544	
Grand Total	7,677,893	133,148	141,505	146,047	139,195	139,830	138,923	35,856	36,095	34,226	13,398	

* Wandsworth District is included in the return for the metropolis.

MORTALITY OF THE METROPOLIS.

A Table of the Mortality in the Metropolis, showing the Number of Deaths from all Causes, registered in the 13 Weeks ending 29th June, 1844.

CAUSES OF DEATH.		Deaths in the Hospital.		Deaths in the Community.	
		No.	Per cent.	No.	Per cent.
ALL CAUSES		10,960	11,471	10,911	11,430
SPECIFIC CAUSES					
I. Zymotic, Febrile, Re- cumbent, and Contagious Diseases		1,993	2,453		
SPERMIC DISEASES.					
II. Dropsy, Cancer, and other Diseases of internal or variable seat		1,300	1,209		
III. Diseases of the Brain, Spine, Nerves, and Senses		1,887	9,006		
IV. Diseases of the Lungs and of the other Organs of Respiration		3,340	3,229		
V. Diseases of the Heart and Blood Vessels		260	375		
VI. Diseases of the Stomach, Liver, and other Organs of Digestion		735	847		
VII. Diseases of the Kidneys, Ac- cessory Organs, and of the Uterus, &c.		68	94		
VIII. Rheumatism, Disorders of the Bones, Joints, &c. . . .		108	99		
X. Diseases of the Skin, Cal- cular Tubes, &c.		77	82		
XI. Old Age		14	12		
XII. Violence, Fractures, and Intemperance		795	629		
		324	328		
CAUSES OF DEATH.					
I. Small Pox		144	435		
Scarlatina		303	601		
Measles		438	191		
Whooping Cough		99	185		
Diphtheria		40	42		
Thrush		40	43		
Scalds		40	83		
Dysentery		18	18		
Diarrhoea		40	83		
Infarction		50	26		
Ague		6	4		
Bromental Fever		6	4		
Typhus		406	405		
Erysipelas		40	19		
Syphilis		8	12		
Infestation		81	81		
Scabies		41	83		
Dropsy		41	83		
Consumption		41	83		
Mortification		35	46		
Purpura		5	5		
Scorbuta		29	43		
Cancer		106	112		
Tubercle		13	19		
Gonorrhea		13	19		
Leucorrhoea		239	236		
Debility		239	236		
Violence		239	236		
Sudden Death		174	124		
III. Cephalitis		164	165		
Hydrocephalus		2	2		
Apooplexy		299	299		
Paralysis		299	299		
Convulsions		670	670		
Tetanus		2	2		
Chorea		2	2		
Epilepsy		2	2		
Hysteria		18	18		
Delirium Tremens		22	20		
Disease of the Heart, &c. .		18	18		
Laryngitis		7	17		
Tracheitis		2	2		
Bronchitis		120	120		
Pneumony		83	71		
Hydrothorax		54	62		
Emphysema		18	18		
Phthisis or Consumption .		1,919	1,939		
Disease of the Lungs, &c. .		18	18		
Peritonitis		11	22		
V. Pericarditis		11	22		
Worms		2	2		
Disease of Heart, &c. . . .		249	303		
VI. Tabes		299	299		
Enteritis		120	119		
Peritonitis		120	119		
Tabes Mesenterica		61	133		
Ascites		9	17		
Colic or Diarrhoea		2	2		
Hemipia		22	20		
Colic or Diarrhoea		2	2		
Intemperance		5	5		
Stricture		6	6		
Hæmaturia		6	10		
Disease of Stomach, &c. .		90	74		

PRICES OF PROVISIONS,

Average Contract Prices of the Provisions and Fuel supplied to the Workhouses.

Districts marked out by the Registrar-General, and Central Unions contained therein.	Average Weekly Cost per Head of In-door Paupers.									
	Food.	Clothing.	Food and Clothing.	Washing Fuel per Stone.	Washing Soap per lb.	Meat—Beef and Mutton per lb.	Salt Butter per lb.	Cheese per lb.	Pantries.	
<i>Metropolis.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	
East London	2 9½	2½	2 12½	2 12	8	6	4½	6½	4	12 3 cwt.
Holborn	2 1	2½	2 12½	2 12	8	6	4½	6½	4	12 6 cwt.
<i>South Eastern Counties.</i>										
Malden	2 2½	2½	2 12½	2 12	9	5½	4	7	4½	10 bbl.
Portsea Island	2 2½	2½	2 12½	2 12	9	5½	4	7	4½	10 cwt.
<i>South Midland Counties.</i>										
Northampton	2 5½	4½	2 12½	2 12	2	5½	3½	13	6	14 cwt.
Cambridge	2 5½	4½	2 12½	2 12	1	5½	4	9	4½	12 bag.
<i>Eastern Counties.</i>										
Ipswich	2 0½	5½	2 5½	1 10	5½	5	10	5½	..	..
<i>South Western Counties.</i>										
Devizes	2 0½	5½	2 5½	1 9	4½	3	7½	4½	16	bbl.
Penance	2 0½	5½	2 5½	2 0	5½	4½	7½	10	2 3½	cwt.
Bath	2 0	2½	2 12½	1 9	5	3½	8	3	5 0	sack
<i>Western Counties.</i>										
Stroud	1 10	1½	1 11½	..	5	4	7½	3	5 0	bag.
Wolverhampton	1 11½	6½	2 5½	1 11½	5½	4½, 6d. per st.	18	5	1 6	bbl.
<i>North Midland Counties.</i>										
Derby	1 9	1½	1 10½	2 0	5½	4½	12	5½	4 0	cwt.
<i>North Western Counties.</i>										
Macclesfield	1 9	7	2 4	1 9	..	3½	10	6½	5 11	load
Bolton	1 7½	3½	1 11½	1 8½	5	4	7½	4½	3	load
Prescot	1 10½	12½	2 11	..	5	3½	8	..	2 6 90	lb.
<i>North Eastern Counties.</i>										
Sheffield	2 5	7	3 0	2 0	..	4½	..	7	5 4	load
<i>Halifax</i>	<i>1 10½</i>	<i>1½</i>	<i>2 0½</i>	<i>2 4</i>	<i>5</i>	<i>4½</i>	<i>8½</i>	<i>..</i>	<i>0 6</i>	<i>load</i>
<i>Sculcoates</i>	<i>2 4</i>	<i>7</i>	<i>2 11</i>	<i>2 1</i>	<i>4½</i>	<i>4½</i>	<i>14</i>	<i>..</i>	<i>0 5½</i>	<i>peck</i>
<i>Northern Counties.</i>										
Gateshead	1 5½	4	2 1½	2 0	4½	4	10	6½	2 10	cwt.
Kendal	1 10½	5½	2 4	1 10½	..	4	9½	5½	0 2½	st.
<i>Wales.</i>										
Pembroke	1 5½	1½	1 7½	2 0	6	4½	7	5	2 6	cwt.
St. Asaph	1 8	3½	1 11½	..	6	3½	9	5½	2 10½	st.

FUEL, &c.—(Continued from p. 187.)

of the following Unions, during the Quarter ended at Lady-day, 1844.

Peas per quart.	Oatmeal per lb.	Chickens per 12 lbs.	Yellow Soap per lb.	Coal per Ton.	Tea per lb.	Sugar per lb.	Milk per quart.	Miscellaneous Articles.
<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	
2½	12	5 1	4½	16 0	3 5	6	2½	Table Beer, 5s. barrel.
2½	12	5 3	4½	15 9	3 3	6	2½	Porter, 33s. barrel.
..	3	5 6	5	20 9	3 8	6	..	..
2½	3	5 12	4½	15 10½	..	..	..	..
3	3½	5 6	4½	22 6	3 9	6½	2½	..
3	1½	5 6	4½	22 6	..	..	..	..
2½	3½	5 8	5	19 6	..	..	..	..
2½	3½	5 10½	5	18 6	4 2	7	..	Beer, 7d. gall. Bacon, 4d. lb.
2½	3½	5 5	5	14 6	3 10	6½	..	Fish, 12s. 10d. cwt.
2½	3½	5 4	4	14 0	3 6	6½	..	Rice, 12s. cwt.
2	..	5 6	4½	15 6	..	..	1½	Groats, 19s. cwt. Rice Flour,
2	1½	5 3	5	7 0	..	..	..	19s. cwt. Bacon, 4d. lb.
2	1½	5 6	4½	8 8	4 0	7	..	Treacle, 2½d. lb. Rice, 3d. lb.
2½	2½	5 6	4½	9 2	..	..	..	..
2½	2½	4 9	4½	6 4	..	..	1	Treacle, 2½d. lb.
2	2½	4 10	4½	9 4	..	..	1½	Bacon, 4d. per lb.
2½	1½	5 3	5	6 1½	4 2½	6½	1½	Treacle, 3s. 3d. stone. Rice,
2½	2	5 0	5	9 6	4 5	7	8	2s. 2d. stone. Coffee, 1s. 9d. lb.
2½	1½	5 3	5	16 0	..	..	..	Tobacco, 3s. 6d. lb. Porter, 11d. gall. Salt, 3d. stone.
2½	2½	5 6	4½	4 0	4 1	6½	..	..
..	1½	5 9	5	12 11	4 2	7	6½	Coffee, 1s. 5d. per lb.
2½	3	6 6	5½	14 5	4 8	7	1	Coffee, 1s. 6d. lb. Rice, 2s. st.
2½	1½	5 10	4½	14 0	3 6	6½	..	..
2½	1½	5 10	4½	14 0	3 6	6½	..	Rice, 2½d. lb.

QUARTERLY METEOROLOGICAL TABLE,

Communicated from the Weekly Tables furnished to the Registrar-General by the Astronomer Royal.

[illegible]

^a The ages of 15, on account of the corrections for returns not received, were not specified in the Table.

REVENUE.

An Abstract of the Net Produce of the Revenue of Great Britain, in the Quarters and Years ended 5th July, 1843 and 1844; showing the Increase or Decrease thereof.—(Continued from p. 188.)

Quarters ended 31st July.				
Source of Revenue.	1843	1844	Increase.	Decrease.
Customs—	£.	£.		£.
Consolidated Duties . . .	3,304,473	3,802,921	..	..
Sugar Duty applicable to Consolidated Fund . . .	1,252,733	1,066,714	..	..
Ditto Ditto to Supplies . . .	..	..	..	..
Total Customs . . .	4,557,206	4,869,235	312,029	..
Excise	3,030,113	3,115,592	85,479	..
Stamps	1,659,010	1,705,033	46,023	..
Taxes	1,984,212	1,969,242	5,970	..
Property Tax	861,709	732,485	..	9,224
Post-Office	145,000	155,000	10,000	..
Crown Lands	32,500	30,500	..	2,500
Miscellaneous	1,061,524	422,187	..	641,337
Total Ordinary Revenue . .	13,333,893	13,039,406	498,574	633,061
Imprest and other Moneys Repayments of Advances.	138,207	274,537	36,550	18,162
Total Income	13,539,286	13,362,981	494,924	671,223
Amount applied to Consol- idated Fund, exclu- sive of Advances . . .	6,442,506	8,994,078	2,498,673	494,924
Ditto applied as Advances .	191,501	177,276	Decrease on the Quarter	176,239
Ditto as part of the Ways and Means of the Year.	6,905,273	4,191,627		
Total	13,539,280	13,362,981		

Years ended 31st July.				
Source of Revenue.	1843	1844	Increase.	Decrease.
Customs	18,824,809	19,772,158	838,349	..
Excise	11,545,529	11,965,062	420,533	..
Stamps	6,445,379	6,518,063	72,683	..
Taxes	4,191,129	4,197,516	6,387	..
Property Tax	3,317,997	3,547,547	229,550	..
Post-Office	598,000	632,000	34,000	..
Crown Lands	120,000	145,000	25,000	..
Miscellaneous	1,647,541	493,140	..	1,154,401
Total Ordinary Revenue . .	46,800,375	48,969,142	3,323,168	1,154,401
Imprest and other Moneys Repayments of Advances.	302,254	187,703	..	114,551
	677,713	1,063,833	386,120	..
Total Income	47,780,342	50,220,678	3,708,288	1,268,955
Amount applied to the Consolidated Fund, ex- clusive of Advances . .	32,110,389	33,013,579	1,268,952	Deduct Decrease.
Ditto applied as Advances .	506,506	848,777		
Ditto as part of the Ways and Means of the Year.	15,163,447	14,358,322	2,440,336	Increase on the Year.
Total	47,780,342	50,220,678		

CORN.

Average Prices of Corn per Imperial Quarter in England and Wales, with the Rate of Duty on Foreign and Colonial Wheat, during each week of the Second Quarter of 1844; together with the Average Prices for the whole Quarter.—(Continued from p. 190.)

Returns received at the Corn Office, 1844.	Wheat.		Barley.		Oats.		Rye.		Beans.		Peas.		Date of Certificate of Proceeding Prices, Foreign Countries.		Duties on Wheat per Quarter.	
	Weekly Average.	Aggregate Average of the Week, including Duty.	Weekly Average.	Weekly Average.	Weekly Average.	Weekly Average.	Weekly Average.	Weekly Average.	Weekly Average.	Weekly Average.	Weekly Average.	Weekly Average.	From Foreign Countries.	From British Possessions out of Europe.	From Foreign Countries.	From British Possessions out of Europe.
Weeks ended 1844																
April 6	55 5	56 1	32 10	32 1	33 9	33 11	31 8	31 8	31 8	31 8	31 8	31 8	April 11	16 0	3 0	3 0
13	55 1	55 11	32 1	32 1	33 4	33 2	32 5	32 5	32 5	32 5	32 5	32 5	18	17 0	4 0	4 0
20	55 4	55 10	32 10	32 10	33 4	33 2	32 5	32 5	32 5	32 5	32 5	32 5	25	17 0	4 0	4 0
27	55 6	55 8	32 7	32 7	33 1	33 1	32 8	32 8	32 8	32 8	32 8	32 8	May 2	17 0	4 0	4 0
May 4	55 3	55 6	31 8	31 8	33 1	33 1	32 8	32 8	32 8	32 8	32 8	32 8	May 9	17 0	4 0	4 0
11	55 1	55 3	31 5	31 5	33 1	33 1	32 8	32 8	32 8	32 8	32 8	32 8	16	17 0	4 0	4 0
18	55 19	55 4	31 1	31 1	33 1	33 1	32 8	32 8	32 8	32 8	32 8	32 8	23	17 0	4 0	4 0
25	55 19	55 6	30 7	30 7	33 2	33 2	32 7	32 7	32 7	32 7	32 7	32 7	30	17 0	4 0	4 0
June 1	55 6	55 6	30 9	30 9	33 4	33 4	33 10	33 4	33 4	33 4	33 4	33 4	June 6	17 0	4 0	4 0
8	55 6	55 6	31 4	31 4	33 11	33 11	33 11	33 11	33 11	33 11	33 11	33 11	13	17 0	4 0	4 0
15	55 9	55 7	31 10	31 10	33 6	33 6	33 11	33 11	33 11	33 11	33 11	33 11	20	17 0	4 0	4 0
22	55 8	55 8	32 8	32 8	33 8	33 8	33 10	33 10	33 10	33 10	33 10	33 10	27	17 0	4 0	4 0
29	55 9	55 8	34 0	34 0	33 9	33 9	33 9	33 9	33 9	33 9	33 9	33 9	July 4	17 0	4 0	4 0
Average of the Quarter	55 6	55 6	32 0	32 0	33 2	33 2	33 9	33 9	33 9	33 9	33 9	33 9	..	..	..	..

Foreign and Colonial Wheat and Wheat-Flour imported in each of the Months ended 5th May, 5th June, and 5th July, 1844; the Quantities upon which Duties have been paid for Home Consumption during the same Months; and the Quantities remaining in bond at the close of them.—(Continued from p. 190.)

Months ended	Imported.			Paid Duty.			In Bond at the Month's end.		
	Foreign.	Colonial.	Total.	Foreign.	Colonial.	Total.	Foreign.	Colonial.	Total.
1844	Qrs.	Qrs.	Qrs.	Qrs.	Qrs.	Qrs.	Qrs.	Qrs.	Qrs.
5th May	67,997	64	68,061	80,416	64	80,480	236,187	117	236,304
5th June	246,358	3	246,361	63,319	1	63,320	411,209	119	411,328
5th July	..	..	..	..	..	..	..	..	..

WHEAT FLOUR.

Months ended	Imported.			Paid Duty.			In Bond at the Month's end.		
	Foreign.	Colonial.	Total.	Foreign.	Colonial.	Total.	Foreign.	Colonial.	Total.
1844	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.
5th May	42,534	996	43,530	4,733	4,849	9,582	151,694	4,685	156,379
5th June	42,123	1,091	43,214	658	1,078	1,736	191,969	4,106	196,075
5th July	..	..	..	..	..	..	..	..	..

CURRENCY.

Quarterly Average of the Weekly Liabilities and Assets of the Bank of England, in the Quarters ended 26th April, 18th May, and 15th June, 1844; and in the corresponding Quarters of the preceding Year.—(Continued from p. 191.)

Quarters ended	LIABILITIES.			ASSETS.		
	Circulation.	Deposits.	Total.	Securities.	Bullion.	Total.
1844.	£.	£.	£.	£.	£.	£.
26th April	21,427,000	13,615,000	35,042,000	21,150,000	15,015,000	36,165,000
18th May	21,203,000	13,215,000	34,418,000	21,176,000	15,010,000	36,186,000
15th June	21,237,000	13,485,000	34,722,000	21,166,000	15,000,000	36,166,000
1843.						
26th April	20,520,000	11,631,000	32,151,000	21,587,000	11,100,000	32,687,000
23rd May	19,403,000	11,154,000	30,557,000	22,696,000	11,291,000	33,987,000
17th June	19,521,000	10,495,000	30,016,000	21,604,000	11,472,000	33,076,000

Average Aggregate Amount of Promissory Notes, which have been in Circulation in the United Kingdom, distinguishing the several Banks, or Classes of Banks, by which issued in each part of the Kingdom, with the Average Amount of Bullion in the Bank of England, during the four weeks ended the 27th April, 25th May, and 22nd June, 1844, respectively.—(Continued from p. 191.)

Banks.	Circulation during the Four Weeks ended		
	27th April, 1844.	25th May, 1844.	22nd June, 1844.
	£.	£.	£.
England—Bank of England	21,839,000	21,504,000	20,634,000
Private Banks	5,295,239	5,142,830	4,743,037
Joint-Stock Banks	3,752,867	3,680,413	3,665,104
Scotland—Chartered Private & Joint-Stock Banks	2,714,627	3,041,079	3,117,988
Ireland—Bank of Ireland	3,625,928	3,663,500	3,488,300
Private and Joint-Stock Banks	2,337,446	2,241,722	2,080,277
Total	39,585,104	39,273,544	37,728,726
Bullion in the Bank of England	15,844,000	15,572,000	15,898,000

Consolidated Fund Operations.—The total income brought to this account in the quarter ended 5th July, 1844, was 13,377,883*l.*; the total charge was 10,219,337*l.*, leaving a surplus of 3,158,546*l.* The amount of Exchequer Bills issued to meet the charge on the Consolidated Fund for the quarter ended 5th April, 1844, and paid off out of the growing produce of that fund for the quarter ended July 5th, 1844, after deducting 300,000*l.* paid off out of the Sinking Fund, was 3,667,317*l.* The surplus of the Consolidated Fund for the quarter ended July 5th, 1844, was 1,033,081*l.*; and the probable amount of Exchequer Bills required to meet the charge on the Consolidated Fund for the quarter ended July 5th, 1844, was 4,700,398*l.*

BANKRUPTCY.

An Analysis of the Bankruptcies in England and Wales, gazetted in each Month of the Quarter ended June 30, 1844; showing the Counties and Branches of Industry in which they have occurred. (Continued from p. 192.)

COUNTIES.	April.	May.	June.	TRADES.	April.	May.	June.
Metropolis	37	31	15	<i>Agriculture and connected Trades.</i>			
Bedford	1	1	1	Farmers	1	1	1
Berks	1	1	1	Agricultural Implement Makers and Wheelwrights	1	1	1
Cambridge	1	1	1	Millers and Maisters	1	1	1
Chester	1	1	1	Hop Merchants	1	1	1
Comwall	1	1	1	Brewers	1	1	1
Cumberland	1	1	1	Horse and Cattle Dealers, and Woolstaplers	1	1	1
Derby	1	1	1	<i>Mining and connected Trades.</i>			
Devon	1	1	1	Mining Firms	1	1	1
Dorset	1	1	1	Blasting Works	1	1	1
Durham	1	1	1	<i>Manufactures.</i>			
Essex	1	1	1	Woollen Manufactures	1	1	1
Gloucester	1	1	1	Cotton	1	1	1
Hants	1	1	1	Linens	1	1	1
Hertford	1	1	1	Silk	1	1	1
Huntingdon	1	1	1	Printers and Dyers	1	1	1
Kent	1	1	1	Lace Manufacturers	1	1	1
Lancaster	1	1	1	Hosiery	1	1	1
Leicester	1	1	1	Hardware	1	1	1
Lincoln	1	1	1	Earthenware	1	1	1
Middlesex (exclusive of the Metropolis)	1	1	1	Glass	1	1	1
Monmouth	1	1	1	Paper	1	1	1
Norfolk	1	1	1	Builders	1	1	1
Northampton	1	1	1	Miscellaneous Manufactures	1	1	1
Northumberland	1	1	1	<i>Commerce.</i>			
Nottingham	1	1	1	Bankers and Merchants	1	1	1
Oxford	1	1	1	Shipowners, Warehousemen, Brokers, and Wholesale Dealers generally	1	1	1
Rutland	1	1	1	<i>Retail and Handicraft Trades.</i>			
Salop	1	1	1	Bakers	1	1	1
Somerset (including Bristol)	1	1	1	Butchers	1	1	1
Stafford	1	1	1	Corn and Hay Dealers	1	1	1
Suffolk	1	1	1	Innkeepers and Victuallers	1	1	1
Surrey (exclusive of the Metropolis)	1	1	1	Wine and Spirit Merchants	1	1	1
Sussex	1	1	1	Dealers in Grocery, Drugs, and Spices	1	1	1
Warwick	1	1	1	Makers of, and Dealers in, Clothing	1	1	1
Westmoreland	1	1	1	Makers of, and Dealers in, Furniture	1	1	1
Wilts	1	1	1	Cash Builders	1	1	1
Worcester	1	1	1	Miscellaneous	1	1	1
York (East Riding)	1	1	1				
York (North Riding)	1	1	1				
York (West Riding)	1	1	1				
Wales	1	1	1				
Total	85	101	61	Total	85	101	61

Among the contents of the six completed Volumes of this Journal, are Reports and Papers on the following subjects:—

VOL. I.

On the State of the Working Classes and Poor in Bristol, Newcastle, Glasgow, Hyde, Norwich, &c.; Education in Westminster, Newcastle, Massachusetts, the Universities of Great Britain, &c.; Pauper Schools; Agriculture and Agricultural Labourers in Northumberland, Bedfordshire, Bellingham, Norfolk and Suffolk; Vital Statistics of Troops in the West Indies, &c.; Fever, Diseases of the Heart, &c.; Strikes in the Potteries; Copper Mines in Cornwall; the Glass Manufacture; the Collieries in Durham; Emigration; Savings Banks; Joint Stock Companies; Mines and Commerce of France; Fires in London; Moral Statistics of Parishes in Westminster, &c. &c.

VOL. II.

On the State of the Working Classes in Rutlandshire, Bristol, Nottingham, &c.; Education in Leeds, Pendleton, Rutlandshire, Bristol, West Bromwich, Belgium, France, Switzerland, English Factories, &c.; Sickness and Mortality among the Metropolitan Police; Statistics of Leeds, Penance and New York; Progress of Population in Saxony, Prussia, Hanover, Norway, Denmark and Algeria; Railways in Belgium; Manufactures in Prussia; Tin Mines in Cornwall; Steam Power in Manchester; Sulphur Trade of Sicily; Crime, England and Wales; the Numerical Method applied to Science; the Collection of Agricultural Statistics, &c. &c.

VOL. III.

On the State of the Working Classes in Westminster and the Mining Districts of Devonshire; Education in Birmingham, and among the Criminal Population of England and other Countries; Moral Statistics of Southwark; Vital Statistics of European and Native Troops in India, of Manchester, Glasgow and Limerick; on the Census of the United Kingdom in 1841, and the system adopted in other Countries; on Scottish Management of the Poor; on the Mont de Piété System in Ireland; Plan of a New Common Place Book; Metropolitan Lunacy; Book Trade of Germany; Penny Postage, &c. &c.

VOL. IV.

On the Census of 1841; Income and Expenditure of the Working Classes in Manchester; Education in Hull, Bristol, and Paris; Polytechnic School at Paris; Vital Statistics of Army and Navy compared; of Troops in Madras Presidency; of Lunatics; Abstract of Taverstock Registers; New Postage; the Corporation of London and the Thames; Agriculture in Cornwall; Loan Funds in Ireland; Continental Monte de Piété; Scottish Management of the Poor; Statistics of Plymouth; Newspapers; Railways in United Kingdom, &c. &c.

VOL. V.

On General, Superior, Secondary, and Primary Education in France; Prices and Fluctuation of Grain in Prussia and England; Progress of the two Sicilies; Depreciation of Trade at Batavia; Municipal Institutions of the English Towns; Hospital Statistics; Periodical Phenomena; Belgian Statistical Commission; Working Classes of Hull; Accidents in Coal Mines; on Railways; English Universities; Past and Present State of Lancashire; Parish Registers; Capital Punishments; Influence of Factory Employment on Life and Health; Loan Funds in Ireland; Destitution and Mortality in Scottish Towns; Belgian Coal Mines; Commerce of Russia; Popular Education, &c. &c.

VOL. VI.

On the Census of 1841; Condition of the Working Classes in St. George's, Hanover-square; Education in Finsbury; the Book Trade in England; Progress of Real Property, Population, and Pauperism; Civil and Criminal Justice in British India; State of Husbandry and Education in Middlesex; Agricultural Statistics; Influence of the Seasons on Mortality; Vital Statistics of Large Towns in Scotland; Division of Heritable Property and Distribution of Wealth in France; Influence of Employments on Health; Education in the Metropolis; Progress of Crime in the United Kingdom; Famines in India; Railway Accidents and Traffic; Superior Education in France; Medical Relief and Lunatic Poor in Ireland; Census and Social Economy of Ireland.

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S. Hale

M4/8
With the Authors compliments

COMPARISON

OF

THE SICKNESS, MORTALITY, AND PREVAILING
DISEASES AMONG SEAMEN AND SOLDIERS,

AS SHOWN BY THE

NAVAL AND MILITARY STATISTICAL REPORTS.

BY T. GRAHAM BALFOUR, M.D., Assistant Surgeon,
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COMPARISON

OF

THE SICKNESS, MORTALITY, AND PREVAILING DISEASES
AMONG SEAMEN AND SOLDIERS.

SINCE the paper by Colonel Tulloch on the sickness, mortality, and prevailing diseases among seamen and soldiers in the Mediterranean, was read to the Society (15th February, 1841), another volume of reports on the health of the Navy has been published, and an opportunity thereby afforded of extending the comparison to the two services when exposed to the influence of a tropical climate. The volume alluded to comprises—1st. The Cape of Good Hope, Western Africa, and the Mauritius; 2nd. The East India command; and 3rd. The Home and various Forces. The first of these cannot be made available for our present purpose, because climates so diametrically opposed are included together, and there are several circumstances which render it impossible to institute a fair comparison between the home force and the troops in the United Kingdom. We shall, therefore, confine our observations to that portion of the Navy employed in the East India command.

This command is of great extent, stretching from the tropic of Cancer to the 45th degree of south latitude, and from the 50th to the 150th degree of east longitude; the northern limit being the Isthmus of Suez, the southern the island of Tasmania. It includes all that part of the coast of Asia bounded by the Indian Ocean, the islands in that ocean, the British possessions of New Holland and Tasmania, and the islands in the North Pacific. The operations of the squadron, however, are principally directed to the shores of the Bay of Bengal, of the coast of Coromandel, and of the island of Ceylon, so that its service is chiefly intertropical. The only military force of which the sanitary condition can be brought into comparison with this portion of the Navy, by means of the Statistical Reports, are the European troops in Ceylon. The following table shows the amount of sickness, mortality, and invaliding in the two services respectively, from 1830 to 1836 inclusive:—

Years.	Naval Force.				Military Force.			
	Mean Strength.	Number Treated.	Total Deaths.	Number Invalided.	Mean Strength.	Number Treated.	Deaths from all Causes.	Number Invalided.
1830	1,621	2,520	32	25	2,192	3,148	94	8
1831	1,523	2,548	25	89	2,186	3,123	80	..
1832	2,294	3,019	33	82	2,056	3,009	204	5
1833	1,809	2,412	45	77	2,002	2,434	65	2
1834	2,134	3,259	46	44	2,060	2,723	91	8
1835	2,088	2,610	29	49	2,005	2,466	116	7
1836	1,563	2,013	14	69	2,089	2,875	77	22
Total	12,942	18,381	224	435	14,590	19,778	727	52
Annual ratio per 1000 of mean strength.	..	1,420	17.3	33.6	..	1,356	49.8	3.6

From this table it appears that the amount of sickness has been greater in the naval than the military force, though not to such an extent as in the Mediterranean, while, on the contrary, the mortality has been considerably higher among the soldiers. Deducting the cases of wounds and injuries to which sailors are more liable from the nature of their duties, the sickness and mortality arising from disease alone will be found to be as follows:—

	Naval Force.		Military Force.	
	Admissions into Hospital.	Deaths.	Admissions into Hospital.	Deaths.
Total	18,381	224	19,778	727
Deduct arising from wounds and injuries	2,522	28	2,086	51
Remain from diseases	15,859	196	17,692	676
Annual ratio per 1000 of mean strength	1,225	15.1	1,213	46.2

It is remarkable how nearly the proportion of cases approximates after making this deduction for accidental injuries, the admissions among the sailors being 1225 per 1000 of the strength, and among the soldiers 1213. The deaths of the latter, however, amount to three times those of the former. All the circumstances already noticed as tending to reduce the mortality in the naval force in the Mediterranean, are in full operation here also, while the soldiers do not enjoy even the same advantages as in that command. Perhaps the most striking difference between the two services is in the amount of invaliding, which has been nine times as great in the Navy as in the Army. The effect of thus getting rid of chronic cases must be very obvious, for while of the military only 7 or 8 have been discharged in each year, 62 of the naval force were invalided annually out of a somewhat smaller number employed. The difference in the mode of invaliding, too, which was remarked upon as being so advantageous

to the sailor in the Mediterranean, exists even to a greater extent in this command, for while frequent opportunities occur of sending him home in one of Her Majesty's ships at an early period of his disease, the soldier is detained until a passage can be procured on board some freight ship or transport, however urgently his case may demand removal to a temperate climate. Much benefit must also be derived by the sailor from the frequent change of station in cruising about the coast, or being removed from one part of the command to another. This has been found of such advantage, particularly in diseases of the bowels, that occasionally a portion of a regiment in India, when in a sickly state, has been sent on a short cruise for the benefit of their health, and with the best results.

The period of a sailor's service in the East India command rarely exceeds four years, when his ship returns to England to be paid off, while the tour of service of a regiment in Ceylon is ten years; soldiers, therefore, remain much longer in the command, and, as a necessary consequence, their average age is greater than that of the sailors: but the military reports clearly prove that continued residence in a tropical climate diminishes the power of the constitution to resist the fatal effects of disease, and in such climates the mortality increases with age in a much more rapid ratio than in temperate regions, consequently the sailor derives a great advantage from the limited duration of his service. In illustration we may remark, that while the mortality of the troops generally was 49 per 1000, that of the men under 25 years of age amounted only to 24, while among those above 40 it was as high as 126 per 1000 of the strength.

The following table, compiled from the statistical reports in the same form as in the previous comparison by Colonel Tulloch, shows the relative prevalence and mortality of the different classes of diseases in each service:—

Classes of Diseases.	Naval Force.		Military Force.		Ratio per 1000 of Mean Strength.			
	Out of an aggregate Force of 12,942.		Out of an aggregate Force of 14,590.		Attached.		Died.	
	Attached.	Died.	Attached.	Died.	Naval Force.	Military Force.	Naval Force.	Military Force.
Fever	2,302	39	4,641	80	178	319	3.1	5.6
Eruptive Fevers	7	2	13	3	..	..	..	..
Diseases of the Lungs	2,501	24	1,158	83	193	79	1.8	5.6
Diseases of the Liver	381	19	730	73	29	50	1.5	5
Diseases of the Stomach and Bowels	3,447	60	4,720	283	266	323	4.6	19.4
Epidemic Cholera	220	31	344	107	17	24	2.4	7.3
Diseases of the Brain	523	10	93	20	41	7	.8	1.4
Dropsies	10	1	77	13	1	5	.08	.9
Rheumatism	845	2	490	2	65	34	.16	.13
Syphilis	530	..	238	..	41	16	..	..
Gonorrhoea	270	..	371	..	21	35	..	..
Ulcers	860	..	1,507	1	67	103	..	.07
Erysipelas	42	..	26	..	3	2	..	..
All other diseases	3,921	8	3,284	12	303	225	.6	.8
Total	15,859	196	17,692	676	1,225	1,213	15.1	46.2

This table shows the influence of the principal classes of diseases on the two services; but to elucidate the subject still farther we shall briefly analyse these classes, and add a few observations on the chief points of difference.

Fevers.

Under this head are comprehended—

	Naval Force.		Military Force.	
	Out of an aggregate strength of 11,942.		Out of an aggregate strength of 14,500.	
	Attacked.	Died.	Attacked.	Died.
Intermittent	324	..	249	2
Remittent	422	17	482	60
Common continued	1,541	21	3,910	18
Typhus	15	1	..	..
Total	2,302	39	4,641	80
Annual ratio per 1000 of mean strength . .	178	3	318	5.5

These diseases have been nearly twice as prevalent and fatal among the military as the sailors. The difference in the mortality has arisen from the much greater virulence of the cases of remittent fever, of which 1 in 8 died in the Army, while only 1 in 25 proved fatal in the Navy. This, probably, arises in some degree from the difference of the service; the sailor is considerably exposed to the causes of intermittent and remittent fevers when employed in wooding and watering, or in refitting, and we consequently find the amount of the former to be higher and of the latter type of fever nearly the same as among the soldiers; but as soon as he becomes ill he is taken on board ship, generally beyond the influence of the miasmata which have produced the disease, while the soldier, under similar circumstances, is taken into hospital in the immediate neighbourhood, and probably within the range of the operation of such cause. There can be no doubt that this removal of the patient from the locality where the fever has originated materially simplifies the case, and increases his chances of recovery. The difference in the prevalence of this class of diseases is caused by the larger number of cases of the common continued form among the military; but as the ratio of deaths is even lower than in the naval force, there seems good reason to believe that their excess arises in part, at least, from the admission of more cases of a trivial nature, resulting from exposure to the heat of the sun and the more frequent opportunities enjoyed by the soldier of indulging in the use of intoxicating liquors. This opinion is strengthened by the circumstance of 384 cases of headache and vertigo appearing in the Navy Report in the class of "Diseases of the Brain," while there are only 7 in the military, admissions from these causes among the soldiers having most probably been entered as ephemeral fever. It is very remarkable that if we take the diseases of this class collectively, their intensity will be found to be within a fraction the same in both services, being 1 death in 58 cases among the soldiers, and 1 in 59 among the sailors. The same fact was observed in the Mediterranean command, where the proportions were 1 in 57 and 1 in 56 respectively.

Eruptive fevers require no remark; only 13 cases and 2 deaths from small-pox occurred in the military, and 6 cases, whereof 2 proved fatal, in the naval force. There were, besides, 1 case of scarlet fever in the latter and 10 of measles in the former, all of which recovered.

Diseases of the Lungs.

Under this head are comprised in the preceding table—

	Naval Force.		Military Force.	
	Out of an aggregate strength of 11,942.		Out of an aggregate strength of 14,500.	
	Attacked.	Died.	Attacked.	Died.
Inflammation of Lungs and Pleurisy . .	210	4	167	13
Spitting of Blood	20	2	52	6
Consumption	39	16	78	51
Catarrhs	2,211	2	818	13
Asthma, and difficulty of breathing . .	21	..	43	..
Total	2,501	24	1,158	83
Annual ratio per 1000 of mean strength . .	193	1.8	79	5.6

As in the Mediterranean command, this class of diseases is much more prevalent in the naval force. This excess in the attacks is confined to inflammation of the lungs and catarrhal affections, but particularly the last, the ratio of which among the sailors has amounted to 171 per 1000, while among the soldiers it has only been 56. This, as already shown, arises from the much greater exposure of sailors to the vicissitudes of the weather, and from their being compelled every night to turn out of their over-heated berths to take their turn of duty on deck, while the soldier is seldom on guard more than every fourth or fifth night, and remains on sentry only two hours at a time, instead of four. The soldier, moreover, is obliged to wear his great coat at night, while it seems left very much to the sailor's discretion to wear what clothing he pleases.

But from the more formidable and fatal diseases of the lungs, spitting of blood and consumption, the sailor enjoys a considerable exemption. It is known that the prevalence of consumption among the troops serving in the Peninsula of India* is lower than in any other British possession, and this exemption may, perhaps, extend to the naval force serving on that coast; but though the difference may be thus, in part, accounted for, there seems no reason to doubt that the disease is really less common in the Navy than the Army. This, probably, results from the frequent change of station in the Navy, from the shorter exposure to the debilitating influence of a tropical climate, and from the less prevalence of fever, which is undoubtedly a frequent exciting cause in persons predisposed to tubercular disease.

Not only the actual mortality but the proportion of deaths to attacks is much lower by every disease comprised in this class among the naval force, a result towards which the more frequent opportunities of invaliding must materially contribute, the number discharged on account of pulmonary diseases having been 40, while among the military it only amounted to 14.

* This remark does not apply to the troops in Ceylon.

Diseases of the Liver.

Under this head are comprised in the preceding table:—

	Naval Force.		Military Force.	
	Out of an aggregate strength of 12,942.		Out of an aggregate strength of 14,500.	
	Attacked.	Died.	Attacked.	Died.
Inflammation of the Liver	356	19	715	73
Jaundice	25	..	15	..
Total	381	19	730	73
Annual ratio per 1000 of mean strength . .	29	1.5	50	5.

This class of diseases is a source of considerably greater inefficiency and mortality than in the Mediterranean; the relative proportion of cases in the two services is nearly the same as in that command, but the mortality among the military is much higher. This, probably, is greatly influenced by the facility with which chronic cases in the Navy are sent home, and likewise by the shorter term of tropical service.

Diseases of the Stomach and Bowels.

Under this head are comprised:—

	Naval Force.		Military Force.	
	Out of an aggregate strength of 12,942.		Out of an aggregate strength of 14,500.	
	Attacked.	Died.	Attacked.	Died.
Inflammation of Stomach, Bowels, and Peritoneum	49	3	60	8
Vomiting of Blood	4	..	4	2
Dysentery	872	55	2,620	265
Indigestion	374	1	57	1
Diarrhoea	1,295	1	994	1
Cholera Morbus	..	..	162	4
Colic	479	..	687	1
Constipation	374	..	136	1
Total	3,447	60	4,720	283
Annual ratio per 1000 of mean strength . .	266	4.6	323	19.4

This is the most prevalent and fatal class of diseases in the command. It is remarkable that while the total number of cases is much greater in both services, the relative proportion in each is exactly the same as in the Mediterranean, where it was found to be as 155 to 188, and in the East India command it has been as 266 to 323. But the sailors have enjoyed a much greater comparative exemption from mortality, the ratio having amounted to scarcely one-fourth of that among the soldiers. The difference will be found chiefly in the cases of dysentery, which constituted more than half the admissions by this class of diseases among the latter, and only one-fourth among the former; in the Navy, too, it assumed a milder form, 1 case in 16 having proved fatal, while of the soldiers attacked by it 1 in 10 died. But it must be borne in mind that

95 sailors were got rid of by invaliding on account of hepatic disease and dysentery, while only 2 soldiers were discharged for the same diseases. As dysentery appears to be an endemic disease in the East, the same remarks which were made regarding the greater prevalence of fevers among the soldiers must apply equally to it. Of the other diseases of this class, inflammation and colic are rather more common in the military force, while indigestion and constipation are much more prevalent in the naval; the latter difference arising most probably from the nature of their diet. Of late years, dysentery has been diminishing, both in prevalence and intensity, among the troops, owing apparently to certain improvements in their diet and accommodation.

Epidemic Cholera.

Naval Force.		Military Force.	
Out of an aggregate strength of 12,942.		Out of an aggregate strength of 14,500.	
Attacked.	Died.	Attacked.	Died.
220	31	344	107
Ratio 17	2.4	24	7.3

This disease has proved more prevalent and fatal among the military than among the sailors, and the proportion of deaths to cases has also been higher. Dr. Wilson, however, states his opinion that some cases of common cholera have been included, which seems probable, as in 1835 we find 21 admissions recorded and no deaths. Cholera being an endemic disease in India, although prevailing occasionally as an epidemic, it was naturally to be expected that the troops would suffer more from it as being more exposed to endemic influences. In 1832 it raged with great virulence at Colombo and Trincomalee, cutting off nearly one-fifth of the white troops at the latter station, while only 9 cases occurred among the sailors in the harbour there, of which 3 terminated fatally; and throughout the rest of the command there were but 15 attacks and 1 death recorded.

Diseases of the Brain.

Under this head are comprised:—

	Naval Force.		Military Force.	
	Out of an aggregate strength of 12,942.		Out of an aggregate strength of 14,500.	
	Attacked.	Died.	Attacked.	Died.
Inflammation of the Brain	7	1	6	2
Apoplexy	17	5	11	10
Paralysis	9	2	19	3
Headache and Vertigo	384	..	7	..
Epilepsy	73	1	15	2
Fatuity	14	1	..	..
Madness	9	..	13	..
Brain Fever of Drunkards	10	..	20	3
Total	523	10	93	20
Annual ratio per 1000 of mean strength . .	41	0.8	7.	1.4

If from the cases in the Navy those of headache and vertigo be deducted, the proportion of attacks would scarcely amount to 11 per 1000, being very little higher than in the Army. From the very great disproportion in this particular, we are induced to believe that cases which in the Navy are recorded as headache and vertigo have in the military returns been entered as ephemeral fever; and if so, this would tend to equalize the admissions by that class of diseases. Of the other diseases of this class, epilepsy prevails to a much greater extent among the sailors than the soldiers. We are at a loss to assign a satisfactory reason for this; in the Army, fits of this nature generally result from excessive drinking; but if the prevalence of delirium tremens can be taken as a measure of the relative intemperance of the two services, the soldiers carry off the palm; and, considering the greater facilities they have for obtaining liquor, and the constant temptation to indulgence therein, this estimate is probably correct. It is worthy of remark, however, that in a country where spirits are so cheap as in Ceylon, with the inducements to drink arising from the heat, excessive perspiration, and want of occupation or means of amusement to fill their leisure hours, the attacks of delirium tremens have averaged only 14 in every 10,000 soldiers, and the deaths but 2 in the same number. The deaths from apoplexy are more numerous among the soldiers, although there have been fewer cases. It seems probable, therefore, that the larger proportion of fatal cases from this cause among the sailors in the Mediterranean was an accidental circumstance, and not, as conjectured by Colonel Tulloch, a peculiarity resulting from the confinement of shipboard.

Dropsies.

Under this head are comprised:—

	Naval Force.		Military Force.	
	Out of an aggregate strength of 13,942.		Out of an aggregate strength of 14,500.	
	Attacked.	Died.	Attacked.	Died.
Subcutaneous Dropsy	8	1	32	4
Abdominal Dropsy	1	..	15	5
Water on the Chest	1	..	1	1
Beri beri	..	..	9	3
Total	10	1	77	13
Annual ratio per 1000 of mean strength .	1	·08	5·	·9

Dropsies, being commonly the sequel of fevers or hepatic disease, might naturally have been expected to be more prevalent among the military, who suffer to so much greater an extent from these than the sailor; while, moreover, the influence of the sea-breezes in restoring tone to the constitution of the latter, when convalescent from fever, must prove highly beneficial in warding off dropsical affections.

	Naval Force.		Military Force.	
	Out of an aggregate strength of 13,942.		Out of an aggregate strength of 14,500.	
	Attacked.	Died.	Attacked.	Died.
Rheumatism	845	2	490	2
Syphilis	530	..	238	..
Gonorrhoea	270	..	371	..
Ulcers	860	..	1,507	1
Erysipelas	42	..	26	..

These diseases present much the same features as in the Mediterranean, except ulcers, which were there found to be slightly more common in the Navy, but in this command have been considerably more numerous among the soldiers than the sailors. Part of this increase has been attributed to the bites of insects, particularly of a small leech which is very abundant among the dry leaves and bushes. Erysipelas has not prevailed to any extent, nor has it raged as an epidemic during the period under review. The relative proportion of cases in the Navy has been considerably less than it was found to be in the Mediterranean.

Among the "other diseases" two only seem to require observation, on account of the great diversity in their prevalence in the two services. In the Navy there have been recorded 2475 cases under the head of "Inflammation" (phlegmon), and 204 bile and abscesses, making a total of 2679; while in the Army only 900 admissions have taken place from the same causes. Most of the cases in the Navy have been superficial inflammations of the legs, seldom extending above the knee, and often terminating in small abscesses. This affection has been supposed to arise partly from the nature of the sailors' duty, especially cleaning the decks by washing and stoning; and it probably also depends on the stimulating quality of the salt water, with which their feet and legs are so constantly wet. The other class of cases alluded to is that of diseases of the eyes, of which 193 cases have occurred among the sailors; while they have amounted to 1092 among the soldiers. We are unable to assign any reason for this marked difference: there seem no good grounds for supposing these diseases to have been excited by unfair means, as their prevalence has been nearly the same in all the years included in the military reports, and they have been equally common in the native (Malay) and European regiments.

These reports confirm the impressions produced by the previous volume, of the high standard of health enjoyed by our Navy, because, even under all the disadvantages of tropical service, the mortality has amounted only to 1½ per cent., including accidental and violent deaths. They also afford strong presumptive evidence of the advantages to be derived from limited service. Were the prospect of a termination to his engagement at a fixed and not very distant period held out to the soldier, it would doubtless restrain him from many of those reckless excesses which cannot but impair his health and render him more amenable to the attacks of disease; and it would also afford him the opportunity of quitting the service if he found himself unequal to the duties, or his general health was beginning to be impaired. The Army Statistical

Report further shows the advantage of attention to military hygiene, in the diminished admissions and deaths from dysentery which have followed the adoption of various improvements in diet and barrack accommodation. This branch of medical science has unfortunately been too much neglected; but we trust that one effect of these investigations will be to draw attention to this important subject, and impress upon the authorities the great advantages to be derived from the adoption of judicious sanitary measures.

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CONTRIBUTIONS

TO

VITAL STATISTICS,

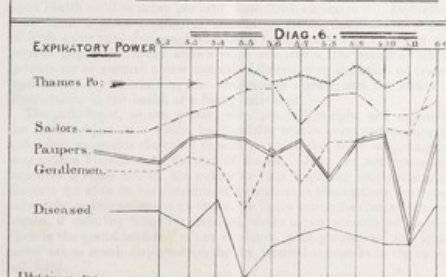
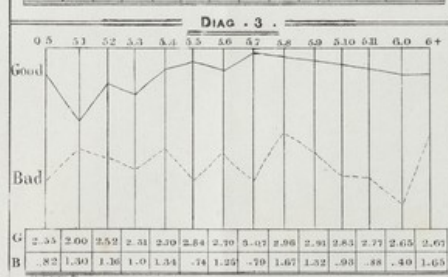
OBTAINED BY MEANS OF A PNEUMATIC APPARATUS FOR
VALUING THE RESPIRATORY POWERS WITH
RELATION TO HEALTH.

By JOHN HUTCHINSON, Esq., SURGEON, F.S.S.

[Read before the Statistical Society of London, June 17th, 1844.]

From the QUARTERLY JOURNAL of the STATISTICAL SOCIETY of LONDON,
AUGUST, 1844.





Contributions to Vital Statistics, obtained by means of a Pneumatic Apparatus for valuing the Respiratory Powers with relation to Health. By JOHN HUTCHINSON, Esq., Surgeon, F.S.S.

[Read before the Statistical Society of London, June 17th, 1844.]

If in the present day there is one subject pre-eminently engaging the public mind, it appears to be, the best means of preserving the public health. And if any one among the various divisions of that subject can be ranked before another on the score of utility, it should seem to be, that regarding the effects produced on individual health by particular occupations.

The earliest original contribution to this branch of knowledge which has come under my notice, is that by Ramazzini, of Padua, published in English in 1705, and which much redounds to the credit of the author. The only other book of which I am aware, is that written in the present time by our countryman Thackrah, whose labour in this cause has far surpassed that of all others. Many journals have bestowed praise on this author, but it appears to me they have all come short of the commendation which is due to his industry and accuracy.

It is generally the custom to estimate the healthiness of a trade by the mortality among the individuals employed in it; but, however correct this system may be, it is an expensive method of coming to the conclusion; since, in this way, we do not count the effect of a certain trade upon health until so many per cent. have fallen victims to it. Deducting from these a given number of cases as uncertain, this *fatal* list is still of little value until compared with other fatal lists. The object of the present paper is to make known some researches, the result of which induces me to venture a new method of determining the effect of trades upon health, by ascertaining the *presence* of disease, and the extent of deterioration in the health of a living individual.

The pathologist, in the present day, not only weighs and measures the dead subject as a whole, but carefully weighs every internal organ, and often ascertains the cubic measurement of the heart also, that he may inform himself as to the seat of disease. Here we see that *measurement* is made one of his guides in thus inquiring into the seat of disease; for after he has determined by numerous observations the natural weight or dimensions of an organ, he justly concludes that all similar organs, if differing from this standard, differ so on account of disease. Such is the grand harmony of our structure, that proportion and symmetry are as much displayed amidst the internal organs as in the external form.

And again, the physician, when inquiring into the state of his patient,

desires to know whether the natural secreting organs are acting in excess or in deficiency, and upon this he grounds his opinion as to the healthiness of the particular organs. Every organ, then, has its appropriate action, which cannot be altered to any material amount without the presence of disease; and surely this argument applies with some force to an organ whose action is of such vital importance that its suspension for a very brief period terminates our life. I mean, the "respiratory functions," the investigation of the different states of which in various conditions of life forms the subject of the present paper.

With the instruments I have constructed, and which are now before the Society, I have measured the *volume* of air that a man can force out of his chest, together with his *power* of inspiration and expiration; these observations I have connected with the state of his health, because I find this to vary according to his volume and power of expiration and inspiration.

Simple as this method appears to be, it is extraordinary that up to this time very few have been the physical experiments made upon the lungs, so as to determine with any accuracy even their absolute capacity; and we are perfectly ignorant as to how much air is necessary for our well-being; nevertheless, this knowledge is perfectly accessible, and the present observations will assist in forming that chain of inquiry.

Physiologists generally divide respiration into three or four different stages, and these again will admit of numerous subdivisions.

My object has been, first of all, to determine *what quantity of air we are able to expel from the lungs by the greatest voluntary effort* we are capable of exercising. Owing to the various terms given to designate the different divisions of respiration, I have found it difficult to separate this division from the chaos of physical experiments hitherto made upon the lungs. And what I have gathered from them is of little value, not being connected with any other observations upon the human frame. Another object of my inquiry has been, to determine the *power* of the *inspiratory* and *expiratory* muscles; so that observations upon the *volume* of the lungs, and the *power* of these two classes of muscles, form the foundation of the present research, combined with certain external measurements.

I may here mention that, for brevity's sake, I have used the term "*capacity*" to signify that quantity of air which an individual can force out of his chest by the greatest voluntary expiration, after the greatest voluntary inspiration.

With these introductory remarks, I now proceed to the matter of this paper.

One thousand one hundred and fifty-one individuals, of different occupations, have been carefully examined; and, by Table C, now suspended before the Society, the various classes, also the numbers composing those classes, are thus arranged:—

TABLE C.	
Sailors	121
Fire Brigade	82
Police, Metropolitan	144
Police, Thames	76
Paupers	129
Mixed Class (Artisans)	162
First Battalion Grenadier Guards	87
Royal Horse Guards (Blue)	59
Pugilists, &c.	24
Anomalous cases	3
Pressmen	30
Compositors	43
Draymen	20
Gentlemen	98
Diseased cases	60
Miscellaneous cases	13
Total	1,151

I must here pause a moment to express my thanks to certain gentlemen, who with the greatest liberality and politeness have rendered me every assistance in their power to obtain these cases, and any other facility I might require towards my object; viz., Mr. Farr; Dr. Balfour; Surgeon-Major Johnston, and Assistant Surgeon Mr. Hurthwaite, of the first battalion Grenadier Guards; Mr. Golliver, of the Royal Horse Guards; Mr. Fisher, for the police force; Dr. Boyd, for the paupers in the Mary-le-bone infirmary; Captain Bazalgette, for the sailors; Mr. Braidwood, who twice summoned his whole brigade force for my examination; Mr. Taylor, for the printers; Dr. Taylor and Dr. Williams for the diseased cases; also to Mr. Tibson; and last, though not least, for the liberal assistance of Mr. Brent, whose acquaintance with the physical proportions of man I believe to surpass that of all other men in Europe.

Each of these 1151 individuals was submitted to the observations given in Table B, here suspended, viz.:—

Number of cubic inches given by a full expiration.	} Height.
Power of inspiration.	
Power of expiration.	
Height.	
Circumference of the chest over the nipples.	
Weight.	
Pulse.	
Number of respirations per minute.	
Age.	
Temperature of the air expired into the receiver.	

The detailed accounts of these observations upon this multitude are given in full, MS. Table, where it will be seen that upwards of 10,000 facts have been gathered together.

Each individual breathed three times into the machine, because, either from timidity or inexperience, the first observation was frequently not a correct experiment, but by three observations it is possible correctly to ascertain the point. But if more observations than three be made at the same time, the number of cubic inches of air will, from fatigue, be found to decrease. Moreover, so constant is the quantity of air in the lungs, that I have frequently examined men 18 months or two years afterwards, and have never found a variation exceeding two cubic inches; and although I have blown into this instrument not less than 2000 times, I cannot exceed 247 cubic inches at 60". The operator in a little time becomes so well acquainted with the process of taking an observation, that he can readily tell when the individual under examination has done his utmost, and also determine the correctness of the experiment. The time required to pass a person through the whole of these observations, is three minutes.

A minute description of the mechanical construction of the two principal instruments, I have already read before the Society of Arts (29th May); therefore I will not detain the present meeting upon this branch of the subject; different sections of the instruments are represented by diagrams here exhibited, and may be referred to if required. Yet I may briefly state that the three observations, viz., those of the capacity, power of inspiration, and power of expiration, are determined by two instru-

ments;—the *capacity* by the large brass machine, now before the Society; the *power* of the two classes of muscles by the other instrument on the right. The breathing machine is principally constructed as an ordinary gasometer, one vessel inverted within the other; the outer cylinder contains water, the inner receives the breath, by which it is elevated, assisted by counterbalance weights. This receiver is graduated into cubic inches; therefore to whatever height the receiver is raised by the breath, the cubic inches are determined. Fig. 1* is a front section of this instrument with the receiver partly elevated. Fig. 2 is a ground plan of the same. Figures 4 and 5 are lateral sections of the same. The instrument for valuing the respiratory power is represented by Fig. 6; the resistance is a column of mercury in a tube which, upon being elevated or depressed, moves the index on the dial, which is divided into inches and tenths, with certain words differing in meaning, fixed opposite certain figures, their position having been determined by 1200 experiments. The words and figures are given on Table A; on the left side are the figures for *inspiratory* power; on the right those for *expiratory* power.

Power of Inspiratory Muscles. Inches.		Power of Expiratory Muscles. Inches.	
1-5	Weak	2-0	Weak
2-0	Ordinary	2-5	Ordinary
2-5	Strong	3-5	Strong
3-5	Very Strong	4-5	Very Strong
4-5	Remarkable	5-8	Remarkable
5-5	Very Remarkable	7-0	Very Remarkable
6-0	Extraordinary	8-5	Extraordinary
7-0	Very Extraordinary	10-0	Very Extraordinary

It will be observed that the power of expiration is nearly one third stronger than that of inspiration. This power is taken by the nostrils; I first used the mouth, but the tongue and cheeks possessing a strength six or seven times greater than that of the true inspiratory muscles, and the difficulty of separating these powers, compelled me to make all the experiments by the nostrils.

The order of taking the observations given on Table B was in the following manner. The hand of the person to be examined was placed over the abdomen, in the sitting posture; the pulse was numbered, and also the respirations per minute; this twofold operation was kept secret from the individual, or the number of his respirations would have been modified. I next took his height, weight, and circumference of his chest; then three forced and full expirations were made into the spirometer; and, lastly, his power of inspiration and of expiration was tested. I cannot here give time to explain how errors may be detected; they sometimes arise from simple mistake; sometimes from an intention to deceive; but with a little skill on the part of the operator, no deception can be successfully practised. When the two experiments upon the inspiratory and expiratory muscles are properly made, there is a peculiar look in the eyes and over the whole countenance. There is not the least danger to be apprehended in this operation. I have found nothing injurious occur out of 1200 persons submitted to this test, including the diseased cases.

The whole matter of the present research may be divided into the

* All the "Figures" refer to coloured diagrams exhibited before the Society, but which are not here introduced.

consideration, first of the healthy cases, and secondly of the diseased cases.

It will be self-evident that until a healthy standard be determined, I have no means of detecting by measurement the inroads made upon the organs by disease: therefore I have collected as many classes of men as possible, and submitted them carefully to the test of these instruments; and I believe that I have made experiments enough to point out what is the *healthy standard*, and hence to deduce what may be considered as an indication of disease.

My first object was, to discover whether any relation existed between this "*capacity*" of the lungs, inspiratory and expiratory power, and any other external and physical sign; therefore I submitted the whole number of subjects to all the observations enumerated in Table B (page 3), and to my gratification I *did discover* a relation *intimately existing* between this capacity and power, and the *height* of the individual, as I have indicated by the bracket on that table. I shall demonstrate most clearly to this Society, that so uniform is this relation, that if I be allowed to take a man's height, I can tell what the capacity of his lungs and his inspiratory and expiratory powers should be, to constitute him a healthy individual.

Therefore, as height can with ease be definitely determined, and is less changeable than any other of the physical observations taken, we have at *all* times a simple method of determining the presence of disease, first in the chest, and secondly in the head and abdomen, or trunk, of the body.

These two tables, C and B, admit of numerous interesting calculations, many of which have been gone through, and remarks will be made upon them as may be required.

The first *grand point* I wish *especially* to draw the attention to, is the capacity of the lungs of what may be considered healthy individuals. Let us turn to Diag. 1, where I have drawn fourteen perpendicular lines, which are to indicate different heights: the first line on the left is to indicate all heights up to and including 5 feet: the second line includes all from 5 feet to and including 5 feet 1 inch, the next from 5 feet 1 inch to and including 5 feet 2 inches, and so on, increasing inch by inch, up to 6 feet; all above 6 feet come under 6 feet +. The horizontal line or curve indicates the capacity or quantity of air that 1088 individuals manifested by this "*breath-meter*," the difference of quantity being denoted by the elevation or depression of this curve, as it passes over the perpendicular lines. The number of cases examined under each height is given in the bottom row of figures, a point most necessary to be acquainted with, as that stamps the value of the curve as it passes over the lines for indicating heights. The row of figures above this are the number of cubic inches obtained from the mean of so many cases as are marked in the bottom row of figures: thus, under the height 5 feet 8 inches, 172 persons have blown, and the *mean* of these men will be seen as 220 cubic inches,—32 of these men out of 172 were below 200 cubic inches, the rest above; so that I expect every man between 5 feet 7 inches and 5 feet 8 inches, if healthy, to blow out of his lungs *about* 220 cubic inches of air at 60°; but if he cannot throw out of his lungs *more* than 185 cubic inches, I should most decidedly suspect disease to be present; and again, if a 6 foot man,

whose capacity is marked as 255 cubic inches, could only blow 200 or 220, the healthy mark for the 5 feet 8 man, I should in like manner suspect disease. The exceptions to be made, are for *very stout and corpulent* individuals, whose capacity I find to stand the lowest. Very fat men of any stature, therefore, may blow 40 or 50 cubic inches less than the mean, and yet not be diseased in the chest. It simply requires more observations upon the corpulent than I have had an opportunity of making, to determine their capacity. So beautifully regular is the increasing capacity with the height, that the curve on Diag. 1 is nearly a perfect ascending line; and I have no doubt but that if I had examined twice the number, the line would have been elevated in a perfect arithmetical progression. In confirmation of this, I will call the attention of the Society to the following table, *singularly gratifying* to me, and which I feel fully to reward my labour in working out this subject.

The three columns of figures exhibits the relation between height and "capacity." The first column contains the various heights between 5 feet and 6 feet; the second column, the series of cubic inches derived from observation under each height; and the third column, the series of cubic inches in arithmetical progression: thus,

Heights.			Series derived from Observation.	Series in Arithmetical Progression.
Fe.	In.	Mean.	Cubic Inches.	Cubic Inches.
5	0	5	173.0	174.
5	2	5	188.5	190.
5	4	5	200.	206.
5	6	5	222.	222.
5	8	5	237.5	238.
5	10	5	254.5	254.

Hence I deduce a rule, viz. that "FOR EVERY INCH OF HEIGHT (FROM 5 FEET TO 6) 8 ADDITIONAL CUBIC INCHES OF AIR AT 60° ARE GIVEN OUT BY A FORCED EXPIRATION." Here at once is a guide for the operator, and a rule given that will enable us to compare men of different stature and different trades one with another, which may be done by referring to a table (I. page 15), where the mean capacity from whence I deduced this rule will be seen, and any comparison among thirteen classes of men may be made. In this table, the similarity is remarkable between the second and third columns: if we mark out the unit figures in each, the numbers become, with one exception only, quite the same; and where this difference is, viz. at 5 feet 3 inches, 188.5 instead of 190, the number of persons here examined are so few compared with the numbers examined under the heights following, that this may account for the trifling difference here apparent.

The mechanical act of respiration depends essentially upon increasing the cavity of the thorax; this is accomplished principally by flattening

the arched floor of the chest (the diaphragm). It is attempted to illustrate this by Fig. 7: C is the space allotted to the organs of respiration; the black outline is to represent the chest filled to its maximum with air after the deepest inspiration; the black line E may be considered as the floor or diaphragm; the inner and red line is to represent the chest after a forced and full expiration has been made, when, it will be observed, the arch of the diaphragm E is considerably increased, and the red line G is considerably depressed. Thus we may liken the act of respiration to the operation of a pair of common bellows; it follows, that the space existing between the red and black line, marked B B, is measured by the spirometer; hence it is certain that whatsoever disease impedes this mobility of the walls and floor of the chest, the amount of impediment will be manifested by this machine; moreover, it is *self-evident*, that as the lungs are the sole receptacle for the air we breathe, whatever disease there may be which affects their permeability for air, it will be manifested by the spirometer; and I believe that no disease can be detected in the chest that will not be found attended by a change in the bulk of air in the lungs.

If this be granted, how important is it to examine the capacity, as an adjunct to the other means of detecting disease amidst these vital organs.

I will now draw attention to the observations I have made upon diseased cases, which confirm me in this last assertion. On Diag. 1, I compare the diseased with the healthy cases. The upper line is the same as already noticed, to which is affixed the word "good;" the lower line contains the diseased cases. The difference between the two classes is very marked, and must forcibly impress us that this method of detection is highly worthy of attention.

I am sorry that the number of diseased cases is so small, but this even speaks more favourably for the distinction between the healthy and diseased cases; for had there been more cases, the curved line would have been much less curved. Whereas, with few cases, one disturbing observation is clearly seen. We here see that the mean capacity of the diseased scarcely exceeds one half of that of the healthy, if it be so much.

The full particulars of the diseased cases have been taken down in the table of observations; amongst which there will be seen 20 cases of consumption in various stages. There are 12 cases in the earliest stage of this disease. I shall here give the capacity of these as observed, compared with the mean of the healthy cases of the same stature.

TABLE Q.

Early Stage of Consumption.	
Capacity of Diseased.	Capacity of Healthy.
Cubic Inches.	Cubic Inches.
113	220
105	173
128	220
160	193
160	204
136	229
115	173
130	204
120	229
140	246
110	220
135	204

In the more advanced stage of the disease, the difference is much more considerable: thus,—

Advanced Stage of Consumption.	
Capacity of Diseased. Cubic Inches.	Capacity of Healthy. Cubic Inches.
59	135
89	224
108	254
72	135
80	229
75	254
34.5	246
18	183

It is truly interesting to witness the broad difference here exhibited.

Not only does disease in the chest limit the natural capacity; but also an enlargement of any of the visceral organs, acting so as to prevent the arch of the diaphragm freely alternating in its curve. A moderate meal reduces the "capacity" from 4 to 6 cubic inches, and a plentiful dinner from 9 to 14 inches, according to the powers of the individual at table. The capacity of those who suffer from curvature of the spine is most remarkably small. One person was so low as 27 cubic inches, being the utmost quantity he could throw out of his chest by one full expiration.

The greatest capacity I have ever witnessed was that of Freeman and Randall, both measuring upwards of 6 feet 11½ inches. Freeman's capacity was 432 cubic inches, and Randall's 464 cubic inches. The lowest healthy capacity I have examined is that of Robertson, height 3 feet 9 inches, being 80 cubic inches; and it is worthy of mention that when you reduce the giant Randall down to the size of Robertson, *i. e.* by taking off ½, and ¼ of his height, breadth, and depth, the capacity of the giant is then reduced to 79.56 cubic inches, which is *within* half an inch of the actual quantity blown by Robertson.

The capacity of all the classes examined may be compared by referring to a table here suspended. (See Table I., p. 15.)

The relation between the capacity of the lungs and circumference of the chest appears as yet so feeble, that it is no guide to me.

I have combined this calculation of circumference and capacity, which will be seen amongst the other tables handed round; where, it may be observed, that the mean of 11 men of 5 feet 8 inches, whose chests measure 35 inches in circumference, has a capacity of 235 cubic inches, while that of 10 men of the same height, whose chests are 38 inches, is only 226, being 9 cubic inches less. I may here mention, that it was in consequence of so often witnessing tall, narrow-chested men blowing so much more than broad-chested men, that I was induced to combine the height of the individual with the capacity. The only parallel remark I have seen in physiological writers upon respiration is that by Müller, who says (page 294, 1st ed., vol. i.)—"Herbst found that adults of large stature, when breathing tranquilly, inspired and expired from 20 to 25 cubic inches; persons of smaller stature 16 or 18 cubic inches."

I must now pass on to the other *grand* series of observations, upon the "power" of the inspiratory and expiratory muscles of the healthy in different classes, and of the diseased.

By the power of inspiration and expiration, I mean the greatest effort that can be employed by all those muscles used in performing

that function; and it will be found that if this observation be connected with the "capacity," we possess a *sure method* of detecting disease in the most important part of the human frame. The instrument with the dial face is that with which the observations have been made.

The resistance afforded to test these muscles was that of mercury, and according to the inches elevated by the respiratory muscles, in proportion was the index hand moved opposite certain figures, by which figures I denominate a certain power either of inspiration or expiration, so that, according to the value of the figure, such is the relative power required to elevate the index to that figure. Hence the resistance is perfectly the same, whether we draw out of or blow into this tube, and *must* therefore measure the relative difference between inspiration and expiration. By a comparison of these efforts in different classes, I estimate the health of men employed in different trades, as will be shown. Certain words are affixed to these figures, as exhibited on Table A. (page 4); the figures on the right side denote the powers of inspiration; those on the left, those of expiration. It will be observed that the figures on the right are much higher than those on the left, because the power of *expiration* is greater than the power of *inspiration*: thus a "*remarkable*" inspiration is 4.5 inches, while that of expiration is rated at 5.8 inches. These words are engraved on the dial, and are so fixed according to the result of 1100 observations. Diag. 2 is given to illustrate, upon the same principle as Diag. 1, the *power* of inspiration of 13 different classes; the perpendicular lines indicate the gradation of heights from 5 feet to 6 feet. The direction of the black curve marks the power of these 13 different classes; it will be seen to ascend gradually up to 5 feet 9 inches, from thence as gradually to descend; therefore the power of all these classes is greatest at 5 feet 9 inches. This line must not be taken as the true line of health. The line which I mark immediately above it is the one I term the "*standard of health*," because this dotted line is calculated from four classes of men, selected by surgeons as healthy, viz. Firemen, Metropolitan police, Thames police, and Royal Horse Guards (Blue).^{*} In this standard line, the men of 5 feet 7 inches elevate 3.07 inches of mercury; and those of 5 feet 8 inches, 2.96 (nearly 3 inches); whereas in the black line, the course of the mixed multitude, the men of 5 feet 7 inches and 5 feet 8 inches elevate only 2.65; and the 5 feet 9 inches men, 2.75. This depression of the black curve is in consequence of the weakness of the paupers, gentlemen, mixed class, and printers, being here included. According to the dotted line, the most powerful men are found at the height of between 5 feet 7 inches and 5 feet 8 inches.

For the convenience of the members present, I have reduced the height between 5 feet and 6 feet into four divisions, with the powers of inspiration and expiration of all the 13 classes, so that any combination of comparison between the different bodies of men may be made. (For the complete table see page 16.) The conclusion to be drawn from the inspiratory power is, that a man of 5 feet 7 inches or 5 feet 8 inches, if healthy, should elevate 3 inches of mercury. If this be recollected, we see the gentlemen stand very much below this mark, only 2.15 inches; so that I am compelled to call a gentleman a

^{*} Their powers are given in Table II. (p. 16, 17), as "*the mean of four healthiest classes.*"

tolerably good gentleman of the middle stature, who can elevate 2·5 inches by his inspiratory muscles; but it is curious to remark, that at 5 feet 9 inches, 5 feet 10 inches, and 5 feet 11 inches, they stand better than the Thames police, and nearly as good as the fire brigade—the two best classes of men which have been submitted to this test.

It will be seen that in this table the Grenadier Guards stand very high between 5 feet 3 inches and 5 feet 6 inches; but it must be recollected there are only four examined under this height; and the fact of their being *fifers*, whose vocation is the constant use of the respiratory muscles, causes this class to stand high at this particular height. Let us now turn to Diag. 2, where the expiratory power is compared with the inspiratory power. The upper black curve is the expiratory power of the 13 classes; the broken highest line is the expiratory power of the four healthiest classes: there will be seen a vast difference between these two classes of muscles, which must be interesting to the physiologist. Here is exhibited the result of upwards of 1000 cases, which demonstrate that expiration is about one-third stronger than inspiration. And moreover, I confidently affirm that if the expiratory muscles are not stronger than the inspiratory muscles, disease is the cause of this variation.

The test upon the expiratory muscles peculiarly tries the abdominal viscera. I have frequently detected hernia (rupture) by this means: but where persons have a hernia, well supported by a truss, and have no fear, they may pass detection; but this has seldom occurred during the observations I have made. I have also often detected those who are subject to severe head-aches and fits by these means, and frequently rupture of the drum of the ear. It is also worthy of remark, that I have found rupture of the drum of the ear manifested only in one direction; hence the expiratory force may detect it, and not the inspiratory; or the contrary may occur. Sometimes the rupture is detected by both the experiments, but this is rare. I mentioned this fact to Mr. Gulliver, who said it perfectly corresponded with what he was induced to believe through other means.

I may mention a case in point, of a strong drayman, whose power of expiration naturally was manifested at 5·5 of an inch; but when I requested him to stop up his ears with his fingers, his expiratory power was 5·50 inches, while his inspiratory power in both cases, *i. e.* with his ears open or shut, remained at 3·70; hence, when I found his expiratory power nearly 10 times less than his inspiratory, it was evident that something was wrong.

This, together with other facts, may be seen upon referring to the manuscript table of diseased cases, which I here hand round to the members.

The crossed line at the termination of the expiratory curve (Diag. 2.) marks the direction the cases would take were the Horse Guards omitted. These men being enlisted under the superintendence of Mr. Gulliver, the curve exhibits the skill of selection; hence it mounts considerably at its termination.

Had I not examined this regiment, I should, from past experience, have considered 6 feet men much weaker; I do not believe any other regiment of 6 feet men to possess such power. The inspiratory power of twelve 6 feet men in the first battalion Grenadier Guards was only 1·92

inches, while that of 31 of the same height of the Blues was 2·71 inches; the latter elevating by the diaphragm many pounds of mercury more than the former. I am induced to believe that the test upon the inspiratory muscles is a sure guide to the state of a man's health. The expiratory muscles, owing to a man's vocation, may be trained to an enormous extent, as I noticed in the *fifers*. I have remarked the same in jewellers who use the blow-pipe much. Therefore, when a man's trade is such as to call these muscles much into use, we must rate his expiratory power at a higher figure. I shall show this shortly by the tables here suspended.

We have seen the "capacity" of the lungs of the healthy and diseased cases compared; now I will exhibit, by Diag. 3, the like comparison of the *inspiratory power* between the same.

The upper line to which is affixed the word *good*, is the same noticed as the lower broken line in Diag. 2; the lower black line is the curve of the diseased. The weakness induced by disease in the trunk of the body is here as *broadly* indicated as that of the capacity, being about one-half: had the cases been more numerous, this curve would have been more regular, and I believe lower than it appears at present; therefore the few cases test the comparison the better. When we combine the capacity and power together, there is a certain harmony which must pervade the three observations, *provided the individual is healthy*. Hence, I venture to say, the instruments for estimating *capacity* and *power* will clearly test the presence of disease.

I shall now pass on to exhibit the effect of occupations upon the inspiratory power: as I believe the inspiratory power to indicate the state of the general health, the comparison will be interesting; and if it be found to agree with what other observers have mentioned, this will prove its correctness also.

Diag. 4 shows the comparison between four classes—pugilists, Thames police, paupers, and gentlemen. The black continuous line at the bottom is the path of the gentlemen; the next above, that of the paupers: it will be seen, these two classes struggle in company up to 5 feet 7 inches, at which height the gentlemen mount up to a superior elevation.

The waved line represents the Thames police, a remarkably fine class of men, the sudden fall, observed at 5 feet 10 inches, and 5 feet 11 inches, is owing to the comparatively few numbers examined at this height. A slight cold in the head (as it is termed) of one individual, may have occasioned this.

Above all these are the pugilists, without exception the finest class of men I have examined: in fact we may consider each man of this class as a series of men, for we know not how many fall down the ladder of their fame, before they arrive at that step where I examined these. I may mention it was not a little difficult for me to examine these people, since the correctness of the observation depends upon the air passage in the nostrils being free, and I have not unfrequently found these passages stopped up, from the consequences of their professional *engagements*: I therefore had recourse to testing with the mouth, a method always liable to error, from the power of the cheeks and tongue interfering.

According to the elevation of these lines I estimate the vital powers.

I here exhibit a similar table of comparison between the standard line

of health, and the paupers: how far poor-house diet may be connected with this lowering of the line, I must leave for others to determine. Age doubtless must be taken into account, but, it appears to me, not until after 50.

In Diag. 5, I compare three very unhealthy classes with the standard line. The continuous line at the bottom, represents the compositors, the very worst men I have examined; they even stand below the paupers, except at the heights of 5 feet 8 inches and 5 feet 9 inches. The broken line are the pressmen, a better class of men altogether, with the exception of one dip between 5 feet 8 inches and 5 feet 9 inches, but this was caused by one solitary instance, and that was at the height of 5 feet 9 inches. Nearly between these two classes will be seen the waved line indicating the course of the artisans, a very poor set of men. The double line is the standard line, above all.

Numerous other comparisons of the inspiratory powers may be made between different classes, by referring to Table II. p. 16. I shall now pass on to the expiratory power.

Diag. 6, gives the expiratory power, and exhibits by the bottom line the diseased cases: the dotted line above that is the curve for the gentlemen, the double line above is the paupers, and these two, for the most part, are closely mingled together, up to 5 feet 10 inches. It cannot be said that the paupers here are the worst. The broken line above that, are the sailors; and above them again, the crossed line are the Thames police.

As an illustration of employment increasing the expiratory power over the inspiratory power, I would just refer to Table II. p. 16, wherein the inspiratory power of the Thames police, and that of the Metropolitan appear as nearly equal as possible; but if we look at another of these tables, we see the expiratory power of the Thames police greatly exceeding that of the Metropolitan police. This minute separation of power between these two classes is very satisfactory, exhibiting that the one class of men use their upper extremities more than the other. The Metropolitan policeman deters the thief by the activity of his lower extremities; the Thames policeman, by that of his upper extremities. Many other interesting combinations might be made from the 10,000 facts I have gathered: thus, for instance, we see, the prevalent weight of the 1151 individuals, is from 10½ to 11 stone; next, 12 stone; next, 12½ stone; next, 9½ stone; next, 13 stone; next, 13½ and 14 stone; and lastly, 7½ and 15 stone.

Table V. (p. 20), shows the number of ordinary respirations per minute, observed when in the sitting posture. It will be seen that the greatest number of individuals breathe 20 times a minute; next to this, is 16 times per minute; then, 24; these, it will be seen, are the prevailing numbers; the lowest was 9 respirations, and the highest 40 respirations, per minute. It is worthy of mention that by this table the respirations appear more generally an even number of times per minute than otherwise.

Table VI. (same page) exhibits in like manner the beats or pulsations of the heart per minute: 80 is the prevailing number; next to this, 84; next, 100; and next, 92, &c.: the lowest pulsation was 48, and the highest 180 per minute. These were all taken in the sitting posture. Care was taken never to note the pulse when excited by physical ex-

ertion; but if by any other stimulant through the medium of the mind, then it was taken exactly as it appeared. I believe it always best in statistical research, to note the cases, whatever they may be, exactly as they present themselves, and not to wait until the case comes to what we wish it to be. That we may be kept steady in a research, we must note and believe what we see—not see what we believe. By these two last tables the prevailing numbers run as 4 beats of the heart to one respiration.

By another table I illustrate the circumference of the chest, both of the total numbers examined, and of the several classes, by distinguishing colours. The figures at the left hand, are to signify the increasing dimensions of the chest, from above downwards, increasing by half an inch; the length of the lateral lines, is to represent the different number under each of these measurements of the chest. It will first be seen that 37-inch chest is the prevailing size; next to this, 35-inch; and in detail it will be seen that the colouring indicates the measurement of the different classes. Thus K, the gentlemen, measure from 34 to 35 inches as their average; A, the sailors, from 37 to 37½ inches in circumference; the fire brigade, B, from 38 to 39½ inches; C, the metropolitan police, from 34 to 36 inches, and at 37 are most numerous; D, the paupers, are mostly placed between 31 and 34 inches; E, the artisans, are most numerous from 30 to 36 inches; and so on.

I will now draw attention to another diagram, which, on the same plan, exhibits the heights; and as the relation between height, capacity, and power, are shown to be so strongly connected, a table of heights will almost give us a table of power also. The prevailing heights are 5 feet 8 inches and 5 feet 9 inches. B, the firemen, are well selected, principally measuring from 5 feet 6 inches to 5 feet 9 inches. The Metropolitan police are a taller set of men, therefore of less physical strength; on the other hand, D, the paupers, are low of stature, ranging chiefly between 5 feet 2 inches and 5 feet 6 inches. L, are the Horse Guards, which do not commence until all the rest have nearly disappeared, *i. e.* at 6 feet; they terminate at the indefinite height of 6 feet 4.

I now draw the attention of the members to Table IV., (page 18,) of the capacity compared with weight. Where height and weight correspond, there will be found a relation between weight and capacity; but, as height and weight do not always correspond, the disturbing cases of fat men here account for the relation between weight and capacity of the lungs appearing feeble. I shall in future separate the weight of the corpulent and spare individuals, to determine this point more clearly.

With these remarks I conclude the subject of the tables, which still contain a vast quantity of matter not even hinted at, and no less valuable than what has been touched upon.

The tables of calculations, which afforded me the matter for the diagrams here exhibited, may all be examined; not one case that I ever examined has been kept back, and not one fictitious case has been added. During the time of my research I examined every person I could possibly obtain, from the scavenger, the hawker, or the street mountebank, up to the affluent gentleman: all were requested to submit themselves to these tests. By so doing, I trust that a foundation sufficiently broad and firm has been made for me to request the attention of all the gentlemen

present to an examination of the utility of such a method for testing the vital powers (if I may be allowed the term) of men to be selected for any public service. I believe at present no such test is used in the army or any other organised force. By these means I have frequently detected men as diseased, that were considered not so. I may mention one case (though several might be cited) of a man 6 feet 4 inches in the Queen's Company, Grenadier Guards, whose capacity was only 102 cubic inches instead of 300 cubic inches. This man was given to me as a healthy case; but I classed him among the diseased; and, upon inquiry, it was found that he had solicited to be relieved from certain physical duties; others, again, that have considered their lungs to be in a bad state, have, by this test, been convinced that they were not so, to their great satisfaction, and improvement in health and spirits.

I would also respectfully invite the attention of prison inspectors to this apparatus. Let every man that enters a prison be tested on entering, and again on leaving; the comparison of the two observations will determine his loss or gain in strength and health. Also I solicit the attention of those who examine for insurance offices; since even non-professional men can make these experiments with certainty: by these means a vast amount of facts would be gathered together, so that the tables of heights might be graduated into decimal parts of an inch, instead of whole inches. And, lastly, I would recommend it to the consideration of all who examine into the effect of employments upon health; for by it I show how low the printers and artisans stand.

An idea of this kind occurred to a no less accurate observer than Thackrah, but of this I was not aware until I had completed all these observations. Thackrah mentions, page 21, that he inverted a glass jar, filled with water, and measured the quantity displaced by "one expiration." He submitted 19 individuals of the 14th Light Dragoon Guards to this test, whose average capacity was 217 cubic inches; therefore they must have been about 5 feet 8 inches high. He adds, "this test affords useful information in diseases of the lungs, as well as a ready index to the native power of the respiratory organs." "It would afford (continues our author) an important assistance, I conceive, in examining recruits for the army." He also examined some shoemakers and tailors by this method; but he connected no other observations with this than that of the circumference of the chest; therefore his observations would not be of much value. Until I connected the height with the capacity, I found all was confusion: after examining upwards of 100 persons, I was nearly giving up the research, when the idea fortunately occurred to me, of connecting heights with the capacity, &c.

Some strong persons have wondered that they could not elevate more than three inches of mercury: but when we recollect the hydrostatic law, it will be found that the power thus exerted by the floor of the chest is equal to elevating a cylinder full of mercury whose base is commensurate with the area of the diaphragm, and its height equal to three inches; so that the floor of the chest at that time sustains a weight equal to many pounds.

With these remarks I leave the subject for the discussion of the Society.

TABLE I.—The Mean Capacity of the Lungs of 13 Classes, with the Total Mean of the Mean.

Class.	0 to 5 ft.		5 ft. 1 in.		5 ft. 2 in.		5 ft. 3 in.		5 ft. 4 in.		5 ft. 5 in.		5 ft. 6 in.	
	Cub. in.	No.	Cub. in.	No.	Cub. in.	No.	Cub. in.	No.	Cub. in.	No.	Cub. in.	No.	Cub. in.	No.
Seamen	151	9	198	7	219	1	218	10	213	9	217	11	218	10
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	167	1	187	1	187	1	187	1	187	1	187	1
Metropolitan Police	134	1	1											

TABLE II.—The Mean Power of Inspiration and Expiration of all the Cases presenting the ordinary

Class.	0 to 5 ft.			5 ft. to 5 ft. 1 in.			5 ft. 1 in. to 5 ft. 2 in.		
	Insp.	Exp.	No.	Insp.	Exp.	No.	Insp.	Exp.	No.
Seamen	3.17	3.44	5	2.20	2.60	1	2.03	3.48	7
Firemen	..	..	..	..	..	..	..	..	..
Metropolitan Police . .	..	..	..	..	..	..	..	..	..
Thames Police . . .	2.55	3.28	1	..	..	..	..	..	..
Mixed Class	3.00	3.74	1	2.00	3.35	1	2.52	3.25	5
Grenadier Guards . .	..	..	..	..	..	..	..	..	..
Pugilists, &c. . . .	..	..	..	..	..	..	3.80	4.75	1
Draymen	..	..	..	..	..	..	..	..	..
Gentlemen	..	..	..	..	..	..	1.50	2.50	1
Horse Guards (Blue) .	..	..	..	..	..	..	..	..	..
Total Mean	2.90	3.48	7	2.00	2.98	2	2.46	3.57	14
Mean of Diseased Cases	0.82	1.37	5	1.30	3.00	1	1.16	2.14	4
Mean of four Healthiest Classes	2.55	3.28	1	..	..	..	..	..	..

Class.	5 ft. 6 in. to 5 ft. 7 in.			5 ft. 7 in. to 5 ft. 8 in.			5 ft. 8 in. to 5 ft. 9 in.		
	Insp.	Exp.	No.	Insp.	Exp.	No.	Insp.	Exp.	No.
Seamen	2.63	3.56	15	2.87	4.15	14	3.11	4.19	9
Firemen	3.17	3.95	15	3.02	4.09	15	3.08	4.50	18
Metropolitan Police . .	3.07	4.05	4	2.89	4.07	39	2.81	4.10	46
Thames Police	2.97	4.44	16	3.08	4.31	16	3.05	4.66	11
Mixed Class	2.31	3.38	21	2.16	3.17	27	2.46	3.50	17
Grenadier Guards . . .	..	..	..	2.68	3.83	8	2.54	3.89	19
Pugilists, &c.	4.20	6.42	2	3.65	4.61	2	3.70	4.84	1
Draymen	2.80	3.55	1	2.73	4.59	3	2.37	4.16	3
Gentlemen	2.35	2.62	12	2.35	3.30	16	2.40	3.30	16
Horse Guards (Blue) .	..	..	..	..	..	..	..	..	..
Total Mean	2.93	3.99	86	2.82	4.12	140	2.88	4.12	140
Mean of Diseased Cases	0.79	1.70	4	1.67	1.88	7	1.32	1.78	8
Mean of four Healthiest Classes	3.07	4.18	35	2.96	4.13	70	2.91	4.28	75

examined in 10 different Classes, without any separation for disease; thus Average of Health or Power.

5 ft. 2 in. to 5 ft. 3 in.			5 ft. 3 in. to 5 ft. 4 in.			5 ft. 4 in. to 5 ft. 5 in.			5 ft. 5 in. to 5 ft. 6 in.		
Insp.	Exp.	No.	Insp.	Exp.	No.	Insp.	Exp.	No.	Insp.	Exp.	No.
2.40	3.74	1	2.48	3.89	9	2.68	4.23	8	2.84	4.25	15
..	..	..	2.70	4.51	2	2.21	3.82	3	2.80	3.84	19
..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	2.70	4.26	6	3.05	4.50	9	2.58	4.34	9
2.31	3.15	5	1.85	2.69	17	2.30	3.05	18	2.40	3.37	16
4.50	5.36	1	..	..	..	4.50	5.10	1	2.70	2.90	2
2.40	2.41	2	3.50	3.74	1	3.53	5.29	3	3.86	4.75	3
..	..	..	..	..	..	..	..	..	1.30	1.70	1
2.55	3.00	1	1.77	2.92	6	2.01	2.10	7	1.94	3.21	11
..	..	..	..	..	..	..	..	..	..	..	..
2.63	3.53	10	2.50	3.66	41	2.89	4.01	49	2.55	3.54	76
1.00	1.81	4	1.34	2.30	4	0.74	1.00	1	1.25	1.52	9
..	..	..	2.70	4.32	8	2.84	4.33	12	2.70	3.87	29

5 ft. 9 in. to 5 ft. 10 in.			5 ft. 10 in. to 5 ft. 11 in.			5 ft. 11 in. to 6 ft.			6 ft. to 6 ft. +		
Insp.	Exp.	No.	Insp.	Exp.	No.	Insp.	Exp.	No.	Insp.	Exp.	No.
2.66	3.84	18	2.41	3.86	12	2.61	4.15	6	2.00	4.00	1
2.69	3.33	5	2.40	3.74	1	3.65	6.81	2	2.10	2.80	1
2.92	4.00	23	2.78	3.41	12	2.33	3.23	12	2.75	3.77	8
2.54	4.27	5	2.78	4.45	3	..	..	..	..	..	..
2.41	3.67	15	2.07	2.45	7	2.14	3.08	11	2.77	4.10	2
2.23	3.49	18	2.56	3.76	11	1.92	3.17	12	2.46	3.82	14
3.78	4.38	2	3.77	4.89	4	3.25	4.93	2	3.52	4.64	2
4.50	5.43	3	3.21	4.30	6	2.02	3.13	2	3.15	5.00	1
2.74	3.59	7	2.84	3.49	12	3.12	4.94	5	2.38	3.70	4
..	..	..	..	..	..	2.71	4.84	31	2.68	4.66	27
2.94	4.00	96	2.72	3.81	68	2.68	4.29	83	2.64	4.05	60
0.93	1.60	3	0.88	1.59	3	0.40	2.25	1	1.65	4.02	1
2.83	3.94	33	2.77	3.63	16	2.65	4.48	45	2.67	4.41	36

TABLE III.—Mean of the Respiratory Power of the

Class.	0 to 5 ft.			5 ft. to 5 ft. 1 in.			5 ft. 1 in. to 5 ft. 2 in.		
	Insp.	Exp.	No.	Insp.	Exp.	No.	Insp.	Exp.	No.
Paupers, Mean . .	1.79	2.45	7	1.46	1.93	3	2.52	2.96	9
Compositors, Mean . .	..	..	..	..	..	..	2.32	2.96	3
Pressmen, Mean . .	..	..	..	2.20	5.00	1	..	..	..
Total Mean of Mean of Printers . . .	..	..	..	2.20	5.00	1	2.32	2.96	3

Class.	5 ft. 6 in. to 5 ft. 7 in.			5 ft. 7 in. to 5 ft. 8 in.			5 ft. 8 in. to 5 ft. 9 in.		
	Insp.	Exp.	No.	Insp.	Exp.	No.	Insp.	Exp.	No.
Paupers, Mean . .	2.45	3.33	10	1.96	2.71	8	1.87	3.33	9
Compositors, Mean . .	2.05	3.10	5	2.43	3.22	7	2.83	3.41	8
Pressmen, Mean . .	2.10	2.95	3	2.62	3.55	8	1.65	2.05	1
Total Mean of Mean of Printers . . .	2.07	3.02	8	2.52	3.40	15	2.24	2.73	9

Paupers and the Printers, (Compositors and Pressmen).

Class.	5 ft. 2 in. to 5 ft. 3 in.			5 ft. 3 in. to 5 ft. 4 in.			5 ft. 4 in. to 5 ft. 5 in.			5 ft. 5 in. to 5 ft. 6 in.		
	Insp.	Exp.	No.	Insp.	Exp.	No.	Insp.	Exp.	No.	Insp.	Exp.	No.
Paupers, Mean . .	2.08	3.30	10	2.30	3.38	21	2.17	3.30	20	1.93	3.13	19
Compositors, Mean . .	1.65	2.52	1	2.13	3.23	5	2.17	2.91	4	1.65	2.85	7
Pressmen, Mean . .	3.35	4.20	1	..	..	..	2.81	4.17	3	2.04	3.27	8
Total Mean of Mean of Printers . . .	2.50	3.36	2	2.13	3.23	5	2.49	3.54	7	1.84	3.06	15

Class.	5 ft. 9 in. to 5 ft. 10 in.			5 ft. 10 in. to 5 ft. 11 in.			5 ft. 11 in. to 6 ft.			6 ft. +		
	Insp.	Exp.	No.	Insp.	Exp.	No.	Insp.	Exp.	No.	Insp.	Exp.	No.
Paupers, Mean . .	2.55	3.46	1	1.47	1.67	2	1.61	3.70	4	..	..	..
Compositors, Mean . .	2.00	2.39	2	..	..	..	1.50	1.91	1	..	..	..
Pressmen, Mean . .	2.95	3.93	3	2.62	3.72	2	..	..	..	..	..	..
Total Mean of Mean of Printers . . .	2.47	3.16	5	2.62	3.72	2	1.50	1.91	1	..	..	..

TABLE IV.—The Mean capacity of the Chest, compared with the Weight of the Body (stone of 14 lb).

Class.	7 to 7½		7½ to 8		8 to 8½		8½ to 9		9 to 9½		9½ to 10		10 to 10½		10½ to 11		11 to 11½		11½ to 12		12 to 12½		12½ to 13		13 to 13½		13½ to 14		14 to 14½		14½ to 15		Σ
	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.		
Seamen . . .	208	8	132	1	196	4	203	2	206	11	232	7	234	26	228	15	257	20	236	9	254	8	271	5	290	1	205	1	..	..	..	..	
Firemen . . .	..	..	..	..	..	..	..	..	..	206	2	199	4	213	5	226	11	235	11	226	18	223	10	219	7	233	3	212	5	224	1	570	3
Metropolitan Police . .	..	..	..	..	..	..	..	..	..	198	5	212	10	227	24	236	23	237	29	244	23	255	18	248	8	284	3	237	2	..	..	..	..
Thames Police . . .	..	..	..	..	..	..	158	1	209	4	208	5	240	11	234	23	245	11	236	9	198	3	196	4	..	..	258	2	203	1	212	1	
Paupers . . .	..	..	173	2	178	8	163	14	141	14	176	27	192	19	178	12	183	10	210	7	176	5	..	..	174	3	..	..	256	1	..	..	
Mixed Class (Artisans) . .	164	1	160	6	173	8	199	11	202	23	199	25	220	19	217	20	233	10	249	14	237	8	269	6	227	3	226	6	237	1	..	..	
Grenadier Guards . . .	..	..	..	..	..	..	186	2	..	..	209	4	234	4	222	11	234	8	247	19	241	18	251	10	267	4	228	2	307	1	..	..	
Pugilists . . .	..	..	..	..	..	211	2	198	1	..	..	211	2	195	1	260	1	225	3	265	3	..	..	297	2	279	3	204	2	290	1	..	..
Pressmen . . .	..	..	..	..	..	..	199	5	210	1	194	5	213	7	216	8	237	3	..	..	..	..	..	..	186	1	..	..	..	..	..	..	
Compositors . . .	..	..	..	..	..	174	7	206	7	206	5	185	6	227	6	226	5	207	3	230	2	212	1	216	1	219	1	..	..	..	..	..	..
Draymen . . .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	192	1	234	4	236	3	254	5	..	..	272	2	227	2	231	3	
Horse Guards (Blue) . .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	238	1	262	5	261	8	267	13	260	10	286	6	252	7	273	6	318	1	
Gentlemen . . .	149	1	171	3	184	3	193	4	192	11	199	10	220	16	224	17	228	14	218	4	246	4	233	8	224	4	237	3	202	2	220	2	
Total mean . . .	173	10	159	12	186	32	189	47	196	76	202	105	220	139	225	147	228	128	239	120	231	91	245	66	242	33	233	32	246	16	310	10	

TABLE V.—Number of Respirations per Minute, observed when in the Sitting Posture, in 1,080 Cases considered to be Healthy.

No. of Re- spirations per Min.	No. of Cases.	No. of Re- spirations per Min.	No. of Cases.	No. of Re- spirations per Min.	No. of Cases.	No. of Re- spirations per Min.	No. of Cases.
9	1	18	81	27	2	36	1
10	2	19	11	28	26	37	..
11	1	20	384	29	2	38	..
12	16	21	31	30	5	39	..
13	10	22	67	31	..	40	1
14	12	23	11	32	6		
15	9	24	153	33	..	Total	1,080
16	157	25	15	34	1		
17	71	26	4	35	..		

TABLE VI.—Number of Pulsations per Minute, taken in the Sitting Posture, in 1,086 Cases considered to be Healthy.

Pulse per Min.	No. of Cases.	Pulse per Min.	No. of Cases.	Pulse per Min.	No. of Cases.	Pulse per Min.	No. of Cases.
48	1	69	3	87	1	108	9
52	1	70	14	88	71	110	1
53	2	72	74	89	15	112	15
56	2	73	50	90	19	113	3
57	2	74	2	92	66	116	10
58	1	75	2	93	3	118	2
59	1	76	72	94	3	120	16
60	22	78	12	95	9	124	2
61	1	79	2	96	47	128	2
62	3	80	226	97	1	130	1
64	15	81	..	98	2	132	1
65	2	82	6	100	103	133	1
66	6	84	118	102	2	140	1
67	2	85	1	104	27	144	1
68	3	86	4	105	1	180	1

Pulse per Min.		Pulse per Min.		Pulse per Min.	
48		53		62	
52		56		68	
58		57		69	
59		65		93	
61		67		94	
85		74		113	
87		75			
97		79			
130		98			
132		102			
140		118			
144		124			
180		128			

No. of
Cases.
1No. of
Cases.
2No. of
Cases.
3No. of
Cases.
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ON THE
SANITARY APPLICATIONS
OF
C H A R C O A L, &c.;
AND ON
VENTILATION.

BY J. FORBES WATSON, A.M., M.D.,
BOMBAY ARMY.

LONDON:
JAMES MADDEN, 8, LEADENHALL-STREET.

1855.

To Mr. Milton with Dr. Watson's Compliments.

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SANITARY APPLICATIONS

Dr. Hall. With Mr. Milton's Compliments.

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ON THE SANITARY APPLICATION OF CHARCOAL, AND ON VENTILATION.

BY J. FORBES WATSON, A.M., M.D., BOMBAY ARMY.

(Reprinted from the *Journal of the Society of Arts*.)

Before considering a few of the more definite methods by which charcoal can be brought to bear as a sanitary agent, I would touch shortly upon its action, or the manner in which it deals with, and destroys, the various noxious gases which result from the decomposition of animal and vegetable matter.

The power of charcoal as a purifier of water and sweetener of tainted meat has been known, probably for ages, but it is to Dr. Stenhouse, of St. Bartholomew's Hospital, that we are indebted for the elucidation of the principle on which it acts, as well as for the idea of applying it to the filtration of impure atmospheric air; but to Mr. Turnbull, of Glasgow, belongs also the credit of having first demonstrated and directed attention to its wonderful power over decaying animal matter.

Charcoal, as is well known, has the power of absorbing various gases in large quantities, and, perhaps, few more readily than those which arise during the decay of dead animal and vegetable substances. But charcoal does something more than simply absorb, for it is evident that, if it possessed no other property, a point would shortly be reached, when, having become quite saturated, it would cease to act. Charcoal, then, has another power in addition to that of absorption, and for the illustration of this I would refer to the following striking experiment:—Certain dead animals were placed in an open box and covered with a layer of roughly-pounded wood charcoal, rather less than three inches in thickness, and all the decomposable portions disappeared more rapidly than if they had been buried in the ordinary way. Moreover, the boxes containing these dead animals were kept for many months in a room in which several persons were employed during the day, but still no disagreeable effluvia were detectable, and their health remained unaffected.

All decaying animal and vegetable matters give off during decomposition, fetid and deleterious gases, which, in the end, tell as fatally upon the human constitution as does the bite of a viper, or the most insidious poison known to the chemist, and the animals referred to in these experiments formed no exception to this rule—a fact which could be readily ascertained by removing a portion of the charcoal so as to get nearer to the putrid

mass below. From this, therefore, it follows that not only does the charcoal hasten decomposition, but that those deadly gases that are constantly being given off, become, in their passage through the charcoal, converted into inodorous and comparatively harmless ones.

The explanation of this peculiar result is simple and very beautiful. Charcoal is an extremely porous substance, presenting through its mass an almost incredible amount of surface, and upon this depends its power of absorbing various gases in such large quantities. The oxygen of the air is the great vivifier of nature. The deadly emanations given off by decomposing matters are in what is called a "low state of oxidation," that is, they contain a comparatively small proportion of oxygen. Combine them with, or force them to take up, more of this purifying element, and the point is gained—that which perhaps an instant before would have proved most hurtful if breathed, becomes now almost entirely resolved into harmless combinations.

Now charcoal contains within its pores a very large proportion of oxygen, amounting to rather more than eight times its bulk. As already shown, it absorbs the various putrid gases with avidity, and in this way they are brought into intimate contact with the condensed oxygen existing in the charcoal, and the result is as has been described.

Such, then, is the action of common charcoal in dealing with the fetid gases of decomposition. It not only absorbs but destroys them; that done, it gives out the resulting comparatively harmless products; room is made for more oxygen from the air, and more of these bad gases from whatever source, and thus the process ceaselessly goes on. In this manner the charcoal is, so to speak, constantly purifying itself and under ordinary circumstances, with occasional exposure in front of a large fire, or to the sun's rays, its powers remain intact for an almost indefinite period. This secondary, or self-purifying action of charcoal is, however, a slow process, and, therefore, bulk comes to be an important element in calculating the amount of charcoal to be employed in particular cases, as will be shown afterwards.

To increase, then, the oxidizing power of the charcoal, so as to enable in some instances a smaller quantity to be used, is an object of considerable importance, and this for many purposes of the chemist has been effected. Platinum, in a finely divided state, has less power of absorption than charcoal, but it causes oxygen to combine with certain gases with infinitely greater avidity. Dr. Stenhouse, therefore, resolved to endeavor to deposit in the pores of the charcoal, a certain proportion of platinum, in the metallic form, and this he readily accomplished by boiling the charcoal in a solution of this metal in aqua-regia, evaporating to dryness, and afterwards subjecting it to the action of a red heat in a close vessel. The result exceeded his expectation, for he found that charcoal containing only two per cent. of platinum had its alternative or secondary power immensely increased, for some chemical purposes, although, I fear, that practically, the permanency of its action over mordant gases will be found to have become diminished by the addition of the platinum.

This conclusion I have reluctantly been obliged to come to from the following experiments:—Small but definite amounts of flesh in an advanced state of decay were covered with equal quantities of common wood charcoal, and of "platinized charcoal," the latter containing platinum in the proportion by weight of six, two, and one-fourth per cent. The jars containing these specimens were carefully and frequently examined. For the first two or three days no smell from either was detectable. After that period, however, a slight odor was perceived from the one with the common charcoal, thus showing that at first the addition of the platinum had probably increased the power of the substance. A small additional quantity of common charcoal was then added, and the jar containing this specimen has ever since remained almost constantly on my mantel-piece without causing the slightest inconvenience. The history of the other specimens, or those with the "platinized charcoal," is not so satisfactory. Although at starting, apparently possessed of greater power than the common variety, this in the course of four or five days, ceased to be the case, and it is remarkable that, in the end, the charcoal which contained the 6 per cent. or largest proportion of platinum was found to have the least power, although at first it seemed to have the greatest. From this it is evident that the platinum used in the above experiments had damaged to a certain extent that permanency of power which the charcoal itself usually possesses. It perhaps interfered in some way with the porosity of the charcoal, on which so much depends, but at the same time it is quite possible that its employment in still smaller quantities (or according to a different mode of preparation), may prove of advantage. These experiments will be again repeated, and with regard to other points in what may be called the "science" of the whole of this most interesting subject, I may mention that a good deal has yet to be done.

The practical facts are, however, such as have been indicated, and these are simply sufficient to prove that in a sanitary point of view charcoal is not only the cheapest and most easily applied, but, perhaps, the most effective agent yet discovered. Given, then, a substance with properties such as have been detailed, the question next comes to be how most efficiently to apply it?

The idea of the air filter, as already mentioned, originated with Dr. Stenhouse, but believing that something had still to be done with regard to its practical development, and foreseeing, moreover, that unless some striking demonstration was afforded to the public of the powers of this material, much valuable time was certain to be lost, I proposed to Dr. Stenhouse that we should conjointly carry out, on a somewhat extensive scale, a series of investigations into the modes of more practically bringing charcoal to bear as a sanitary agent than had yet been effected. This was accordingly done, and last month the apartments in which these were carried on were thrown open to the public, so as to enable all who took an interest in the subject to judge for themselves,* and it now remains for me to detail the methods which have been adopted in these experiments, and to indicate the practical deductions which are to be drawn from them.

The first and most important application of charcoal as a sanitary agent to which I would refer, is one by which in a definite manner pure air can be insured to individuals in the mass. This is effected by means of a charcoal filter, through which the air is made to pass preliminarily to its diffusion within the building, &c., to be ventilated. More than six months ago charcoal had been applied for this purpose, both at the Mansion House and at Guildhall, but its power when dealing with a decidedly impure atmosphere had still to be demonstrated. Ample proof, from many sources, had been afforded of the wonderful power of charcoal over a polluted air under still conditions, but the problem for solution continued to remain, whether a putrid atmosphere, passing at the rate of many hundred cubic feet per minute, would become purified; whether, in short, the charcoal would have time, so to speak, to secure and destroy the various impurities during their passage. The amount of charcoal to be employed had likewise to be settled, for it was quite clear that its powers must have a limit, and that only harm would arise to a good cause by assuming too much. For this purpose, the filter used in these experiments was so constructed as to allow the amount of charcoal employed to be varied according to circumstances. The charcoal air filter then, in the present instance, consists of a case in which are placed a series of layers of common wood charcoal, broken into angular fragments, varying from the size of a pea up to that of a large bean. These are contained in flattened cages, made of stout wire gauze,

* Further opportunity for this is about to be afforded by the removal of our apparatus to the Polytechnic.

set in wooden frames, and the air to be purified is forced through by means of a revolving fan of the requisite power. Of course, in all cases the size and shape of the filter—the thickness and extent of charcoal to be employed—the power of the fan, and so forth, must be adapted to circumstances, as, for example, the volume of air required for the ventilation of a given building—the facilities for moving the apparatus—the known malariousness of a district, &c.

The filter used in the experiments referred to, and of which A in Fig. 1 is a representation, is of considerable

Fig. 1.



dimensions, sufficiently so, in fact, to ensure the purification of the air necessary for a building of very large size. Light portable ones, however, of simple construction, with small fans, throwing from two to three hundred cubic feet of air per minute, could be made, and these would be perfectly sufficient for the ventilation of hospital or other large tents, as well as for buildings of an ordinary size. The case for the air filters may be made of wood or other materials. The present one is constructed of zinc; it is three feet six inches in length; the same in height; and two feet in breadth; and the thickness of each of the filters, as seen in section in Fig. 3, amounts to three inches, giving, when the whole four are employed, a depth of 12 inches of charcoal fragments through which the air to be purified has to pass. These filters are made to slide air-tight into their places, and can be readily removed at pleasure.

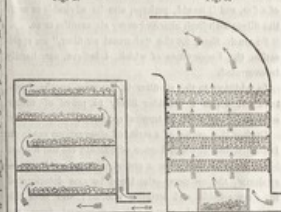
The fan employed, C, Fig. 1, is calculated to throw when worked by the hand, about six hundred cubic feet per minute, but from this amount 200 cubic feet will probably have to be subtracted, on account of the resistance offered by the charcoal, but this may be reduced to a fraction by increasing the extent of surface presented by the filters. In some cases, as in warm climates, it is, however, an object to secure a certain amount of pressure inside the filter, as, by this means, the temperature of the air in the apartment to be ventilated becomes lowered, and this affords a reason why, under such circumstances, the fan to be employed should be capable of forcing (its drawing, as the case may be), the air through with considerable power. The one used in these experiments throws a large volume of air, but not with much force.

but, even, with it the average of a number of thermometric observations showed that the temperature of the air in the adjoining apartment had suffered a diminution of 1½ degrees in consequence of its passage through the filter.

The filter constructed as described, it then remained to ascertain, in the first place, the extreme point to which the power of a certain quantity of charcoal could be pushed; to get, in short, some definite idea of the capabilities of the substance with which we were dealing. This was effected by placing in the bottom of the filter, as attempted to be shown in Fig. 5, a jar, or, in reality, two jars, containing several dead rats in an advanced state of putrefaction, a fact which could be readily ascertained by opening the door of the filter, or the stop cock at E in Fig. 1. The tube there shown communicated with the bottom of the filter, in which these matters were, and the purity of the air after its passage through the charcoal could be readily demonstrated by means of the opening at A in Fig. 4. (This figure will be inserted in the next number,) as well as by a small aperture immediately at the top of the filter. In the experiment above referred to, the layers of charcoal amounted to nine inches in thickness, and the jars containing these dead animals were kept constantly inside the filter-case, and the air after its passage frequently and carefully tested. For nearly four days it stood this extreme trial, but at the end of that period it commenced to fail; the fœtid gases which had hitherto been secured and destroyed during their passage through the charcoal could now be detected.

Fig. 2.

Fig. 3.



A limit to the power of the filter had in short been reached, and it now, therefore, remained, either to increase the bulk of the charcoal through which the air had to pass; to introduce a fresh supply; or to allow that already in the apparatus time to recover itself. The first and last of these alternatives were adopted. An extra layer of charcoal, three inches in thickness, was inserted, and those already in the filter freely exposed to the air, and the precaution was also taken of employing only one of the jars and removing it at night, and the whole then

continued in satisfactory operation until the completion of our experiments, or for a period of about three weeks.

On several occasions a little fester in the filtered air could be detected, and at the expiration of a fortnight fresh charcoal was introduced, but the fault had not lain with it, as the annoyance entirely ceased on repacking the sides of the filters, so as to ensure more completely the passage of all the air through the charcoal; and I mention these particulars in order to suggest to others the precautions which are so essential in experiments of this nature.

With regard to the practical results to be deduced from these observations: the first I believe is, that in no case should the air-filter, or body of charcoal employed, be less than six inches in thickness, and although it would be hardly possible to conceive the conditions which will more severely test its powers than those made use of in the foregoing experiments, still, in all cases, the error in the foregoing ought to be on the "safe side," for it at most only involves the use of a few inches more of charcoal, and, perhaps, a fan of rather more power; and having once laid down the amount of charcoal to be employed, it may be arranged in a single compartment so as to form one layer, as by this means the size of the case (when one is required) can be very much diminished. I should likewise recommend that a spare filter of the proper dimensions be kept in reserve, so as to enable the one in use to be replaced once a week, or oftener if necessary; and that not employed ought to be, in the interim, freely exposed to the action of the air and sun's rays, or to heat in front of a fire, and it would, perhaps, also be advisable to refill the filters with fresh charcoal every six months or so.

So much, then, for the "charcoal air-filter," an application the importance of which, I believe, can hardly be overrated.

In addition to the air-filter is, however, another contrivance, which I consider likely to prove of much advantage, especially in tropical countries.

During the course of a series of observations made in India, on the direct influence of climate on the human body, I found that after a period of continued rain—as during the monsoon—the blood became deteriorated in a remarkable and striking manner; and that this was no accidental occurrence was proved from the fact that it was found, towards the end of the rainy season, to exist, without exception, in every case which I examined. The details of these observations will be published elsewhere, but I may shortly mention that the chief alteration alluded to was found to occur in the blood corpuscles, as ascertained by achromatic microscopes, under every possible precaution for securing truthful results. The change presented itself in two ways: in the first the red globules of the blood, which are usually pretty regular in size, were found to vary, and that to a considerable extent, some of them being not

larger than the one-six thousandth of an inch in diameter, or nearly one-half less than ordinary; but the most striking feature was, that the great majority of them, instead of presenting their usual smooth appearance, were found studded with small highly-refracting granules, evidently from that and other circumstances, of a fatty nature. The blood-cells, in short, had undergone a change which some of my readers will recognise as constituting that peculiar morbid condition known, when affecting various tissues, under the name of "fatty degeneration."

The reason for this change under the circumstances referred to is not difficult to divine. An excessive amount of moisture in the air interferes materially with the functions of these two great filters, the lungs and the skin, and the result is that the vital conditions of the blood itself become altered, and ultimately the general health impaired; and, although the inhabitants of temperate climates are not liable to be exposed for any very lengthened period to such influences, still, doubtless, to a certain extent, the same effects are produced in all countries during protracted wet weather. Grant this, and it becomes, therefore, an object of importance to remove from the air a certain proportion of its moisture when excessive in quantity. This can, to a considerable extent, be effected by passing the air, previously to entering the charcoal filter, over a series of trays containing quicklime. In Fig. 1, B represents a lime-box, of which Fig. 2 shows a section, which will sufficiently explain the arrangement adopted. The case containing the limetrays is made of stout tin, and of the same dimensions as its neighbour, the air-filter, and at G H and F in Fig. 1 are stop-cocks of simple construction, which admit of the drying apparatus being used at pleasure. The trays containing the quicklime are five in number, three inches in depth, three feet three inches in length, and two feet in breadth, thus presenting a drying surface of upwards of 32 square feet in all. The lime employed ought, of course, to be as fresh, or "quick," as possible; it should be in pieces about half the size of a man's hand, and the trays ought to be only three-fourths filled, in order to allow for the increase of bulk which attends the process of "slacking," during the passage of damp air, and which, from the nature of the arrangement, occurs with tolerable facility, especially if the fan be slowly driven, so as to allow the air to pass more gradually. For this country an apparatus of the size here indicated would likely be quite sufficient; but, considering the very large amount of moisture which an Indian atmosphere contains during the monsoon, I am inclined to think that perhaps one of larger dimensions, with a couple of additional trays or so, may be required. This is, however, a matter of experience which cannot be settled at this distance.

In order to have, as far as possible, Indian conditions, I saturated, by means of steam, the air in the outside apartment, in which the fan, &c., were placed, and then

carefully tested the effect produced by the lime-box, or desiccator, and these observations, as well as those formerly alluded to, were repeated by Mr. Richard Tunon, with results similar to my own.

In the outer room, the air, on testing it with Daniell's hygrometer, was found to be within rather less than one degree of saturation, whereas, after its passage through the apparatus, the dew point was found to have fallen between six and seven degrees, indicating that a considerable drying effect had been secured, although the entrance of the external air tended somewhat to complicate the results obtained.

I may mention that, the slight increase of temperature, caused by the lime-box, appeared to be fully compensated for during the passage of the air through the charcoal filter, and probably this could in all cases be more than counterbalanced by enveloping the apparatus in wet cloths, &c., and this leads me to make a few remarks on the cooling of the air in tropical countries,—a subject of very great moment, but one, towards the practical accomplishment of which, a great deal has yet to be done.

The low conducting power of the air offers a barrier to any great cooling effect being produced by the direct action of the cold generated during the vaporisation of water, but still some good can be effected by having the cases, tubes, &c., covered with wet cloths, and kept in a draught. The question, however, of sufficiently reducing the temperature of the air, in a tropical country, resolves itself into, how cheaply and efficiently to condense atmospheric air, so as to allow it to give off its latent heat previous to its admission and circulation within a given chamber? This, to a certain extent, has already been done, but the expenses involved in carrying out the process have hitherto rendered it practically unworkable.

The method adopted in India of cooling the air by means of "tatties," or wet mats, through which the air is made to pass, I consider, in the great majority of cases, to be decidedly objectionable, on account of the effects, on the system, which are induced by the moisture thus introduced into an apartment. It is, doubtless, agreeable to the feelings in the mean time, but the results eventually produced are, I believe, detrimental to health. The hot dry season in India is the most trying, as far as the sensations are concerned, but it has to be noted that, upon the whole, it is more healthy than any other period of the year; and from my own observations at Jacobabad, in the desert of Upper Sindh, I am inclined to think that the existence of, even, a certain proportion of moisture in the air is not so necessary as is generally believed, and its absence at the worst, in the vast majority of cases, only involves the drinking of a pint, or more, of extra fluid.

During a series of experiments made towards the end of the cold season, in February and March of 1862, embracing a period of twenty-five days, I found that the average quantity of moisture, by weight, existing in the

atmosphere, as ascertained by passing a definite volume through a tube containing chloride of calcium, the same as used in organic analysis, did not, over the whole of that period, amount to one grain in the cubic foot of air; and on several occasions the atmosphere was perfectly moistureless! as was shown by the fact, that the apparatus, at the termination of the experiment, had not only not gained, but had actually lost weight from the desiccation of the chloride of calcium itself produced by the dry air passing over it. During the whole of the cold season in Upper Sindh the air is extremely dry, but, nevertheless, a more agreeable climate than it then possesses does not perhaps exist anywhere.

With regard to the warming of the air for winter use, in this and other climates, a few words may be said. The method of heating it by means of steam or hot water pipes is an excellent one, but the process could often be more cheaply and readily carried out by passing the air through wrought-iron tubes, arranged, for the sake of economising the heat of the fuel, in a manner somewhat similar to those in tubular boilers, &c. The barriers hitherto opposed to the warming of the air by the direct action of heated iron, as in this way, and in the case of stoves, arises chiefly from the disagreeable empyreumatic odours produced, and which are supposed to result from the partial charring of the organic impurities usually present in the air, and perhaps also, in the case of overheated cast iron, from the giving out of minute quantities of sulphur, and, it may be, of phosphorus combined with hydrogen. These produce head-ache, accompanied with a disagreeable dry sensation, which is corrected, in some measure, by allowing a little water to evaporate within the apartment so heated, and perhaps in all cases the admixture of a small amount of vapour with the air, when artificially heated, will be found of use, as it seems to "temper" it in some way, which has not yet been very well explained. Supposing, then, that the disagreeable effects produced on the system when air is heated in this manner does arise from previously-existing impurities, it is quite clear that if these were removed during the passage of the air through the filter, none such will be experienced, and in employing it for this purpose, I should feel inclined to recommend that the air be first heated, and afterwards drawn, by means of the fan, through the charcoal filter. In this case a small amount of moisture, if still required, could very readily be introduced, by having a portion of the delivering tube, shortly after leaving the fan, expanded and arranged with a small funnel and stop-cock, so as to present a flattened cavity for water, over the surface of which the heated air would have to pass. The great advantage of first heating the air is, that it enables the apparatus adopted for that purpose to be placed so as more readily to avoid accidents.

Given, then, purified air of the proper temperature and degree of humidity, passing at the rate of, it may be,

hundreds of cubic feet per minute, and it comes to be a serious question, how to thoroughly diffuse it without causing "draughts" and dust, in the first place, and, in the second, so as to prevent the entrance of the impure or malarious air from the outside, and this leads me to make a few remarks on the subject of ventilation, strictly so-called, although it must not be forgotten that a true system ought to embrace all the objects, such as purity, and so forth, here indicated.

Ventilation, then, in its ordinary sense, and viewed strictly with reference to individuals, may be defined to be the constant, but insensible, changing of the atmospheric air over the human body, so as to ensure, in accordance with the above conditions, as far as possible, not only a fresh supply of air, but also the removal of that which is constantly being rendered impure from having fulfilled its part as the essential agent concerned in respiration, &c. And here it must be remarked that any system for the ventilation of a building in which a number of individuals are congregated involves a question of dilution, for it is practically impossible, as will be again shown, that all the impurities which are constantly being generated under such circumstances shall be immediately removed, and their contact with others entirely prevented. Indeed, to suppose otherwise would be to assume that circulation of the air could totally be prevented, and that every particle of impurity as evolved could be made to ascend almost vertically upwards, and be at once removed.

The point, then, as it seems to me, is to secure, as far as possible, the maximum of dilution, with the fulfilment of the other objects before indicated.

In considering this subject, it must be kept in view that atmospheric air follows exactly the same physical laws that other fluids do, and that forces acting on, or in, a given mass either of water or of air, will produce similar results. For instance, a large jet of water of sufficient force, if admitted into a tank partially filled with the same fluid, will pass in a straight line to the opposite, or resisting point, then recoil, so to speak, and thereafter become intermixed, to a certain extent, with the water already there. But, suppose that, instead of being a close vessel, the tank had an opening immediately opposite this entering stream or jet, it will be found that it will then pass almost directly out, and that only an extremely partial admixture of the two fluids will occur. Illustrations of these conditions are sometimes afforded by nature on a large scale, as when a river like the Rhine is seen to pass in its onward course directly through a lake, or, as in the case of the Indus, to advance without commixture for a considerable distance into the ocean.

Suppose, however, that, instead of a jet of water forcing its way through in a given direction, we have one or more entrances for the supply of fresh quantities, and that moreover we establish currents, by having, it may be, several openings in the tank through which the water is

allowed to escape, and what occurs? In this, as in the other cases, the amount of intermixture between the two fluids is comparatively small. Currents are established in straight lines betwixt the inlet and exit points, and the result is very similar to that in which the river passes through the lake.

Take, however, another view. Suppose that the entering stream of water, instead of being single, has been divided or broken, as it were, into an immense number of small jets, and that these are then admitted from a great number of points all round; and also not in lines perpendicular to the sides of the tank, but at various angles; and the result will then be the establishment of a series of receiving currents, which, passing in every direction, will secure a thorough intermixture of the two fluids. This, moreover, it must be observed, will occur the more readily, if the exit water, or that flowing from the tank, has been made to depend upon the amount of that entering, and not upon a fall or draught, as that would actually tend to interfere with an effective circulation by establishing straight currents in certain lines.

Let us see now how these simple illustrations can be applied to the subject in question. The proposition is—the best mode of inducing the thorough circulation within, and dilution of, the air in a given building; and in dealing with a question of this nature, we have only to consider how certain conditions affect the great majority of individuals.

A chamber filled with air may be supposed to represent the tank in the former case. Admit a jet of air into it—open a window against which the air is blowing—and the result will be partial diffusion, and a bad cold or face-tick, &c., to the unfortunate with whom it may come into contact, or even after its recoil, should it strike with sufficient force against the opposite side. Suppose, however—and I may mention that examples of the following illustrations may be seen in London—that we resolve on at least preventing the injurious effects which proceed from "draughts," and have therefore our inlet and exit openings placed at a considerable height above the floor, and it is evident that the air will pass through in a manner similar to that of the stream of water in the former case.

Take another instance: instead of causing the air to pass directly out at the opposite side, let us have one large entrance opening above, and an exit one of similar size below it, and the results, although much more favourable in every way than those in the former case, will still be defective. The volume of air, if it reaches the opposite side at all, will recoil and seek an exit through the point of least resistance, which in this case is very nearly in a line with its newly-acquired direction.

Suppose, again, that we have a number of openings for the passage of the air, arranged at intervals around the sides, and that a large exhausting shaft, or shafts, is made

to enter at the top of the chamber, and what takes place? The air is drawn from the lower openings in straight lines towards the shaft in the roof, and the result is that only the comparatively few individuals who happen to be placed at or near to the sides of the apartment will receive the requisite amount of fresh air, and even these will suffer from the effects produced by draught.

Take another instance—Suppose that, instead of allowing the air to enter at the sides, we resolve that at least the individuals in the apartment shall have the benefit of what we do admit, and adopt the plan of having openings or perforations in the floor, through which the air shall be made to pass, and the result, then, is dust, and the inevitable cooling of a portion of the human body which ought to be kept warm, viz., the feet.

We shall pass now to more favourable conditions. In order to avoid "draughts," let us retain our entering current at the height of seven or eight feet above the floor, but divide it by having several openings around the room, and also a number of exit ones at a lower level, and one of which may be represented by the chimney, &c. In this case the diffusion will be much more perfect than in any of the others, but still, between these entrance openings and the supposed exit ones, a certain amount of direct current will be established, which will actually tend to prevent diffusion, by impeding circulation.

If, however, the current of entering air—just as in the case of the stream of water—were broken, not into a few, but into an immense number of smaller ones, and that these, instead of passing into the chamber from one or two, should pass in from all sides; and that, moreover, these minute jets of air should also, as in the same instance, be made to enter at different angles, the result will be the establishment of a series of revolving currents, which in their course will ultimately leave no portion of the air in the chamber in a state of rest. This motion will, however, be inseparable from a general movement of the air in masses, and, just as in the case of the water tank, I pre-suppose that the air is not being dragged out by means of shafts, &c., which will establish currents in straight lines, and produce the effects already explained, but that it is forced into an apartment in requisite quantity, and allowed to seek an escape by, in some cases, special openings, and at others through those thousand-and-one apertures which every chamber, however close, ordinarily affords.

From the foregoing, it seems clear, that in all cases, in order to ensure, according to the rule already laid down, as perfect ventilation as possible, the diffusion and circulation of the required amount of air cannot be accomplished by means of draught-shafts, or alternations in the temperature of relative bulks of air, and that no system can be efficient that does not take it, as it were, into its grasp, and make it do the work.

The illustrations already given can, I believe, be applied to any given instance, and although it will not be worth while to multiply examples, I may still be permitted to refer, for a moment, to the ordinary case of large hospitals, and other public buildings, in which fires are the great ventilating media during cold weather. Here, the ventilating shafts are the chimneys, the openings of which, instead of being, as in the former instances, placed in the roof, are brought to within about three feet from the floor. In such cases, the points of supply are the doors and chimneys of the windows;—and now what occurs? Certain linear currents are established, and a very partial diffusion takes place: a few patients, or others, as the case may be, receive a very large supply of air in the harmful form of draught, while the majority are left in a still atmosphere, which is being rendered every minute more impure by the emanations from their bodies. And while on this subject, I may mention that the hospital physician has continually to recognize, in practice, this same question of dilution, which I consider to be the essential point in ventilating all public buildings whatever—and to secure which he is obliged, as when dealing with typhus fever, and gangrene, to diminish to often one-half the number of cases in wards devoted to infectious diseases; for if this precaution be not taken, the attendants themselves eventually become struck down, and a considerably greater proportion of the patients die.

Returning, however, to the case of the low-placed ventilating shaft, or chimney: from this and from the ascent of the heated air, are allowed to arise those conditions of intensified impurity in the higher portions of an apartment, by which an individual may be standing with his feet in a draught, and his head in the still foul air above, unless some method, such as that proposed by Dr. Arnott, be adopted.

The tendency of the heated air under all conditions will, of course, be to ascend, and a few small openings ought, therefore, to be left at the top; but in the system or mode which I am about to propose, the chief exit points ought to be low down, and under conditions in which it is an object of great moment to exclude the outside impure air, so special apertures ought to be made; for every apartment, however closely shut up, will still afford a thousand openings, of one sort or another, through which the air can be made to pass; but, at the same time, if these natural openings are, in any instance, too large, means must be taken to contract them sufficiently. In all these cases it must be noted, that I pre-suppose that the air is being made to pass into a given chamber, in quantities sufficient not only to fill it, but also to give, under ordinary circumstances, a certain amount of exit current through these openings, and the result of this will be to prevent "draughts," or the entrance of the air from without.

The heated and impure air will, doubtless, in all cases, even in those in which a continued circulation—in the true sense of the term—is ensured, have a tendency to ascend, and thus a slight accumulation of impurity, as in other cases, occurs towards the top, and hence the advisability, perhaps, of having a few small openings in the roof, but, at the same time, particular care must be taken that these are not arranged so as to cause an upward draught, or left too large so as to allow too free an exit for the air at this point; and if these indications prove in any case difficult of attainment, it will be better to have one large opening with a valve, which can be kept shut during the time the air is being forced into the apartment, and opened afterwards; and it must, of course, be borne in mind, that if the lower or inhabited portions of any room or chamber be thoroughly well ventilated, the existence of a little impurity above will not be of any consequence, and even that will be in a very diluted state.

The whole question of the ventilation of a building in which a number of human beings are congregated, must, I believe, resolve itself, in a given climate, into a balancing between certain difficulties, for, as I have already shown, any system proposed can be only relatively, not actually, perfect. Suppose, for a moment, that we lay aside experience, and look at the thing through the light afforded by one or two scientific facts.

The elements for the calculation are these. In a given chamber, filled with people, the particles of the air which come into contact with their bodies become heated, have thus their specific gravity lessened, and consequently, ascend, carrying with them also the greater proportion of the products of respiration and other gaseous impurities. Here we say, perhaps, that Nature herself indicates the method to be adopted. What has to be done in ventilating a building is evidently to have openings in the roof, and the chief point is accomplished.

But having thus readily disposed of the upper impure air, an equally essential consideration, viz., the supply of fresh, has to be attended to. We have got rid, we shall suppose, of the impure air above, (although even that depends upon the supply of cooler air to those below, for otherwise, the temperature all over soon becomes equalized, the ascent of the impure air now ceases, and before long the atmosphere becomes intolerably stagnant, for the removal of the products of respiration, &c., arises now from the slow process of interstitial diffusion), but we have now to secure the entrance of a sufficient quantity of fresh; and now comes the difficulty, for not only is it possible, as every one knows, to do an immense deal of harm by the direct action of currents of air, but also, that by one system or mode of application alone is it practicable to insure, by means of main shafts at the top, a practicable supply of fresh air to even a majority of the occupants. The only possible mode of carrying this into effect is to have a perforated floor, through which the air

is passed to be again drawn off by a shaft, or shafts, above, and as before-mentioned, this in practice has proved a failure, for to say nothing of the dust which must infallibly be raised, the effect of a current, even, of heated air directed against the feet of the unfortunate sitters, could only be to produce one result.

I hold, then, that, practically, any system for the ventilation of a large building, by means of draught-shafts must fail, and, that, that only will be really efficient which ensures a thorough circulation of the air after its admission.

The physiological objection to such a system, viz., that it pumps out the air, and thus tends to diminish in a given time the bulk of that essential fluid which is required for carrying on the purifying functions of the lungs and skin, is correct in theory, but, in the case of such an extremely subtle substance as the air, which rushes with extreme readiness from all quarters on the slightest attempt to produce a vacuum, in practice must prove of an extremely fractional description.

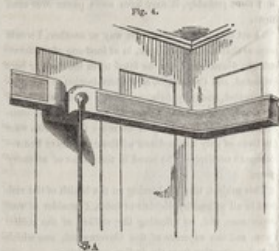
To sum up, then—the indications to be fulfilled, by as perfect a system of the ventilation as it is practically possible to have, I conceive to be the following: in the first place the air should be purified; and it ought to be of the proper temperature, and neither too dry nor too moist; and in the second, it must be delivered into a given building, and diffused or circulated so that the individuals within shall be constantly, but insensibly, receiving supplies of fresh air in requisite quantity, and that this should be effected in such a manner as to avoid draughts, and prevent also, as far as possible, the entrance of the unpurified, or malarious air, from without. The first of these conditions can, I believe, be ensured by the means already detailed, and it now only remains to treat of the second.

I shall assume that the fan, or supplying agent adopted, is capable of furnishing the required volume of air, and at once pass on to the question of its diffusion. In order to effect this, I have adopted the following arrangement. The air, after passing through the filter, &c., is conducted, by means of a large tube, into the adjoining apartment, at a height of about eight feet from the floor.

This tube, immediately on entering the chamber, bifurcates or divides into two branches, which pass round the room at the same level, and ultimately unite at the opposite side, thus forming, as it were, a loop, composed of tubing, of which Fig. 4 endeavours to represent a portion—the small tube A, as elsewhere mentioned, being employed for demonstrating the purity of the air after its passage through the filter.

This tube, or "air diffuser," may be of very simple materials. In the present experiment it is constructed of light zinc, and attached to the wall in a temporary manner by means of a few nails. It is of a square form, four inches in depth from before backwards, and six inches in

breadth in the vertical direction. The front of the tube, as attempted to be shown in the figure, is composed of a tolerably close-textured canvas, and it presents an air-delivering surface of 35 square feet, the length of the tubing being 70 feet. Immediately at the entrance-point for the air, and extending for a little way, the front of the tube is completed by means of metal—not canvas—in order to ensure more completely the division of the current, and to prevent an unequal or extra amount being delivered at this part. The result of the whole of the arrangement is, that the air, on being forced by means of the fan into this delivering tube, is caused to pass from



all sides through the pores or meshes of the canvas, and is thus becomes constantly and insensibly diffused in every direction throughout the room. In this manner—returning to a former illustration—we get our large entering current of air broken into almost an infinity of jets, which are constantly being passed from all sides into the apartment, and not only so, but also being made to enter at varying angles, so as to insure, as formerly explained, the establishment of a series of revolving currents, which, in their progress, shall pass into every corner, and leave no part unventilated. The angles at which these minute jets or currents pass through the canvas, can be readily demonstrated by means of down or light feathers, or by the flame of a taper, but for the sake of convenience, and in order to avoid accident, in the experiments actually made the former method was adopted. In the first place, the fact that the air during the action of the fan did pass through at every part of the canvas was ascertained, and the direction of the currents then established. The angles at which these entered the apartment were found to vary at different parts, that of the side once being, as might have been expected, by far the most acute; in fact, the only part where a direct current existed at all, was found to be on the side opposite to the main entrance. Of course, if the canvases were very close in texture, and the amount of air urged insufficient to cause some pressure within the

tube, the result would be that these currents would pass more directly from the sides and for a greater distance towards the centre of the room, but the effect produced would ultimately come to be the same. With regard to the amount of air delivered from the different sides under ordinary circumstances, or those in which the air is not made to pass through under particular pressure; as was to be anticipated, the largest quantity passes through the canvases towards, and at, the point where the two currents meet, opposite the main entrance, and the least at the sides; and this leads to the practical suggestion of having the canvases at the latter parts, viz., the sides, of a coarser description than at the others, as by this means the amount of air delivered from all quarters will become equalized. This indicates also another advantage, which the canvases more readily afford than any other material, such as perforated zinc, &c., viz., that when in a given chamber more or less air, from its shape or other circumstances, is required at one part than at another, this can, in the same manner, be readily delivered by using a wider-meshed canvases at those parts, and vice versa. In the same way, also, the adoption of the canvases secures another convenience, as it prevents the necessity, within certain limits, for increasing the size of the tube, or air-diffuser; for one, even, of very moderate size, by employing very coarse canvases, can be made to deliver almost any amount of air, and on the other hand, if a small amount only be required, canvases of finer texture can be used, and so on; and in addition to these advantages, the cheapness of this material is, of course, a recommendation.

With regard to the position of the "air-diffuser" above the floor: this must also, to some extent, be adapted according to circumstances, such as the height and breadth of a chamber, &c. In some special cases, even more than one tube may be required, and of course in all public buildings with galleries, a separate diffuser, coming off from the main one, will have to be adapted for the ventilation of those. As a rule, I am inclined to think that ordinarily six to eight feet from the floor, or from two to four above the heads of the sitters, will prove in the great majority of cases about the proper distance, and the same height will probably answer for hospitals, although the relative distance between the entrance of the air and the individuals will be somewhat increased from the recumbent position in the case of the patients. The rule in the first place is to avoid the direct current of the air, and this at once establishes the position of the diffuser above the heads of the occupants, and in the second, at the same time, to have the tube so placed as to secure, consistently with safety, full effect from the circulation of the air which is constantly going on. I have already shown that the air in an apartment with an arrangement of the above description must be in constant movement, and the object is to hit as near as practicable to that point when its action

becomes insensible, and, at the same time full benefit from its diffusion at the proper level secured. If care be taken not to place the "diffuser" too low, the height then comes to be of less importance, as, from the absence of special openings of any size above, the general movement of the air, as was formerly explained, must be downwards, as the exit points are all below, and as it is presumed to be passing in in considerable quantities, it has no resource but to seek a way out through these.

There are some people who would prefer, as far as their feelings are concerned, to remain almost constantly in a "draught," but, in considering various sanitary arrangements, reference can only be had to such as will secure the greatest amount of benefit to the majority, and certainly under our climate in this country such instances as the above are comparatively rare.

From what has been said it will be evident also that the distance of the "diffuser" above the heads of the occupants will have to be regulated according to the amount of force employed, for if a large volume of air be driven into an apartment with considerable force, it is clear that the tube will require to be placed considerably higher up than it would under more moderate circumstances. It is impossible, therefore, to lay down the exact position of the "air diffuser"—all that can here be done is to indicate a few of the elements involved in the calculation.

Utility is, in all cases, a main consideration; and, although it is often difficult to combine the "useful with the ornamental," care ought at least to be taken to avoid causing a disfigurement; and as these "diffusers," as attached in the present experiment have, perhaps, somewhat that effect, I should recommend that, in practice, they be embedded in the walls, at the proper height, and this could be readily done—especially during the construction of new buildings; and in such cases the necessity for even a tube of metal, or other material, could be obviated by simply leaving a plastered cavity, of the requisite size, all round, with edges of wood disposed for the convenient attachment of the canvases, which, when an object, could be dyed of various colours, such as red, green, &c. Other steps could, of course, likewise be taken to render such arrangements actually ornamental, and this is by no means an unimportant consideration, for health itself is not unfrequently sacrificed when this cannot be secured.

I may here mention that, although of course the plan here proposed may be applied anywhere, it is for public buildings, or those in which a number of persons are collected, that it is chiefly applicable, for, as I have already attempted to show, by no other system is it practically possible to secure, in such cases, even an approach to thorough ventilation.

With regard to the application of the foregoing method to buildings in India: the general rules already laid down can be applied, and under certain conditions, as in

malarious districts, where the purity of the air within, and the exclusion of the unperfected without, come to be objects of vital importance, the system—including, of course, the charcoal filter, &c., here recommended, ought to receive a fair trial.

We know the invaluable power of charcoal over putrid elements of decomposition, which, in themselves, prove most hurtful to human life, but we are, as yet, ignorant of what its influence may be when dealing with those more special poisons which give rise to diseases like ague, or intermittent fever, but some facts and analogies, into which I have not here time to enter, would lead us to believe that, probably, it may have some power over even these.

To set this point at rest, one way or another, I would propose that a certain barracks, in at least one of our fever-stricken districts in India, be fitted up in the manner here indicated, and the results, at the termination of a reasonable period, carefully balanced. The expenses involved in carrying out such an experiment would be comparatively trifling, and would be more than repaid, were the lives of only half-a-dozen of those expensive European soldiers—to be saved in the course of as many years.

This subject, then, as bearing on the health of the resident in all unhealthy districts in India, I consider of vast importance, and, as affecting the welfare of the soldier there, and the expenses of the Government, one which calls for attention from the Indian authorities.

So much, then, for the subject of the purification and diffusion of the air in public buildings, &c.

The next application of charcoal as a sanitary agent which I would mention, is one by which it is brought to bear upon each individual separately. This is effected by means of a respirator, or, more strictly speaking, a filter for the inspired air, and it must not be confounded with any other respirator, as the entire object of this instrument is to purify (not to warm) the air. The objects accomplished by it are the following. All the inspired air, or that which enters the lungs, is made to pass through a layer of small angular fragments of carefully prepared charcoal, fully an inch in thickness; and, on the other hand, all the expired air, or impure breath, is allowed to pass freely out by a separate passage, and in this way its after contact with the charcoal entirely prevented. This is effected by means of valves of a very durable description, but which act with great freedom. The arrangement of these will be readily understood by referring to Fig. 5, which shows a section of the instrument,—Fig. 6 being an attempt at a general view.

In Fig. 5, C represents the upper or expiratory valve, B the lower or inspiratory one, through which the purified air passes. Both valves are shown open in the figure, and the arrows indicate the directions of the

currents, but in practice C of course shuts while B opens, and *vice versa*, and from the sloping of the seat of the valves their tendency under all ordinary positions of the body is to remain shut until called into action.

Fig. 5.



Fig. 6.



Mr. Roof, of Willow-walk, Kentish-town, is the manufacturer of these respirators, as well as of the old form first brought out by Dr. Stenhouse. Some years ago Mr. Roof took out a patent for the application of valves to such instruments, and under my directions he has been successful in applying these so as very effectually to accomplish the foregoing objects, and thus to render the instrument as far as possible effective. The application of the valves of course obviates the objections to the old form of the charcoal respirator, in which the expired as well as the inspired air has to pass through the charcoal, thus rendering that impure which it is an object of importance to retain as long as possible intact, for in the case of a respirator, only a small quantity of charcoal can conveniently be employed. The other objection to this form,

and one which I at once saw would prove fatal to its employment in warm climates, is that it tends, like all the common forms of air-warming respirators, slightly to impede respiration, by opposing somewhat the exit of the breath, an objection which the introduction of the upper valve, C, has entirely removed. For some purposes, however, the old form of the charcoal respirator will be found of advantage, as, for example, in instances in which a mechanical filter, as well as one calculated to destroy a certain amount of gaseous impurity, is a desideratum, as in the case of needle-grinders, fencers, painters, &c., and in "London fogs" I can myself strongly recommend it.

The new, or valved charcoal respirator, from the nature of the materials of which it is constructed—wire—thin tinned iron, and charcoal, with the requisite padding, is very light, but it appears somewhat bulky. Its object is, however, to prevent, as far as practicable by such means, the introduction of the elements of disease into the system, and hence efficiency has in this instance been the chief consideration.

The action of the instrument while being worn is so easy, that I have myself slept with one on during a warm close night without inconvenience—a thing of very great moment, for it is during sleep that the body is most easily influenced by the floating elements of disease.

These, then—the "air-filter" and the respirator—are two definite methods by which, as directly affecting individuals, charcoal can be brought to bear on the purification of the air, but there are an immense number of simpler applications of this substance, into which however I shall only very shortly enter.

If charcoal be placed so as to present a considerable surface to the currents of air, which are to a greater or less degree constantly passing through every chamber, these become deprived, to a very considerable extent, of a certain amount of impurity. This is readily accomplished by having flattened-shaped cages, or baskets, constructed, and filled with angular fragments of wood-charcoal, about the size of common beans. These cages ought to be from one-and-a-half to three feet in extent either way, and from two to three inches in thickness. They may be made of stout-wire gauze, set in wooden frames, or extemporised of various other materials, such as small cases, narrow slips of wood, &c.

These charcoal protectors must, in all cases, be applied so as most readily to allow the air, during its circulation, to come into contact with them, and they ought to present a considerable surface, as well as bulk; for it will not do to place a few handfuls of charcoal in the most out-of-the-way corners of an apartment, as is sometimes done, under, apparently, the expectation that all impurities will be drawn thitherwards by some magically attractive power! Like every other thing, charcoal, to be effective, must be put under reasonable conditions.

Other methods than those here mentioned can, of course, be adopted, by which charcoal may be employed for the purification of the atmosphere in a room, but, perhaps, sufficient has been said to indicate the general principles by the application of which these are to be carried out.

Undoubtedly, however, the most important of all the indications to be fulfilled by the use of this substance, is, the prevention of the various deadly products of decomposition from ever reaching, as such, the surface at all; and its employment for this purpose may be shortly summed up. It ought to be used for covering exposed filth of every description; and dead bodies, under many circumstances, should be buried with a layer of about three inches of powdered charcoal over them; and for this purpose, that from peat, when it can be procured more cheaply than the wood variety, may be used, although its absorptive power is not quite so great as that of the latter.

For some purposes, peat charcoal answers remarkably well, but in others, that from wood will be found preferable. Its power is somewhat greater than that of the former; it is less readily damaged by exposure to wet or moisture, and, with ordinary care, does not cause annoyance from dust—a thing which it is very difficult to avoid when employing the peat charcoal, on account of its friability. As a rule, therefore, I should recommend that wood charcoal be used within buildings, and that from peat, chiefly employed for out-door purposes.

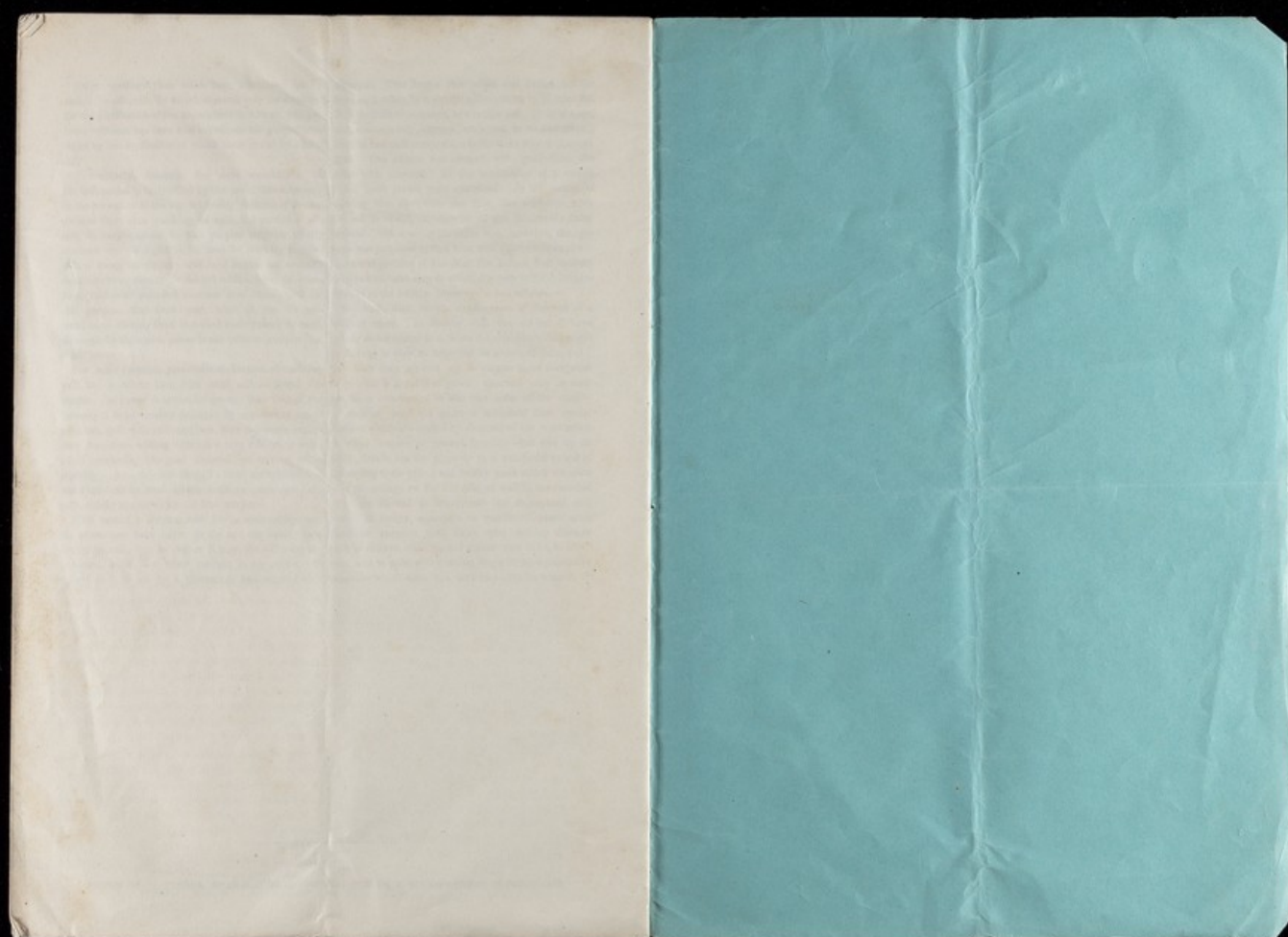
With regard to burying dead bodies with quick-lime: its advantages have never, as far as I am aware, been clearly proved; but, be this as it may, the following experiment, which was lately brought to my notice, will show that it is not for a moment to be compared with

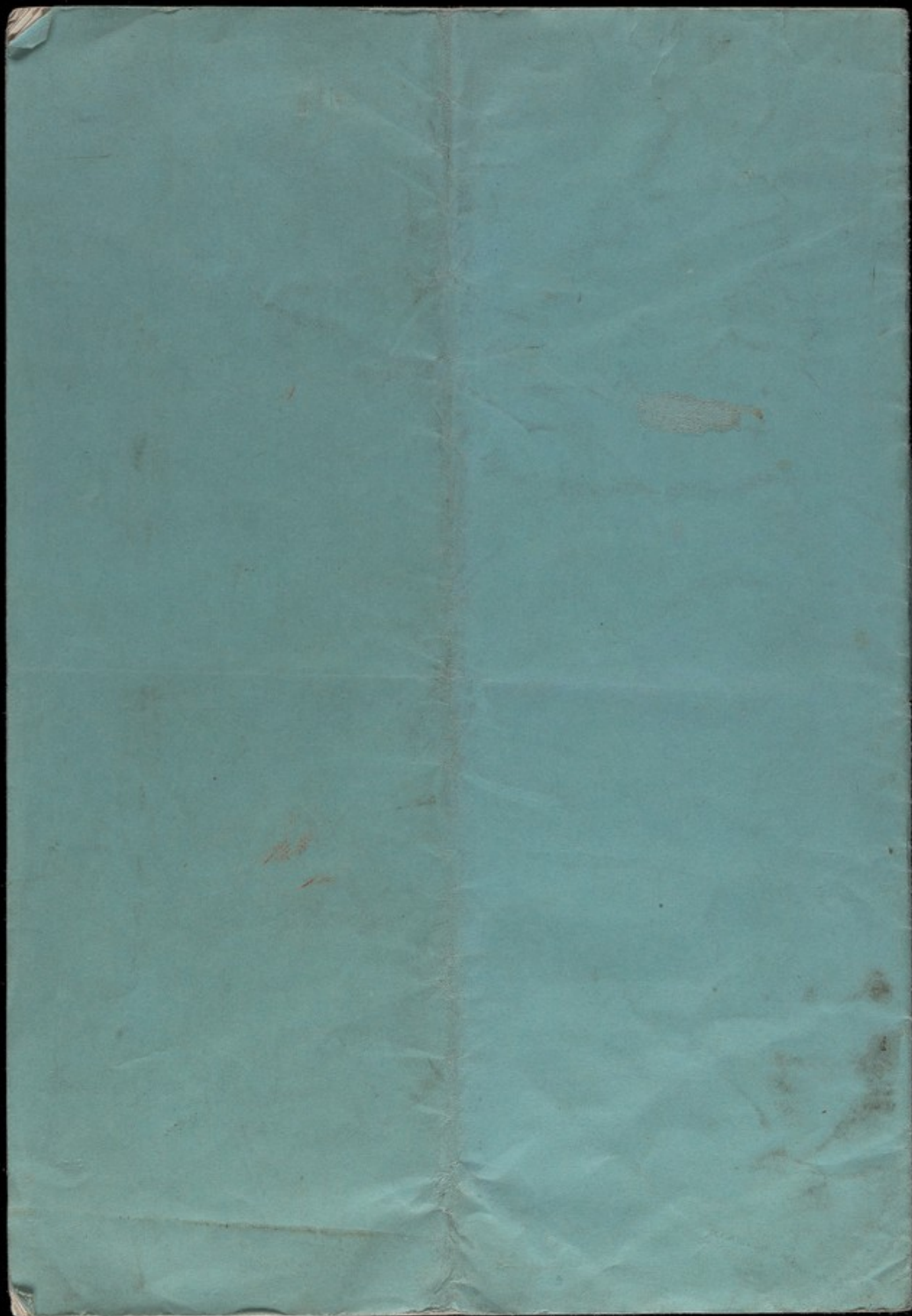
charcoal. Two horses were taken and buried, not far from each other, in a similar soil—a thing to be attended to in such an experiment, as a porous soil, (from the air, and, consequently, oxygen, contained in its interstices,) tends to hasten decomposition in the same way as charcoal does. One animal was covered with quick-lime, the other with charcoal. At the termination of a certain period both graves were examined. In the course of opening the one with the lime, the workmen were obliged to desist, on account of the intolerable fumes emitted. On opening the other one, however, the operator was surprised to find that, with the exception of the bones and portions of the skin, the animal had entirely disappeared, and thus afforded a very striking demonstration of the relative power of the two substances.

So much, then, for the employment of charcoal as a sanitary agent. In dealing with this subject I have chiefly endeavoured to indicate the principles which ought to be kept in view in bringing its powers to bear, and I have also done my best not to assume more than what at present is capable of proof. Charcoal may or may not be a disinfectant in the true sense of the word—it may or may not prove a safeguard from special diseases which are caused by elements of the constitution of which we are at present ignorant—but this we do know, that it has the property to a wonderful extent of destroying those putrid and deadly gases which too often—in the cottage on the hill side, as well in the crowded city—are allowed to impregnate the atmosphere, and which, in reality, constitute far deadlier, because more insidious, enemies than those more striking diseases such as cholera, which would almost seem to be, in kindness, sent to point with warning finger to those preventive measures which never can, with impunity, be relaxed.

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ON THE
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OF
CHARCOAL
TO
SANITARY PURPOSES.

A LECTURE DELIVERED AT THE ROYAL INSTITUTION,
ALBEMARLE STREET,

ON FRIDAY EVENING, MARCH 2, 1855,

BY JOHN STENHOUSE, L.L.D., F.R.S.,
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MR. PRESIDENT, LADIES, AND GENTLEMEN,

THE subject to which I would wish for a short time this evening to solicit your attention, is the Economical Applications of Charcoal to Sanitary Purposes.

Charcoal, of greater or less purity, is invariably produced when organic substances, whether vegetable or animal, are heated to redness in close vessels. The various kinds of charcoal most commonly in use may be conveniently divided into three species, viz., wood charcoal, peat charcoal, and animal charcoal. Wood charcoal may be prepared in a variety of ways. In countries where wood is abundant, it is made into faggots, which are piled up into a kind of cone. This is covered with a mixture of turf and clay, so as to exclude the air, except by a few small openings at the top and bottom. The faggots are then lighted, and in consequence of the very limited supply of air, burn with a smothered flame, and are in fact subjected to a rude

A 2

kind of destructive distillation, the object in view being to char the mass with as small a diminution of its carbonaceous portion as possible.

During this operation a considerable amount of volatile products are evolved, consisting of smoke, empyreumatic oils, tar, &c., about sixteen per cent. of charcoal being obtained when the process is properly conducted. The charcoal produced in this way constitutes a black shining mass, which retains the form of the pieces of wood employed in its preparation. In this country, where wood has a comparatively high value, charcoal is usually manufactured by distilling wood in cast-iron cylinders—the smaller branches of oak, birch, ash, and the harder kinds of wood being used for this purpose. By employing cast-iron cylinders much waste is avoided, and large quantities of vinegar or pyroligneous acid, as it is called, creosote, wood-spirit, &c., are also obtained.

Peat charcoal is manufactured by precisely similar operations. It is much more friable than wood charcoal, and is therefore very easily reduced to the state of fine powder.

Animal charcoal is usually obtained by the destructive distillation of bones in cast-iron cylinders. It contains very little carbonaceous matter—seldom more than about twenty per cent.

It has long been known that the various kinds of animal and vegetable charcoal, especially when dry, possess the power of absorbing effluvia, and the greater number of gases and vapours. This subject was first investigated by M. Löwitz, a German

chemist, settled at St. Petersburg, who, towards the close of the last century, between the years 1785-91, shewed that charcoal might be advantageously employed to deodorise and purify a great number of substances. The subject was afterwards taken up by Compté Morozzo, who made many interesting observations on the quantity of different gases absorbed by charcoal; it is, however, to the indefatigable M. Theodore de Saussure that we are indebted for by far the most complete and satisfactory series of experiments on the absorption of gases by charcoal.

The only kind of charcoal which Saussure employed in his experiments was that made from box wood. His mode of proceeding was to heat the charcoal to redness, to cool it under mercury, and to introduce it, when cold, into the gas he wished to examine. The table exhibits the amount of gas absorbed by a single volume of charcoal.

Ammonia	90°	Bicarburetted hydrogen	35°
Hydrochloric acid	85°	Carbonic oxide	94°
Sulphurous acid	65°	Oxygen	92°
Sulphuretted hydrogen	55°	Nitrogen	75°
Nitrous oxide	40°	Carburetted hydrogen	5°
Carbonic acid	25°	Hydrogen	17°

The absorption of these gases, which is complete in twenty-four hours, has nothing chemical in its nature, but is quite analogous to the peculiar attraction of liquids by very small tubes, usually called capillary attraction.

Saussure's experiments, as we have seen, having been all performed with one species of charcoal—

namely, that from box-wood—nothing was known of the comparative efficacy of other kinds of charcoal in the absorption of gases; I was, therefore, induced to make a few experiments on the subject. The kinds of charcoal which I employed were three in number. Firstly, ordinary wood-charcoal, as obtained from the pyroligneous acid manufacturer; secondly, peat charcoal; and, thirdly, animal charcoal. You will at once perceive from the results before you in a tabular form, that wood charcoal has rather the highest absorbent power for gaseous ammonia, sulphuretted hydrogen, and sulphurous acid.

Half-a-gramme (five decigrammes) of the following kinds of charcoal absorb the undermentioned number of centimetres of different gases.

	Ammonia	Hydrochloric acid	Sulphuretted hydrogen	Carbonic acid	Oxygen	Sulphurous acid
Wood	98.5	45.0	36.0	14.0	8	32.5
Peat	26.0	66.0	23.5	10.0	6	27.5
Animal	43.5	—	9.0	5.0	5	17.5

Animal charcoal is decidedly inferior to both wood and peat charcoal, as an absorber of gases and vapours; but, as a decoloriser, it is immensely superior to either of them.

Great efforts have been recently made, chiefly in Ireland however, to persuade the public into a belief of the superior efficacy of *peat* charcoal for sanitary purposes. A single glance at the table shews that this is not warranted by the fact, and

that peat charcoal is slightly inferior, as an absorbent, to ordinary wood charcoal. Notwithstanding this, however, I lately saw it ostentatiously announced in the newspapers, that thirty tons of peat charcoal had been sent to Scutari, for the use of the hospitals in Turkey, by the Irish Amelioration Society, who did not appear to be at all aware that wood charcoal is the ordinary fuel employed in Turkey and most other Eastern countries, where it can always be had of the best quality and in any quantity that may be desired.

This proceeding with regard to the peat charcoal reminds one of the old proverb of "carrying coals to Newcastle," though, unfortunately, it is but too much of a piece with most of our doings in regard to the hitherto ill-starred expedition to the Crimea.*

My attention was particularly drawn to the importance of charcoal as a deodorising and disinfecting agent, about eighteen months ago, by my friend, John Turnbull, Esq., chemical manufacturer, of Glasgow. Mr. Turnbull, about six months previously, had placed the bodies of two dogs in a wooden box, on a layer of charcoal powder of a few inches in depth, and covered them over with a quantity of the same material. Though the box was quite open, and kept in his laboratory, no effluvia was ever perceptible; and, on examining

* As the price of peat charcoal, however, is considerably less than that of wood charcoal, in some situations and for certain purposes, peat charcoal will be found the more economical of the two.

the bodies of the animals at the end of six months, they were found to be in a very advanced state of decay. Mr. Turnbull sent me a portion of the charcoal powder which had been most closely in contact with the bodies of the dogs. I submitted it for examination to one of my pupils, Mr. Turner, who found it contained comparatively little ammonia, not a trace of sulphuretted hydrogen, but very appreciable quantities of nitric and sulphuric acids, with acid phosphate of lime. Nearly eighteen months ago, I buried the bodies of a full-grown cat and two rats in about two inches of charcoal powder, and kept them ever since in my laboratory. During the whole of this time not the slightest odour has been perceptible, nor have any injurious effects been experienced by the eight or nine persons by whom the laboratory is daily frequented. On recently examining the state of the animals, I found that almost all the nitrogenous portions had disappeared, and that what remained consisted chiefly of bones and a portion of fat, and even this latter substance was in a state of rapid decay.

The putrefaction of animal and vegetable substances is, in general, a process of imperfect oxidation. Hence, under ordinary circumstances, when this is the case, a variety of more or less complex secondary products is formed, which usually possess very disagreeable odours, and exert exceedingly injurious effects upon the animal economy. For these substances the general name of miasmata has been given. Not much is known of their nature, but they are believed to be heavy,

complex, nitrogenated vapours, which are decomposed by oxygen, chlorine, sulphurous acid, nitric acid, and other disinfecting agents. From the experiments already detailed, it is evident that powdered charcoal, instead of retarding, hastens the decay of putrifying substances with which it is in contact. In all the modern systems of chemistry, however, such, for instance, as Professor Graham's, the last edition of Turner's Elements, &c., charcoal is described as possessing antiseptic properties, while, as has just been shewn, the very reverse is the fact.

Common salt, nitre, corrosive sublimate, arsenious acid, alcohol, camphor, creosote, and most essential oils, are certainly antiseptic substances, and therefore retard the decay of animal and vegetable matters; none of these, however, are oxidisers. Charcoal, on the contrary, from the considerable amount of condensed oxygen contained within its pores—amounting to between nine and ten volumes—not only absorbs, but rapidly oxidises the effluvia and miasmata emitted by decaying substances, and resolves them into the simplest combinations they are capable of forming—their carbon being converted into carbonic acid, and their hydrogen into water. The reason why antiseptic properties were until recently universally ascribed to charcoal, appears to have been simply this—that charcoal masks or conceals its operation by absorbing and oxidising the products evolved. Now, we have hitherto been accustomed to judge of the existence and progress of putrefaction by

the offensive effluvia evolved, and when we have missed these, we have been apt to imagine that decay has either been prevented or ceased to progress. This inference, though natural, is in such cases as those we have been considering, wholly fallacious. It is just as if wishing to know whether there were any fires in a house which we happened to see at a little distance, we were to look at the chimneys to observe if any of them smoked; and if we found that to be the case, we might safely conclude that there really were fires burning in the rooms; should the house, however, be furnished with Dr. Arnott's smokeless grates, or any other equally effective apparatus, if, were we still hastily to conclude that because we saw not a trace of smoke issuing from the chimneys that there could be no fires within the building, we should certainly arrive at a very erroneous conclusion indeed.

When putrefying animal and vegetable substances are covered with charcoal powder, the effluvia and miasmata which, under ordinary circumstances they would evolve directly into the atmosphere, are absorbed and oxidised within the pores of the charcoal, where they undergo a species of what is called low combustion, which as effectually destroys them as if they were at once passed through a furnace; it is, therefore, on its absorbing and oxidising power that the great efficiency of charcoal as a deodorising and disinfecting agent depends.

The porosity of charcoal is much greater than many persons are aware of. Liebig states, at page

132 of his "Letters on Chemistry," that "the pores in a cubic inch of beech-wood charcoal must at the lowest computation be equal to a surface of 100 square feet;" and several other experimenters have estimated the porosity of a cubic inch of charcoal at even more than double that amount.

Hence the extraordinary efficacy of charcoal in the absorption and oxidation of gases and vapours is most satisfactorily accounted for. The oxidating power of charcoal is easily demonstrated by an old experiment of Thenards. When some pieces of dry charcoal are introduced into sulphuretted hydrogen gas over mercury, the charcoal absorbs about fifty-five times its volume of the gas; the charcoal is then transferred into a jar of dry oxygen; in the course of a short time a tolerably energetic action ensues; the sulphuretted hydrogen is decomposed; heat is evolved; water is formed; and the whole of the sulphur is deposited within the pores of the charcoal.

All porous substances, such for instance as platinum black, pumice stone, &c., possess the power in common with charcoal of absorbing and condensing gases within their pores. Some of these, especially sponge platinum, are even much more powerful absorbants and oxidisers than charcoal. When, therefore, even a few grains of platinum black are thrown into a mixture of oxygen and hydrogen, the two gases are brought within the sphere of their mutual attractions, when they instantly combine with explosive violence.

Since, therefore, charcoal as we have seen is such

a powerful oxidiser, it is manifestly injudicious to incorporate it with manure, which is not to be immediately applied to the ground. For no sooner is the manure and charcoal in contact, than a species of low combustion ensues, and the manure is soon greatly deteriorated. Notwithstanding this very obvious objection, this is the very process which a Company, called the "Health of Towns' Improvement Institute," established in Dublin, is constantly recommending. They propose that the whole of the offal from Dublin and other large cities, instead of being run into the common sewers, as at present, should be collected and mixed with peat charcoal. To say nothing of the enormous expense of such a proceeding, the deterioration which the manure undergoes would of itself, in my opinion, be a serious if not a fatal objection to their scheme.

Now this alleged deterioration does not rest on hypothetical grounds merely, but is an ascertained fact. Some six or seven years ago, my friend, Mr. Turnbull, of Glasgow, who is not only an extensive charcoal and artificial manure manufacturer, but also largely engaged in agricultural pursuits, happened to mix up a quantity of charcoal powder with some excellent manure made by boiling down the flesh and bones of horses into a pulp, with oil of vitriol. After keeping the mixture for some months, Mr. Turnbull was surprised to find that it had diminished in weight, and had greatly deteriorated in value, and he asked me what I thought could be the cause of this. I told him I thought the charcoal had oxidated the manure, and that it

had undergone a species of low combustion, which, if long enough continued, would almost entirely destroy it.

When reflecting on the wonderful power of charcoal as a deodoriser and disinfectant, as exhibited in the cases already described, where, as we have seen, a layer of charcoal powder, not more than an inch in thickness, was capable of absorbing all the miasmata from such an extensive source of corruption as the putrid body of a large animal, it struck me that a thin layer of charcoal powder interposed between wire-gauze, would be equally effectual in preventing the noxious effects which too frequently result from the very minute quantity of putrid infectious matter floating in the air, of what are generally known as unhealthy situations.

These considerations led me to the construction of the so-called charcoal air-filter for the purification of the atmosphere, which was first publicly exhibited and described by me, at the meeting of the Society of Arts, on the 22nd of February, 1854.

Charcoal powder has, during many centuries, been advantageously employed as a filter for putrid water, the object in view being to deprive the water of numerous organic impurities diffused through it, which exert injurious effects on the animal economy.

It is certainly somewhat remarkable, that the very obvious application of a perfectly similar process to the still rarer fluid in which we live, namely, the air, which not unfrequently contains even more noxious organic impurities floating in it than those present in water, should have, up till within little

more than a year ago, been so unaccountably overlooked.

The charcoal air-filter consists of a thin layer of charcoal powder interposed between two sheets of wire-gauze, and can be readily applied to buildings, to ships, to the gully-holes of sewers, to respirators, and to various other purposes. One of these charcoal air-filters was fitted up in the justice-room of the Mansion-house, about three months ago, where it has ever since been in successful operation.

This room, as many of my hearers are probably aware, is ventilated from a very narrow street, containing a large urinal and several other nuisances, and was often so offensive as to have become the subject of general complaint. Since, however, it was furnished with a charcoal ventilator, through which all the air entering it was made to pass, the atmosphere of this apartment has become quite unexceptionable. As the most satisfactory proof of the successful operation of the air-filter at the Mansion-house, I need only state that within the last few weeks the City authorities have fitted up a similar apparatus in the Justice-room at Guildhall.

The utility of charcoal ventilators inserted into the framework of buildings, of ships, and in other situations where foul air is apt to accumulate, as in water-closets, in the close wards of hospitals, in the many back courts and mews, lanes of great cities, is, therefore, abundantly clear; all the impurities would, with such an arrangement, be absorbed and retained by the charcoal, and a current of pure air alone admitted into the apartment.

In this way pure air would be obtained from exceedingly impure sources.

Such an arrangement as this, carried out on a pretty large scale, would be especially useful to persons necessitated to live in pestiferous districts within the tropics, where the miasmata of ague, yellow fever, and similar diseases, are prevalent.

The proper amount of air required by houses in such situations might be admitted through sheets of wire-gauze, or coarse canvass, containing a thin layer of charcoal powder.

Under such circumstances, also, pillows stuffed with powdered charcoal, and bed-coverlets having the same material quilted into them, could not fail to prove highly beneficial.

A tolerably thick charcoal ventilator, such as I have just described, could be very advantageously applied to the gully-holes of our common sewers, and to the sinks in private dwellings, the foul water in both cases being carried into the drain by means of tolerably wide syphon-pipes, retaining always about a couple of inches of water.

Such an arrangement would effectually prevent the escape of any effluvia, would be easy of construction, and not likely to get soon out of order.

The air-filters, or charcoal ventilators, at the Mansion-house and Guildhall, are each of them several feet in diameter. The layer of charcoal is about an inch and a half in thickness, and consists of fragments from the size of a pea to that of a largish bean. The one at the Mansion-house, as previously stated, has been in operation three

months, and has never required any alteration, such as the renewal of the charcoal or otherwise.

[Models of charcoal-ventilators, as in use at the Mansion-house and Guildhall, constructed by Mr. W. B. Rooff, together with charcoal bandages for gangrenous and other foul wounds, manufactured by Messrs. Darby and Gosden, 140, Leadenhall Street, were then exhibited to the Meeting].

Before describing the charcoal respirators to which the air-filter has likewise been so successfully applied, perhaps the audience will pardon me while I enter into a few details respecting the history and construction of respirators in general.

Respirators are an older invention than is usually supposed. They were first proposed and pretty fully described by the late Dr. Beddoes of Bristol, in the fifth of his "Medical Essays or Hygeia" as early as the year 1802. Dr. Beddoes had remarked that travellers when ascending high mountains, such as those of Switzerland, were speedily attacked with a superficial inflammation of the face, eyes, and chest. This he ascribed to the action of the dry cold air at these great altitudes, which rapidly chills the skin and absorbs the moisture of the mucous surfaces. These injurious effects, Dr. Beddoes observes, may be almost entirely prevented by covering the face with several layers of crape, which effectually prevents the too rapid abstraction of heat and moisture. "It is obvious that the construction of these muzzles ought to vary according to the case. Each individual will soon find how many folds of whatever material he

may choose to employ will communicate heat and moisture enough to the air he breathes, without injury to the freedom of respiration." Persons not considerably affected, need only wear such a guard on first going abroad, provided they are on foot, and the weather be not too sharp. Walking soon communicates to the mucous surfaces, as well as to the skin, a degree of activity, during which the functions of the chest are more easily and pleasantly performed; and in this situation a cool atmosphere received directly into the lungs will not produce inconvenience. Of course, the muzzle may be discarded. It is obvious that the consumptive and the asthmatic will be enabled, by the same means, to indulge safely in air and exercise at times when otherwise they must debar themselves the use of both."

From these extracts, it is evident that Dr. Beddoes, so early as 1802, was perfectly aware of the mode of construction and operation of respirators.

Dr. Arnott informs me, that about seventeen or eighteen years ago, the principle and mode of constructing respirators were fully described by him in a lecture delivered in this very room; and a short time afterwards, a patent was taken out by Mr. Jeffreys for the manufacture of respirators.

Mr. Jeffreys' respirator consisted of a numerous series of narrow metallic tubes, through which the expired and inspired air was made to pass. The expired air communicated a portion of its heat to the metallic tubing, and in this way the temperature of the inspired air was considerably elevated.

Mr. Jeffreys is certainly entitled to the very great merit of having brought respirators into general use, and I believe their manufacture has long been to him a source of very considerable emolument. As constructed by Mr. Jeffreys, however, the respirators were both complicated and costly, their price for many years being about two guineas each. When one of these respirators is worn for some time, it not only readily condenses much of the superfluous moisture of the breath, which considerably impedes the free passage of the air, producing a strain upon the lungs, but the solid matter, more or less of which is always evolved from the lungs, condenses in the apparatus, and renders it exceedingly disagreeable, and occasionally positively injurious. That a considerable amount of solid organic matter is constantly given off from the lungs is easily shewn by a very simple experiment. You have only to breathe through a tube inserted into pure distilled water, and on setting it aside for a time in a warm place, it speedily becomes putrid, and is found to contain ammonia, clearly proving that solid nitrogenous matter had been evolved from the lungs. In certain cases, such as those of diseases of the lungs and throat, the amount of this animal matter is often greatly increased.

With regard to the charcoal respirators, my object in constructing these instruments was very different from what Mr. Jeffreys and other respirator makers had in view,—namely, merely to *warm* the air; my object being to *purify* the air

by filtration, and thereby deprive it of the noxious miasmata which, in unhealthy situations, it not unfrequently contains. This it effectually does by absorbing and oxidising them in the way already described. I found, however, that the charcoal respirators not only purified the air, but warmed it sufficiently, while they were free from several disadvantages to which ordinary respirators are incident.

There are three different forms of the charcoal respirator.

The first form is constructed for the mouth alone, and does not differ in appearance from an ordinary respirator, but is only half its weight, and about one-fifth of its price. The air is made to pass through a quarter of an inch of coarsely powdered charcoal, retained in its place by two sheets of silvered wire-gauze covered over with thin woollen cloth, by which means its temperature is greatly increased. This charcoal respirator possesses several advantages over the respirators ordinarily in use:—

1stly. Where the breath is at all fetid, which is usually the case in diseases of the chest, under many forms of dyspepsia, &c., the disagreeable effluvia are absorbed by the charcoal, so that comparatively pure air alone is inspired.

This, I think, may occasionally exert a beneficial influence on diseases of the throat and lungs.

2ndly. The charcoal respirator for the mouth alone will certainly prove highly useful in poisonous atmospheres, where miasmata abound, if the simple

precaution is only observed of inspiring the air by the mouth, and expiring it by the nostrils.

3rdly. The charcoal respirator is exceedingly easy to breathe through, as, owing to the non-conducting nature of the material of which it consists, it does not condense the moisture of the breath to an inconvenient extent.

The second form of respirator is ori-nasal—that is, embracing both the mouth and nose. It is only very slightly larger than the one already described, and does not cover the nose as the ordinary ori-nasal respirator does, but merely touches its lower extremity, to which it is adapted by means of a piece of flexible metal covered with soft leather. It is obvious, however, that a respirator might be easily constructed to cover the greater portion of the nose, without being particularly cumbersome. Such an arrangement would, under certain circumstances, be very advantageous; and, in fact, respirators on this principle have already been manufactured.

When this respirator is worn, no air enters the lungs without first passing through the charcoal, and any effluvia or miasmata contained in the atmosphere are absorbed and oxidised by the charcoal. This form of respirator, therefore, is peculiarly adapted for protecting the wearer against fevers and other infectious diseases.

The third form of the respirator is also ori-nasal, but is much larger, and therefore more cumbersome than the preceding variety.

It is intended chiefly for use in chemical works,

common sewers, &c., to protect the workmen from the noxious effects of the deleterious gases to which they are frequently exposed.

I think it but justice to myself to state, that I have no pecuniary interest in any of those respirators. Though strongly urged to do so, I refrained from securing them by patent, on the ground that inventions for the prevention of disease and death ought to be sold at the lowest possible price, and should not, therefore, be encumbered with the expense and restrictions attendant upon patent rights.

These respirators have been very successfully manufactured by Mr. W. B. Rooff, of 8, Willow-walk, Kentish-town.

I am aware that some persons who admit the deodorising properties of charcoal deny that it acts as a disinfectant. I would direct the attention of such individuals to some of the facts already detailed. Thus, for instance, we have seen that the bodies of pretty large animals, covered only with a couple of inches of charcoal, have been allowed during many months to putrify both in Mr. Turnbull's laboratory and in my own.

Now, had the bodies of these animals been left to decay under ordinary circumstances, not only would the stench emitted have been intolerable, but some of the persons by whom these laboratories were constantly frequented would certainly have been struck down by fever or other malignant disorders. During the last twelve months, charcoal powder has repeatedly been most successfully employed both at St. Mary's and at St. Bartho-

lomew's Hospitals, to arrest the progress of gangrene and other putrid sores.

In the instance of Hospital gangrene, we have to deal not only with effluvia, but also with real miasmata; for, as is well known, the poisonous gases emitted by gangrenous sores not only *affect* the individual with whom the mischief has originated, but readily *infect* the perfectly healthy wounds of any persons who may happen to be in its vicinity. So that in this way gangrene has been known to spread not only through one ward, but through several wards of the same hospital.

In fact there is every reason to believe that many sick persons die not from the direct effects of the disease under which they labour, but they are actually poisoned by the putrid exhalations evolved from their own diseased bodies and those of other parties in their vicinity.

This is especially the case in over-crowded military hospitals, where dysentery, cholera, and similar diseases prevail. In such circumstances the importance of employing some means of absorbing and destroying miasmata is so self-evident, that I think it quite unnecessary to dilate upon the subject.

A short time ago I met with a passage in a recently published work, "*Parkyn's Residence in Abyssinia*," where it is stated that "the natives of that country, in very unhealthy districts, are accustomed before lying down to sleep, to wrap a coarse woollen cloth round the mouth and nostrils, which

acts like a respirator, and to a certain extent prevents the inhalation of miasmata."

Here, therefore, we have an example of an attempt to purify the air by filtration, a very imperfect attempt I admit, but one which I think strongly corroborates the views which I have this evening been endeavouring to enforce.

For a considerable time past, the dissecting-room at St. Bartholomew's Hospital has been thoroughly deodorised, by means of a few trays filled with a thin layer of freshly heated wood charcoal.—A similar arrangement will, in all probability, be likewise soon applied to the wards of St. Bartholomew's, and every other well conducted hospital.*

The efficiency of the charcoal, may be greatly increased, by making it red-hot before using it.—This can easily be done, by heating it in an iron saucepan, covered by an iron lid.—When the charcoal is to be applied to inflammable substances, such as wooden floors &c., of course it must be allowed to cool in close vessels before being used.

From the statements that have already been made, the utility of charcoal powder, as a means of preventing noxious effluvia from churchyards, and from dead bodies in other situations, such as on board ship, is sufficiently evident.

Covering a churchyard or burial vault to the depth of from two to three inches with coarsely

* I have not mentioned the charcoal cataplasm, the "*cataplasma carbonis*" in the text, both because it is so well known, having been so long inserted in the pharmacopoeia, but chiefly owing to the efficiency of the charcoal in this preparation being greatly impaired by its being saturated with moisture, by which its absorbent power is greatly diminished.

powdered charcoal, would effectually prevent any putrid exhalations ever finding their way into the atmosphere. Powdered charcoal should likewise be introduced into all coffins, as it not only favours the decomposition of dead bodies, but prevents them from being injurious to the living.

I was not aware till very recently, that Mr. Jasper Rogers, C.E. of Dublin, had proposed a similar application of peat charcoal, some four or five years ago. Mr. Jasper Rogers' object, was not merely to prevent the escape of effluvia, but to retard the decomposition of the bodies, by means of the supposed antiseptic properties of charcoal. I have also recently learned that the celebrated surgeon, Mr. Ferguson, of King's College, had, about four years ago, successfully applied powdered charcoal as a disinfectant both to cases of gangrene and to purify the wards of the hospital attached to that establishment.

Had I been aware of these facts I should certainly have mentioned them in the paper which I read before the Society of Arts about a twelve-month ago, and I now gladly avail myself of the first opportunity which has presented itself of doing these gentlemen all the justice in my power.

In addition to the cases I have already described, in which charcoal respirators cannot fail to prove eminently useful, I may mention a few others.

For instance, charcoal respirators would entirely prevent the so-called painter's cholic, which usually terminates in paralysis of the extremities. These diseases are produced in house-painters by the ab-

sorption of the oxide of lead which is carried up in vapour by the turpentine with which such pigments are mixed.

In those large casemated batteries with three or four tiers of guns, it is well known that after the first two or three volleys the gunners are almost suffocated with the dense fumes of sulphide of potassium, of which the white smoke of gunpowder consists; were they furnished with respirators, however, and especially if a circulation of air was kept up by means of a blowing apparatus, I have little doubt but that they might maintain their fire from morning till night with scarcely any inconvenience.

As is well known, there exists in India a belt of pre-eminently unhealthy country of from forty to eighty miles in breadth, which extends along the base of the Himalaya and Nielgherry Hills. This belt of country, which is situated where the moisture of the hills comes in contact with the heat of the plains, is covered with the most luxuriant tropical vegetation. During nine months of the year it is so exceedingly unhealthy from the exhalations evolved from putrifying vegetable matter that it cannot be traversed without the most eminent risk. For this reason the communication between Upper and Lower India is seriously interrupted during a considerable portion of the year. Were the parties traversing these and similar districts (such as the Delta of the Niger, and many other localities), furnished with charcoal respirators, I confidently believe they would be enabled to travel through these regions with comparative impunity.

The reception of the charcoal respirators by the public has been remarkably favourable, several thousands having already been sold in the course of the last six months.

A few days ago, during an interview which I had with Dr. Sutherland, who has just gone out as chief medical inspector to Scutari and Balaklava; that gentleman informed me, that so strongly was he convinced of the utility of charcoal respirators, that he had memorialised Government to allow him to take out 500. Dr. Sutherland's request was met with the usual stereotyped official reply, "that respirators did not belong to his department." Dr. Sutherland was, therefore, obliged to content himself with taking out a single dozen for the use of himself and his brother inspectors.

It is evident that no experiments as to the efficiency of respirators can be deemed at all satisfactory unless made on a very considerable scale. In order, therefore, to ensure their speedy adoption, I have prevailed upon Mr. Rooff to offer to supply the Government with the use of 1000 respirators for six months for somewhat less than £90.

A similar offer will speedily be made to the French and Austrian governments by whom, I think, it highly probable it will be accepted; I must confess, however, that I should be rather sorry that an invention, originating in Great Britain, should first be extensively applied by any of the continental governments.

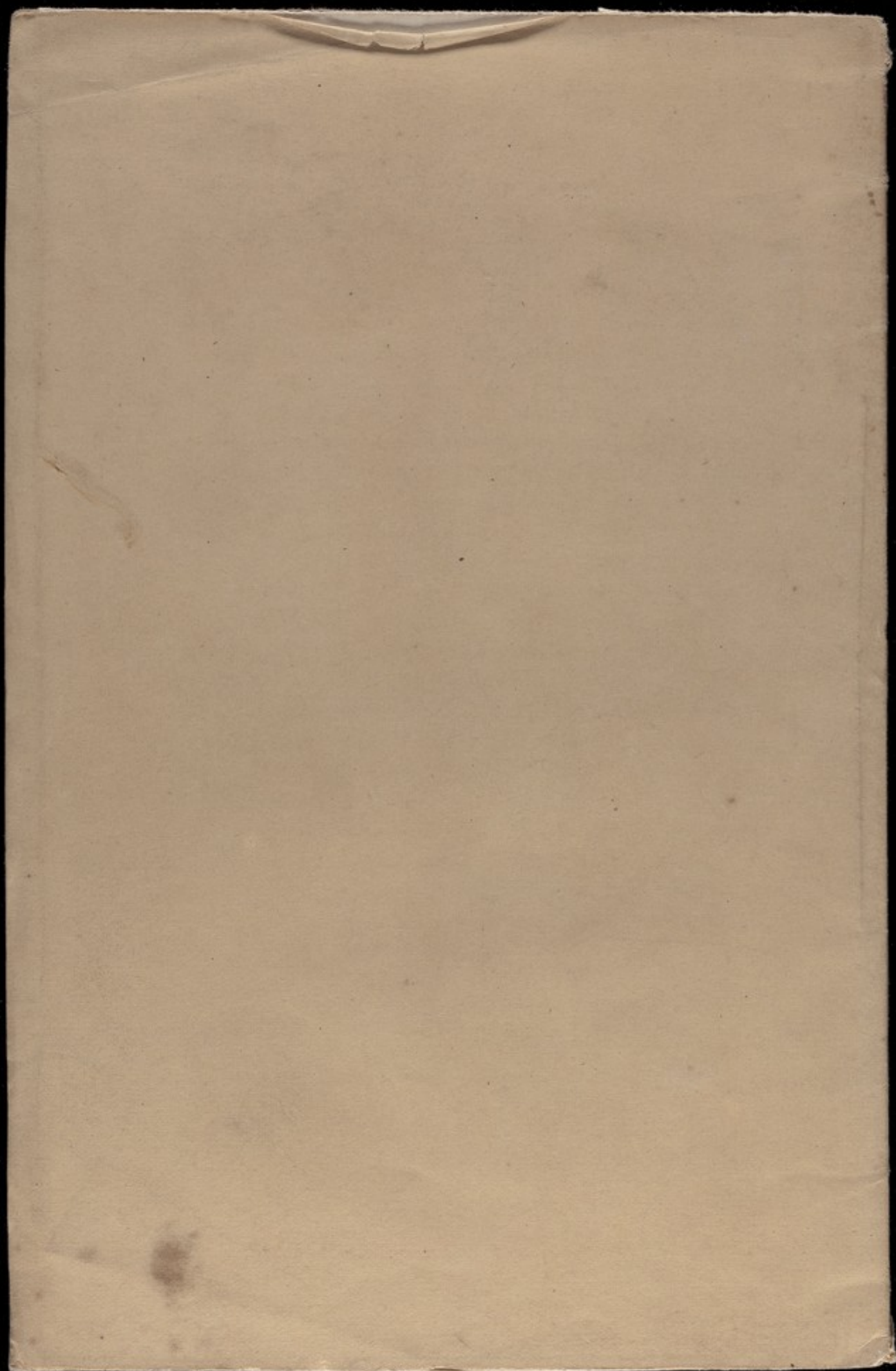
If our soldiers and sailors, when placed in unhealthy situations, were furnished with charcoal

respirators, and if the floors of their tents, and the lower decks of ships, were covered by a thin layer of freshly-burnt wood-charcoal, I think we should have little in future to apprehend from the ravages of cholera, yellow-fever, and similar diseases by which our forces have been, of late, so cruelly decimated. If found more convenient, the charcoal powder might be covered with coarse canvas, without its disinfectant properties being materially injured.

In conclusion, I would confidently hope that the time is now nearly come, when the propagation of disease by infection shall become the exception, and not the rule; when the most nervous and delicate persons will be enabled to attend unharmed on their friends, labouring under even the most malignant infectious disorders; and when we will be enabled to traverse some of the most pestiferous districts of the world, with no greater apprehension than we now would pass through the mews, lanes, and alleys of our densely-peopled and ill-ventilated cities.

[At the close of the Lecture the earthenware pans containing the bodies of the animals, covered with about two inches of charcoal powder, from which not the slightest odour was perceptible, were exhibited to the audience.]

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INTRODUCTORY LECTURE

ON

'CLIMATE.'

BY

ARCHIBALD WILLIAM PULTENEY PINKERTON, M.D.,
EDINBURGH.

LATE STAFF ASSISTANT SURGEON; LATE CLINICAL RESIDENT CLERK ROYAL INFIRMARY,
AND EX-PRESIDENT ROYAL MEDICAL SOCIETY, EDINBURGH; LATE HON.
SECRETARY PARISIAN MEDICAL SOCIETY; ONE OF THE PHYSICIANS
TO THE NEW TOWN DISPENSARY.

DELIVERED AT THE MEDICAL SCHOOL, SURGEONS' HALL,
EDINBURGH,

MAY 28, 1857.

EDINBURGH: SUTHERLAND AND KNOX.

—
MDCCCLVII.

W. & P. Crompton

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TO
WILLIAM PULTENEY ALISON, M.D., EDIN.,
D.C.L., OXON.; F.R.C.P.E.; HON. F.R.C.P.S.;

FIRST PHYSICIAN TO HER MAJESTY FOR SCOTLAND; EMERITUS PROFESSOR OF
PRACTICE OF MEDICINE, UNIVERSITY OF EDIN., ETC., ETC., ETC.,

AS A SLIGHT TOKEN
OF THE
RESPECT, ADMIRATION, AND AFFECTION
OF A
NEPHEW.

The following Lecture is the first of a series on the Effect of Climate on Health and Disease, and Hygiene, which I purpose giving this summer. The importance of the subject, and its bearing directly on Sanatory Measures at home, must be evident to every one who is acquainted with disease.

A. W. P. P.

44, HERIOT ROW, EDINBURGH,
May 28, 1857.

LECTURE ON 'CLIMATE.'

GENTLEMEN,—In coming before you to-day, I would not have you suppose that I intend to lecture or to teach as one who is possessed of consummate wisdom. What I would do, is merely to call your attention to facts relative to Climate which otherwise might not have been presented to you, and to endeavour to show you the real influence of change in health and disease.

My experience is slight, but it has been reaped in various parts; it has been forced upon me often by having to act altogether on my own resources and responsibility. And this has been gained, too, at the sacrifice of several who, had they lived, might now have been teaching you far more ably than I ever can.¹ With them, who now lie in the grave far away from home, I have, only a few short years ago, sat on those very benches listening to him who taught so ably, who, for the honour of this school, and for our advancement, sacrificed himself. And though he now sleeps by the banks of the Belbec, still does he live enshrined in the hearts and memories of those who had the happiness of calling him their friend, or who had the honour of styling themselves his pupils.²

¹ Drs Alexander Struthers and Edmond S. Wason, who died within a few days of one another from Fever contracted in Scutari, during their devoted attendance on the sick.

Others, too, have passed away in other climes.—Drs David Keith, Alexander Brown, A. Thomson.

² R. Mackenzie, M.D., Lecturer on Surgery in this School, went out to the East in the disinterested pursuit of knowledge. He died of cholera after the Alma, at which battle he had exerted himself so much as to have been noticed by the Commander, and cheered by the men. He lies on the banks of the Belbec, where a neat cross has been raised by the officers and soldiers of the 79th Highlanders, with whom he did duty.

The subject I have chosen is too extensive for a short course of lectures. It is so diversified, that it will be impossible to do anything more than merely glance at the leading features.

Few data are yet given whereon to speculate; but what we do already know, we may use as an aid in gaining more information. And if I do so fix on your memories a few general statements relative to climate and to Sanatory Measures, that you will in future carry out the study and find facts for yourselves, my object will be accomplished. To study the laws whereby nature regulates disease, whereby man brings maladies on his own head by wilful neglect, whereby pestilence arises and cuts off more than the sword, is not only a branch of our profession, but one which is most intimately connected with our improvement as a civilized nation. With his thermometer and hygrometer, one may in a few months, in any one place, obtain facts by which to explain some yet unsolved mystery. We may never be able to say why epidemics rage for a time and die away, but we may ascertain what increases the malady when once it does appear, and so we may prevent much misery. 'When,' says Dr Alison, 'the course and effects of a disease are beyond our power, we may still, by a simple induction of facts, ascertain its external causes; and if this knowledge of the laws of nature is allowed the influence which it ought to have on the council of nations, we may be fully justified in asserting, that we do more for the prevention of sickness and suffering among mankind, by studying the mode of propagation of these diseases, even so far as yet known, and giving that advice by which they may be shunned, than we should do by the discovery of a new remedy, more powerful than any that is known in medicine.'¹

The subject before us is a branch of Hygiene.—By limiting the term to climate, I would signify that the most important point to be taken up at present is the relation between climate and mankind. To understand clearly how climate acts on

¹ The exciting causes of Epidemics.—*British and Foreign Medical Review*, Jan. 7, 1854.

disease as well as on health—to see how climates differ, and from what causes, we must first have a clear perception of Physical Geography—we must study the features of every country, the state of the atmosphere, the winds, position of mountains, of swamps, and of forests. It will be our endeavour, in the ensuing lectures, to show the value of Humboldt's system of Isothermal, Isothermal, and Isochimal lines. We will thus see that Scotland has a mean annual (50°) equal to that of the Crimea and New York. These two places have most intensely cold winters and burning summers, while we enjoy a much more equable temperature. I have known the thermometer during the day, in the Crimea, as low as—5°, when it was absolutely painful to stand outside; and I have known it so hot, that the men could hardly bear up against it. We will find that the reason why we enjoy such equability of temperature, compared with these two places, is, because we are insular, and they continental. The isotherm of 40° runs through St Petersburg, through Sweden and Norway, up to Iceland, and then descends to Newfoundland.

Again, the surface of the earth must be considered. Looking at a physical map of Europe, one sees at once what an extent of green waste, and steppes, and rivers abound away to the east, while the mountains are all congregating towards the south. From this we see why the east wind of our shores is so raw and annoying. Every continental wind is more or less irritating, every sea breeze refreshing. Continents lessen the temperature, as is seen in the isotherms falling so decidedly in the northern hemisphere, and running almost parallel in the southern.

All these facts must be understood, to see thoroughly how disease originates, and why it spreads. Though every continent differs, and even varies in the form of disease common to it, still there runs a similarity through all, a grouping into two or three leading types.

And, as a branch of this search after disease, comes our attention to Sanatory Measures. It is useless to try to miti-

gate maladies abroad, if we do not look closely into our own streets and lanes at home. The facts already revealed as occurring in our large towns—our literally allowing thousands of fellow-creatures, who know no better, to wallow in the mire, and to inhale poison at every breath—are revolting. Much has been done to alleviate the poor, but very much remains still to be accomplished. And it is only by studying carefully and methodically the causes of disease, and the agents of its propagation, that we can understand how important it is to allow no such conditions, in towns or elsewhere, as we know now to be certain forerunners of disease.

If we can study some of the facts already given, we may improve not only ourselves and the places in which we reside, but we may do material good to the nation at large.

To-day, I will direct your attention to one of the most important points—the good to be derived by sending invalids abroad. And, to see how this is founded on rational grounds, the varieties of climate must first be mentioned.

Hot and cold climates are the general terms, with the temperature as intermediate. Other conditions are necessary for health, however; and a better division will be *moist* and *dry*. A *moist* climate, cold or hot, is to be found everywhere that civilization has extended. This form is most general. The moisture of these temperate regions need not be exemplified. The chilly fogs of an easterly wind are well known, caused by the passage of air over the Norwegian mountains and the low-lying swamps and forests of Central Europe. The more genial S.W. and W. breezes of our shores are carried hither from a pure marine place of origin, on the breast of a current of water 10° warmer than those of the ocean itself. They are warm and moist, differing in effect, as all know, from the chilly N.E. and E.

A *dry* climate, hot or cold, is more rare. Within the tropics, a continent will cause a dry air, in contradistinction to a moist sea atmosphere. But in these cool regions, where evaporation is slow and vegetation constant, a thoroughly dry

climate cannot be obtained. Africa, Arabia, some parts of India and Australia, and Peru, are the driest we can name. The great African desert extends its drying influences to Algeria and Egypt, while these two continental sites are open on the north to an extent of water, which of itself is several degrees warmer than the Atlantic. In general, a dry climate must be sought for on a continent, and in warm latitudes. A wind blowing across a dry open warm country, unless very strong and irritating, will be much more beneficial to healthy, as well as to delicate constitutions, than one coming over the bleak damp soil of these central European districts. And this is proved by the decrease of consumption in India among men who are predisposed to it, and whose brothers and sisters die here. In both cases, continental winds occur; in the one, producing disease, in the other, apparently arresting the same.

Climates, then, are dry or moist, or more properly, '*Continental*' and '*Littoral*.' A continental differs from a littoral in the latter's position near the sea, and its influences. Madrid is a continental climate; Malaga, on the coast just above Gibraltar, a littoral one. Malaga does not suffer from the intense heats or chills of Madrid, because the sea equalizes the temperature. Continental places are called '*extremes*,' and we may term the littoral '*equable*.' To these two a third may be added, more properly as a subdivision of the last. The '*Insular*' climate possesses many of the advantages of the sea coast without the land influences, and wants many of the more exciting effects of the proximity of table land or mountain. Madeira, for instance, is '*equable*;' but it is different from a littoral site, such as Lisbon or Cadiz. The only land influence felt there is during the prevalence of the '*Leste*,' which blows from the coast of Africa. Malta, again, approaches more to the '*littoral*' character; for it is more dry than most sea stations, being surrounded by *arid* hot continents, and a sea whose heat is higher than that of the ocean. The Mediterranean, in fact, requires to be considered, in a medical view, more a lake than a sea. It has

few oceanic properties. It is hemmed in by hot lands, and is exposed to a scorching sun, with very little and very gradual change of surface water.

These climates—continental, littoral, and insular—are affected by position, by exposure to the sea, east or west, by proximity of mountain ranges, and by the Gulf Stream. Hence we find the west of Europe warmer than the east of North America; the west coast of the latter continent is warmer than the east; the east shores of South America, again, are warmer than the west.

The Atlantic raises the temperature; the continent of Europe depresses it. And these have their influences on any one spot. The same degree of latitude does not cause the same heat. The position of an island will often give a raised mean winter temperature, although the summer be not very hot. The Faroe Islands have a higher mean winter temperature than Paris; Penzance, Gosport, Cherbourg, the most rainy spots in these regions, have a mean winter temperature only 2° below that of Florence or Montpellier. Dublin has a mean winter temperature of 40°; Pesth, a central continental town, only 28°.

Thus position, altogether regardless of latitude, influences the temperature of any one place; and though the summer heat be great, as in Paris, the winter cold may be extreme, and consequently the annual variation of temperature very large. Paris is a continental or extreme climate. It has intensely hot summers, and winters which present a lower temperature than Stromness in the north; the same with St Petersburg, and all places surrounded by land. Sea air is the equaliser; and, though it does not produce so much heat in summer, it prevents the winter cold from falling low.

These terms apply to climate geographically. As far as regards influence on man, they may be styled more appropriately 'relaxing' and 'exciting'; for wherever heat and moisture are combined, then a degree of relaxing effect is always perceptible on the healthy man. And more particularly is this observed on

the sea-shore, where shelter from the north and east is obtained. 'Exciting' climates are those dry and hot, or dry and cold. They possess a similar influence as is exerted by the clear frost of winter, although in a modified form; they elevate the spirits and invigorate the body. Wherever one goes, whether it be to warm or cold countries, various winds will always be met with which cause considerable uneasiness. Here, the east wind is very trying to many. In Spain, the winds from the Pyrenees and Provence, the 'Khamsin' in Egypt, the 'Harmattan,' and many more, all irritate and annoy. But these need not be much feared in winter; and in summer no one need remain in their neighbourhood.

As regards invalids, *soothing* and *bracing* climates may take the place of 'relaxing' and 'exciting'; for, as we shall shortly see, what is *relaxing* to the strong may be most beneficially *soothing* to the invalid.

Taking, then, in a medical view, the titles last used, we have the dry or 'bracing,' and the moist or 'soothing,' forms of climate. There are several places here which answer some patients, but they would do much better abroad. If they do good under the influence of a cool moisture, milder than where they first contracted disease, it seems highly probable that they would have benefited much more by still further change. Ventnor, Torquay, Hastings, the south coast, generally are all more or less soothing to those who suffer in the interior. The climate in the south of England is perceptibly milder than here or in the central districts, and invalids *do* derive some benefit by going to these places; but the position is nothing at all to be compared with those further south. The Isle of Wight is certainly a most enticing spot for the invalid; Ventnor, and Bonchurch, and Shanklin, all present much to interest and amuse. Considerable good is there gained. But this 'Garden of England' will not compare with Madeira; and those who can go abroad had far better go at once, than lose much valuable time in 'trying' new watering-places at home.

Bournemouth should, from its soil and situation, be more exciting—more akin to Clifton, which is one of the mildest and driest places in England.

Abroad, Madeira ranks first among the more soothing places, where irritation is subdued. Rome, Naples, Lisbon, Cadiz, Pau, Montpellier—all are more or less of the same stamp.

Malaga, Gibraltar, Malta, the Ionian Islands, Algeria, Egypt, are all of the exciting kind. They are more dry than the first mentioned, because they are not exposed to a broad sheet of water like Madeira, or to the influence of mountain chains like Rome.

Algeria and Egypt enjoy the advantage of a dry warm continent, which tends to keep up both the heat and the dryness of their atmosphere.

It would be impossible to name all the resorts which exist. In South America, Valparaiso, Rio Janeiro, Peru, all present some aspect favourable for some diseases. Canada, Australia, New Zealand, and the Cape of Good Hope, offer many advantages to those who are delicate; and all these places are more dry than moist—more of the littoral than of the insular type of climate. New Zealand seems to exert a most healthful influence over the troops. There, the mortality per 1000 is only 8; in Newfoundland it is only 9,—far less than is found in warmer places, or even at home.

The atmosphere has an effect on our constitutions more or less marked in individual instances. This is produced probably in some one particular season, and very often always at its recurrence. Spring and Autumn are our two most noxious seasons; and this bad effect is rendered more distressing to invalids, as well as persons in health, by the prevalence of east winds. The mortality, in cases of phthisis, rises during the easterly and north-east winds, falling during the west and south-west. This phenomenon is one of the many for us to investigate. It proves to us, under our own eyes and in our own country, the destroying influences which winds or currents of air obtain by being trans-

ported across continents; while the health-giving, genial, westerly breezes, coming fresh and pure from the waters of the ocean, tend to invigorate the weak and refresh the strong.

Again, it is well known to all how bracing a clear frost is, compared to a humid, hot, sultry summer's day—how very different the keen sensations produced by the former, are from the languid, prostrating effects of the latter. Every one has also observed how much less nutrition is required during heat—how much less call there is for anything beyond merely supporting nature. And in the hot weather, the difference between a sultry damp day and a clear sunshine, is too well known to detain us.

The constitution of a healthy person, in these latitudes, is strong enough for all that nature demands: the great source of want in these cool regions is the supply of animal heat from within. Hence every organ is taxed to contribute towards the maintenance of this. The carbonaceous elements of food have to be properly and thoroughly prepared for the oxidation in the lungs, and these last have a large amount of impurities to throw off.

The direct effect of change to a tropical region, on such a constitution, is the *less necessity for animal heat being generated within the body*. Hence the chylipoietic and the pulmonary organs, and the system generally, are not taxed such as they were here. The whole tone of the system becomes 'asthenic': it is lowered in vital energy. The flow of animal spirits, exuberant health, and capacious appetite of our agriculturist, will be changed to the pale, sallow complexion, and his whole system will be rendered languid. In such a condition, health is enjoyed; it by no means follows that this is lost. At first, the man may suffer; but, by prudence and acclimatization, he may have such a degree of health as is all that is requisite for his less active life.

The influence of the external air yielding a partial supply of heat, together with the enjoyable state of existence that one only knows in the sunny south, is to render one less alive to the pleasures of gastronomy. The stomach revolts at unnecessary

food: the system suffers. Hence condiments are used, and *they* cause more disease than the climate. Why men will not follow nature's example, and live accordingly, is strange. The Indian enjoys health, and possesses much strength, by living on rice! And why may not an European live as well on the same? Why does an Englishman carry about his dining luxuries and customs everywhere he goes? It is impossible to say; but it is possible to lay down as a fact, that such habits kill, and that most certainly. Heat being supplied externally, less elimination of carbon will be requisite; less appetite, less desire for food, loathing at satiety, feverishness or derangement afterwards, will be experienced. It is fallacious to fancy that the hepatic secretion need necessarily be increased in hot climates. Dr Morehead tells us that, in 'Europeans whose habits of living have become adapted to the climate,' biliary derangements are very rarely seen. It is only when nature is overtaxed by external stimulants that such occur. In the hot latitudes the body is quiescent, secretion and excretion are in less active play, every organ loses activity; the atmosphere supports the system, dispensing with the very conditions that a frigid air would absolutely require. The negro requires no oil, the food of the Greenlander.

The influence of *cold* air on a person accustomed to hot climes is that of enforcing more activity in all the textures, of exciting the heat-giving organs to more energetic secretion. The system, feeling the demand, of course enables one to live more freely than he had done before; but if his system be too asthenic, if the tax on his lungs be too great, then phthisis, or some malady more acute, finds a ready victim. The hepatic and pulmonary organs are both engaged in this heat-giving work. And they suffer by change, which involves difference of external warmth, giving rise to what have been styled the 'carbonaceous' and 'oxygenous' diseases.

These two forms of climate—the hot requiring a depression, a more languid state of the system, the cold enforcing a more active organic life—are the extremes. Between these are many

forms that have less marked effects, but still most decided, on the invalid. In these, dryness and moisture are very important. One place, with the same heat as Great Britain, may be more dry or moist. And the action of the one differs much from that of the latter. While the one renders languid and prostrate the healthy man, the other may brace up and invigorate him. Moisture and heat are more inimical to health than cold and dryness. And in tropical countries, when these two former are combined with decaying vegetable matter, disease of every form appears. *Cold and dry air is inimical to disease.* In the northern states, the mortality of the troops is much less than among those stationed at Florida. Chest complaints are more numerous among our men at Bermuda than in Canada; while in Newfoundland the mortality among the English soldiers is only 9 per 1000, just above that of Australia and New Zealand. Newfoundland is cold and foggy; but the mists come from the sea, not from the Continent.

The hot and moist atmospheres tend to languid circulation, slow respiration, and, consequently, less nutrition. The hot and dry climates, though they do require less nutrition, may still be more exciting by mere mental sympathy, or by bracing the system; and hence different constitutions will suffer more or less, according as they are situated; for, as there are different climates, so are there varying constitutions; and what will render one perfectly useless, may develop another's physical frame and mental acquirements. The constitution is so varied, that some can withstand, and even enjoy health under, what will be instant death, or at least certain disease, to his neighbour. In China, near one of our stations, five Englishmen built separate houses in a ravine. Within a few months, four were laid in the grave, while the fifth escaped. Change of air induces disease of the type common to the country. Why cholera seems so much of a continental disease, while fever of some form attacks both islands and continents, is not for us to explain. But it seems evident that civilization has changed the type of disease, independently of the change of constitution which goes on in

the same within any given number of years. We know that on a dry soil, hot and tropical, continued fever may abound, and cause very few deaths, while remittent and intermittent fevers are much more deadly, and are found in new places, uncultivated and uninhabited. In Canada, it is observed that typhus abounds in the old stations, while intermittents are met with in the new. In the expedition to Burmah, out of 600 men, 328 were seized with fever—219 intermittent, and only 4 continued. In the same body of men, at Calcutta, during the hot dry months, 209 cases of fever occurred—34 intermittent, and 173 continued.¹ It would appear that at first we must lose largely, and that as our constitutions become acclimatized, and as improvements are carried forward, we may expect a decrease of mortality. In some places, very little hope can as yet be entertained. In Sierra Leone, we lost two-thirds of our white force within one year; and still the same deadly influence is exerted.

It is well known how a body of men suffer when sent to the East or West Indies—how an army going to a new field of action is affected. Every nation, during warfare, loses more men by disease than by the sword. It matters little where the men are sent to, the result is always the same. And though, in tropical or extreme countries, man does suffer from the change, still there are many intermediate climates in which a healthy European enjoys health, and where a delicate constitution may become strong. Australia, New Zealand, and Canada, are places where any one not absolutely diseased may do so. They are much the same as Great Britain in many respects; and though, ere long, all our diseases, endemic and epidemic, will find their way thither, still one does not lose health as he does in India or West Africa. And in these places it will be found, on more minute examination, that the drier the soil and atmosphere, the more beneficial will the situation be.

Soothing and bracing climates are what invalids require, according to their several constitutions. We have seen that hot

¹ Dr Murchison, Climate of Burmah.

and moist atmospheres are not favourable to health, on account of their rendering the system languid and unfit for active life. In the invalid, this change will be beneficial, if properly applied, just as a dry and hot or cold atmosphere will, by its more exciting qualities, influence another set of patients.

Diseases such as atonic dyspepsia, asthma, and such as involve no structural change, will do good in any climate, provided the constitution be taken into account, and a suitable selection made. In those where organic lesions have occurred, much greater responsibility lies on the physician, and less chance of benefit to be conferred on the patient.

But to the question, as to whether or not change of climate is useful in disease, I think we can safely answer in the affirmative, that many patients do enjoy prolonged life and more comfortable circumstances abroad, in warmer places, than at home. From what I have personally witnessed there among invalids of both sexes, and of all ranks and conditions and ages, I am perfectly satisfied of the efficacy of change of climate, if properly recommended; for all depends on this. Great wrong has been done to what nature and reason both point out as a curative measure, by patients being *all*, of whatever disease, *sent to one place*, and also by their being exiled from home when disease *has left no shadow of hope*. These are two errors, only to be corrected by a more careful study of what conditions are necessary for success. Though Madeira does good to many, and enables them to spend comfortably their years of affliction, and even restores some to almost complete health, still many have died there, and several receive no benefit. This is not the fault of the climate; it is owing to the two errors just pointed out. Many do well in drier places, such as Malta, while the reverse holds good also. I have known patients enjoying health in Madeira, who could not exist in Malta. I have seen others, who, the moment they left Madeira and came to the Mediterranean, were freed from many troublesome symptoms. I have known men who, by living in a hot climate, alternately with going a sea voyage for six weeks,

enjoy such health as rendered them quite comfortable, and able to join in worldly pursuits. If all were sent to Madeira, no wonder many would die, several receive no benefit, and a few recover; hence it is that the opprobrium of the "Englishman's Grave" has been bestowed on Madeira, an island that perhaps is excelled by no other, in whatever latitude, for beauty and diversity of scenery.

Patients are often sent out *too late*, when all hope is gone. I have known patients sent out die within the first week. I have seen invalids come out with extensive disease of the chest and larynx, unable for any fatigue, sensible to the slightest change of heat, and incapable of any mental effort. These die, and consequently the climate or the place gets into bad repute. If there be anything more heart-rending than another, it is to witness a poor invalid come to one of those resorts, buoyed up by vain expectations; mix, it may be, with many of the amusements during the first few weeks, while the constitution is temporarily supported by the warm and genial air; and then, perhaps suddenly, perhaps for weeks, laid aside to languish and to droop, with perchance no one to comfort him. Far away from home, surrounded by strangers, he feels the hand of death coming slowly on him; and he sighs for, he mourns in agony over, the happy land he now shall see no more. Do not on any account, or for any consideration, ever advise any one whose constitution is thoroughly shattered, whose system is deluged with scrofula, and whose chest may be one mass of disease, to go from home. The chances are all against him. And even though he were to gain a month by doing so, is it not far less cruel to allow him to die happily among his friends, than miserably abroad? Besides all which considerations, the true and good effect of change would tell among those who have *some* chance, and would help to remove the opprobrium under which a useful remedy at present lies.

From the effect produced on the body by change to a warmer place, it follows that all the organs will have less to secrete, that the carbon-eliminating and elaborating textures will have much

less to perform, the heat of the body being partially sustained by the external air. Hence the respiration will be less laboured, the necessity for quick breathing done away with, and a warm air will impregnate the lungs, instead of a damp foggy atmosphere.

All diseases in which change can be recommended will be chronic. Functional disorders require change of scene and amusement more than change of air. Heart affections from functional derangement, atonic dyspepsia, anæmia, and others of the same class, are so benefited. In these, some failure of vital energy exists; there must be a low tone in the system, whether preceded by nervous despondency, or inefficient nutrition. In others, irritability of some one function will be present—palpitation, dyspnoea, anorexia, or want of control over the mental emotions. In all, change is to be recommended. The effect on the respiration and circulation will differ in hot moist situations where a soothing influence will be exerted, from the bracing up of the hot and dry atmosphere. In bronchial and bronchitic irritation, soothing air will benefit greatly; while, in some relaxed forms of mucous membrane, where stimulants are more called for, the bracing dry atmosphere will have a more healing influence. These diseases must be judged of by their causes—local or constitutional—and treated accordingly. Climate, when it acts on the diseased frame, acts generally as well as locally; and it must be used just as we employ any other constitutional remedies.

In the atonic form of dyspepsia, where the stomach has lost tone and vigour, and when constitutional stimulants are called for, a dry warm climate does good. Dr Francis remarked that on the coast of Brittany, and in the Channel Islands, which, from their position, are damp, atonic dyspepsia is very common. The inhabitants are vegetarians, with the addition of oil as a luxury. In Murcia, which is dry and warm, the Spaniard feeds on lettuce and large quantities of oil, and suffers from no form of indigestion whatsoever. In Valencia, which is also hot and drier than the west coast of France, he (Dr Francis) has often

seen 'the wiry active muleteers make a mid-day meal of a lump of bread, into a hole in the centre of which a quarter pint measure of oil has been poured!' The Moors in Algeria do the same; and everywhere in the south of Spain oil is drunk like water, and no indigestion caused. And from my own experience, I never enjoyed better health or had such an appetite as I used to have in Spain; while, on the contrary, in other moister climates, a continual languor, headache, and listlessness, constantly existed.

A soothing climate will benefit those who require soothing and nursing, whose constitutions are so tender that any rude exposure, even to heat and excitement, would do harm. It will also benefit those who require to be kept 'asthenic,' or who need their excitable frames kept in abeyance.

Leuco-phlegmatic constitutions do not thrive in hot humid situations; flabby textures and general laxity of frame require the stimulus of a bracing air. But still there are constitutions, not sanguine and not phlegmatic, that will do more good in such a soothing atmosphere.

Bracing climates, hot and dry, or cold and dry, will be too strong, too exciting, for sanguine constitutions. They will do good to those who require stimulating air; and it by no means follows that any exposure is incurred. By 'stimulating,' is merely meant the peculiar feeling which patients feel in a dry air, similar to what we feel on a bright, clear, dry, frosty morning. And as the local soothing effect of a moister air is exerted on the lungs, so is the drying up influence of a dry air to be observed, not only on the pulmonary, but on all the organs of the body. In speaking of a dry and cold climate as one for invalids, of course due allowance must be made for condition and profession of the patient. A man of energy and perseverance, whose constitution is not far gone by disease, or when delicacy is just showing itself, may do a great deal, and enjoy life for years, in Canada, or Newfoundland, or New Zealand, or the Cape of Good Hope—places where invalids among the higher classes and the female sex could never be sent to.

The organic diseases—those in which structural lesions have taken place—are benefited by change of climate. This is a general assertion, to be guarded by the supposition that consistent changes are recommended.

Rheumatism improves in Nice, Rome. At Gibraltar and Malta, this complaint is about 35 per 1000; while in Great Britain it occurs about 50 per 1000, and in Jamaica it is only 30 for the same number.

Diseased cardiac and arterial vessels are benefited. I have seen several improve rapidly after coming into the Mediterranean. The dyspnoea, or palpitation, would be subdued, and the patient enjoy placid, tranquil health. And in both these forms of disease the disposition and habit of body must be studied. A sanguine excitable temperament will suffer by over stimulus, while a lethargic invalid would be lost completely if sent to a depressing soothing air.

The most common disease which leads to this mode of treatment, and which demands our most serious attention, is phthisis. It is not meant that phthisis can be cured by change of climate, any more than that it can be cured by cod-liver oil. Consumption may be retarded, rendered quiescent; but that is not cure. And this state can be procured by climate. Change itself can protect one from this disease. Louis relates the case of a boy whose sixteen brothers and sisters all died, and who escaped himself by being sent away at a tender age. Though consumption be prevalent among the natives of Madeira, Spain, Malta, or Egypt, it does not follow that our northern constitutions will receive no benefit there. What may be a cause of disease to them, habituated to the heat, will be no such thing to us strangers; and what will be to them moisture, may to us be the very reverse.

Consumption is a constitutional disease, whose principal symptoms are confined to the lungs. The liver must have been influenced in some one way to cause the disease; for the lungs are apparently passive organs. The blood sent, if abnormal, will cause diseased action, will give rise to unnatural products left in the lung, and so engender the local symptoms. These are ag-

gravated by a cold, moist air; while the strength is completely lost by mal-assimilation of food. If such, then, be the case,—if the hepatic or carbon-eliminating, and the pulmonary or oxygenating organs, be rendered not only useless, but the cause of death,—if the body cannot keep up its wonted supply of animal heat, and the food taken does not sustain,—if every breath of chilly damp air provokes cough and encourages disease,—it stands to reason, that a remedy which will require less food, less organic activity, and that will sustain by external heat and soothe by warm air, must have a beneficial influence. Such a remedy is more powerful, because it is more general. It removes the patient from all external causes of irritation; it supplies heat, and sustains the body, doing away with the internal use of carbonaceous food.¹ In Sir James Clark's work on Climate, are given Dr Renton's tables of patients treated in Madeira for phthisis. Out of 35 cases of incipient disease, 26 left the island much improved. In Dr Lund's tables, 66 out of 100 lived, and in the following proportion:—

Of those in the first stage,	43
" second "	13
" third "	10

and this compared with the deaths—

Of those in the first stage only 5	
" second "	11
" third "	18

—a striking proof of what is caused by needlessly sending poor dying persons away. And to this may be added the additional facts—out of 47 confirmed cases, 32 died six months after landing; and out of 56 patients with tubercular lungs, or disease well marked, 30 died on the island. These are the proofs of the folly of medical men, not of the insalubrity of the climate, or the non-efficiency of the change.

¹ This is proved by the fact, that cod-liver oil is not used in Madeira; that, in fact, it is hurtful. In the opinion of some, it provokes hæmoptysis. It is too heating and exciting.

Consumption of ancient times was put down as a disease of dry air! This can hardly be granted now; for certainly there is very little, if any, dry air in this continent. The centre of phthisis, as an endemic, is the middle and western parts of Europe, all closely connected with water or with extensive forests. The island of Thasos, on which Hippocrates wrote and made his observations, has a northerly exposure; and the winds he blamed most for causing this disease, were the land winds, the N. and NW. and W. These will have the same effect as our E. and NE. A dry land wind irritates, but it need not cause structural disease: moisture must be present. Besides, phthisis is a disease which will increase anywhere, if not looked to at its outset. It is essentially a disease of civilization, and extends in its wake. The natives of other lands suffer by being translated—and they are uncivilized; but in all cases some moisture is to be discovered, or some land influence connected with vegetation. Again, when we hear of phthisis being common in Madeira or any other warmer resort, probably these statistics are taken from town populations, or from persons who frequent them and do some work connected therewith. Consumption is a disease of the town more than of the country. It is, in fact, one of those diseases which man brings in a great measure on himself, and on his children, even to their children's children. In Turkey, I am told by one who was there for some time,¹ among the country population little or no phthisis exists. In the Crimea, among the Tatars, it is infrequent. Among the Russian soldiery it is met with, certainly; but it is there induced by habits of life very widely differing from the primitive customs of these country people. Among ourselves, we find how much a town life tends to this disease. In our foot regiments, the ratio of deaths per 1000 from pulmonary disease is 10·2, while that of the foot guards is 13·8; showing how decided a difference is made by a town life among men who have been healthy when admitted into the service.

¹ Dr D. Christison.

But of whatever kind, or from whatever cause, consumption, if taken early, may be checked by change of air. European residents in India—civil as well as military—are 'almost exempt from scrofula, and so are their children;' and this is true when the families of any one at home are notoriously unhealthy. In 44,611 British troops at home, 483 admissions are from phthisis, with 5·7 per 1000 deaths. In India, out of 105,919 white troops, only 598 were admitted, with 1·6 per 1000 deaths. In the Madras Presidency particularly, the mortality is very small from this disease. In Ceylon, 4·7 per 1000 of white troops were attacked; deaths, 2·7. In the Tennasserim provinces, again, which are continental, lying on the eastern side of the Bay of Bengal, only 4 cases occurred during an occupation by us of ten years' duration! Troops in the West Indies present a much larger mortality from phthisis: nearly twice what occurs at home. Jamaica, particularly, is fatal to phthisical persons. Phthisis is less fatal among sailors than soldiers. It is not at all common in the Hebrides, Faroe Isles, Iceland, and these northern nations. And though the mortality from lung affections among the troops in Canada be large, their habits and intemperance will probably be found the real causes.

This was seen in these tables just mentioned, where the disease in its first stage seems retarded, and that for years. In our military returns, we find that the ratio of deaths from lung disease, per 1000 men, falls down to 3·5 at Ithaca, and 4·5 at Zante; while at Santa Maura, another of the Ionian Islands, it is so low as ·8. In Newfoundland, the ratio is 4·2; in Canada, about 7. The whole mortality of Australia is small; hence we may draw the same conclusion relative to phthisis.

That in those who are predisposed to this disease—and it may be in those who have deposition already commencing—climate of a dry and warm nature does good, is proved by the almost total want of phthisis in the Crimea during the latter half of the war. The last winter and spring were remarkably healthy—the

¹ Dr Ansell on Tuberculosis, p. 530-31.

mortality very small. Phthisis was not found commencing there. Very few cases were returned at all; and yet draughts had come out during the autumn and winter—young men—who were there exposed to almost every kind of work tending to excite disease. The great secret of the health being so highly kept, was the *constant out-door occupation* of the men in a *clear, dry, pure* atmosphere. The French, who lose many men by phthisis at home, are very healthy in Algeria. According to M. Martin, physician to the Dey in Algiers, 'nothing is more rare among acclimatized Europeans than consumption generated in Algiers.' In Oran, a town of Algeria, of 138 deaths, 1 only was from consumption. M. C. Broussais says, that there the deaths from phthisis are 1 in 20, while in Paris they are 1 in 5.

In Spain and in Malta I have myself seen invalids from phthisis enjoying good health, such as to render life pleasurable to themselves. I have known many, still alive, who would die in England, living very comfortably there, as well as in Madeira; and, from what I have there seen, I feel more and more convinced that this remedy, if properly applied, will be as successful as any other, and as saving of life as we can possibly be on this earth. There is another reason why these places do not get justice done them: the patients themselves, when they feel so much better, so free from all urgent symptoms, immediately join in amusements but little calculated to improve them. Hence many are laid up after violent exercise; hæmoptysis may be induced by over-straining the body, and death ensue. This is what we have very little power over, beyond the advising them against such certain methods of suicide.

If, then, men predisposed to phthisis by birth, as well as by mode of life, enjoy health, become stronger in constitution, in hot places; if, as has been proved, dry continental situations are unfavourable for the development of this disease, and that it is mostly in old cases, which should *never* have been sent from home, that the mortality exists; surely we are warranted in say-

² Dr Francis on Climate, p. 271.

ing, that to very many in the primary stages, and to delicate constitutions, great good and long life may be obtained by change of climate. Out of an army somewhere about 50,000, what an enormous proportion of phthisis we would have had here; and in the Crimea, none! In Tennasserim, as we have just seen, 4 cases in 10 years;—in Madeira, out of 100 patients, of 48 in the first stage, 27 had the disease arrested; of 24 in the second, 5; and of 28 in the third stage, only 5 were benefited by apparent arrest of the malady.

In Malaga, I have seen phthisis do well; I have known many troublesome symptoms kept in abeyance. In Malta, I have witnessed the same. And that there is drying up agency carried on in these places by means of the dry air, I am perfectly convinced from what I have there seen. This is spoken of by Dr Hall as one of the benefits of Clifton—a dry resort in our country.

And now the question comes, who are to go to Madeira, and who are to go to Egypt, Spain, or Algeria? Who are to be sent to the soothing clime, and who to the more dry and bracing? Now, it is sufficient for us at present to specify two constitutions as the basis to go upon—the sanguine and the phlegmatic. These two are at the bottom of all other kinds, influenced by the nervous system, as in the melancholic or hypochondriacal. Persons at all inclined to nervous diseases, should not go from home. In hot and dry places, or in more moist, irritating winds are of occasional occurrence, which not only ruffle the temper, but may induce serious nervous affections.

Generally, it may be said, that sanguine temperaments benefit in dry air, whether cold or hot. But when disease exists, if there be any tendency to irritability or excitement, the soothing climate is most suitable. Again, the phlegmatic constitution, which requires stimulating, will fail in obtaining this in a similar atmosphere to Madeira. But there are some, even among these phlegmatic constitutions, that may be over-stimulated, and who require more of the quiescent mode of life. In general, the more continental the position, the more bracing; but some places, such

as Rome, are soft, without being depressing. Madeira does not agree with the healthy man so well as with the invalid. Children in India, born of English parents, are remarkably exempt from scrofula; and this may be owing to the continental position.

The sanguine temperament, which requires to be soothed and kept in abeyance, should be sent to Madeira or Rome, for instance,—to a climate where there may be little chance of extra excitement. In Madeira, fevers are characterized by more or less of the typhoid type, so that caution must be used in not sending those who have shown tendency to a low type of fever.

To all, however, who travel for mere delicacy, without real disease, any warm climate may suit, provided they be prudent; but still, I must say, from my own personal feelings, I would prefer recommending the Mediterranean; for there the land gives more scope for amusement, and more food for the mental powers. One can roam from one part to another, and always keep in an equal temperature. And that benefit is to be obtained, is proved by our daily increasing experience. Egypt is unfolding a wide field for invalids; Algeria and Palestine all promise to be of most signal service. To those, however, that are drooping, who require nursing more than exciting air, Madeira will be suitable, provided always they be not too low. That leuco-phlegmatic constitutions do not benefit in moist places, is well shown by Dr Hall. He tells us that at Torquay, which is a soothing climate, anything approaching to irritation is more relieved than an atonic system. 'If the complexion be florid, and the skin harsh and dry, Torquay will agree. But when the patient is pallid and flabby; frequently faintish, and always feeble; the skin soft, cool, and often moist with cold perspiration; when, in short, the heart is too weak, without any active irritation existing in the lungs, and with a low state of the general vital power,—as a rule, Torquay will not agree.' It has been very plainly laid down that sea voyages do all the good—that these are far before hot positions on land. This I cannot

¹ Hall's Torquay, p. 13.

agree with. It is quite true that the mortality of our sailors is less than that of our soldiers; that 11 of the former die to 18 of the latter; and that phthisis is not a common disease among seamen. But the different habits of these two classes must be considered; and there will be found that, as in the Crimea, men exposed all day to the open air, and kept from many evil practices, as they are on board ship, will enjoy much better health, even an immunity from phthisis, in hot countries.

Again, phthisis occurring among natives almost always shows itself when they are brought to a moister climate. Africans, from dry parched Africa, die as much of consumption in the West Indies as here.

And, as in many other diseases, *height above the sea* causes recovery, and imparts health. In Peru, consumptive invalids, when sent 7000 feet up the Andes, are relieved. Dr Smith, in speaking of the diseases of Peru, says, 'Thus, on the "hot moist" coast, it is a common disease; but on the intermediate mountains, and in the temperate valleys of the interior, pulmonary consumption is a rare malady.'¹

Equality of temperature, little daily variation in the thermometric markings, are guides to where an invalid should be sent. Extremes are hurtful; draughts of air are most injurious abroad as well as at home. But it is strange to find 'a climate with a great range of temperature, a strong contrast between winter and summer, and constant and rapid changes of season, afforded a smaller amount of tuberculosis in the American army than a milder climate, even in the winter season.'²

Many attempts have been made to erect artificial resorts at home, to construct miniature Madeiras. But that is not possible. Every one knows how oppressive a confined atmosphere is. The great advantage of these places abroad is, that exercise and perfect freedom are enjoyed. Many patients fret under confinement; and certainly very little good can be expected from any such attempts. In judging of how far a person is benefited by moisture

¹ Dr Smith, quoted by Dr Hall.

² Ansell on Tuberculosis, p. 535.

or dryness, a good idea may be formed from the patient finding relief or not from steam inhalations. The local effects of such, combined with the constitutional peculiarities of any one patient, will lead us to say, whether Madeira or Egypt be preferred.¹

The more we study the causes of disease, the more are we convinced that man brings much on himself. Phthisis is generated and fostered by intemperance. Cholera, which takes its origin in hot moist places, abounding with vegetable and animal decay, is greatly encouraged among ourselves by filth, bad sewerage, and over-crowding. Fever, of a continued and typhoid form, is never away from our haunts of poverty, breaking out now and again in ravaging epidemics. And who is accountable? Who will look behind the scenes, and lend a helping hand to the poverty-stricken mechanic? Who will have courage to visit the haunts of disease, and discover the local causes? Unless we, as medical men, look to all these things—unless we make our voices heard denouncing the apathy and indifference of the people, and try to awaken them to what is not only hurtful to themselves and others, but a sin against nature and nature's God, disease will abound yet more and more. It is for our national, as well as our individual interests, that sanatory measures should be most exactly carried out. For, with all the diseases and all the foul-tainted abodes which our poorer people are subjected to, how can we expect our population to be strong and robust? How can we send to our colonies such men as we should? Instead of healthy, able-bodied people, poor, squalid,

¹ 'Change of climate, when it can be accomplished, is unquestionably, in the early period of the disease, of fundamental service.'

² 'In the selection of a climate for any particular case, the dry or moist character of the attending bronchitis, and the general tendency to the *strictum* or *laxum* in the organism, furnish the best guides. In the former case, the climates of Madeira, Tenerife, the Azores, Rome, Pisa, Torquay, Penzance, Ventnor, and the under cliffs generally; in the latter, those of Egypt, Cadiz, Algiers, Genoa, Nice, Clifton, and Bournemouth, are the most advisable for winter quarters.—Walshe, *Diseases of Chest*.

It was not till after this lecture had been written that I found the foregoing passage of Dr Walshe so completely concurring with what I have already advanced.—A. W. P. P.

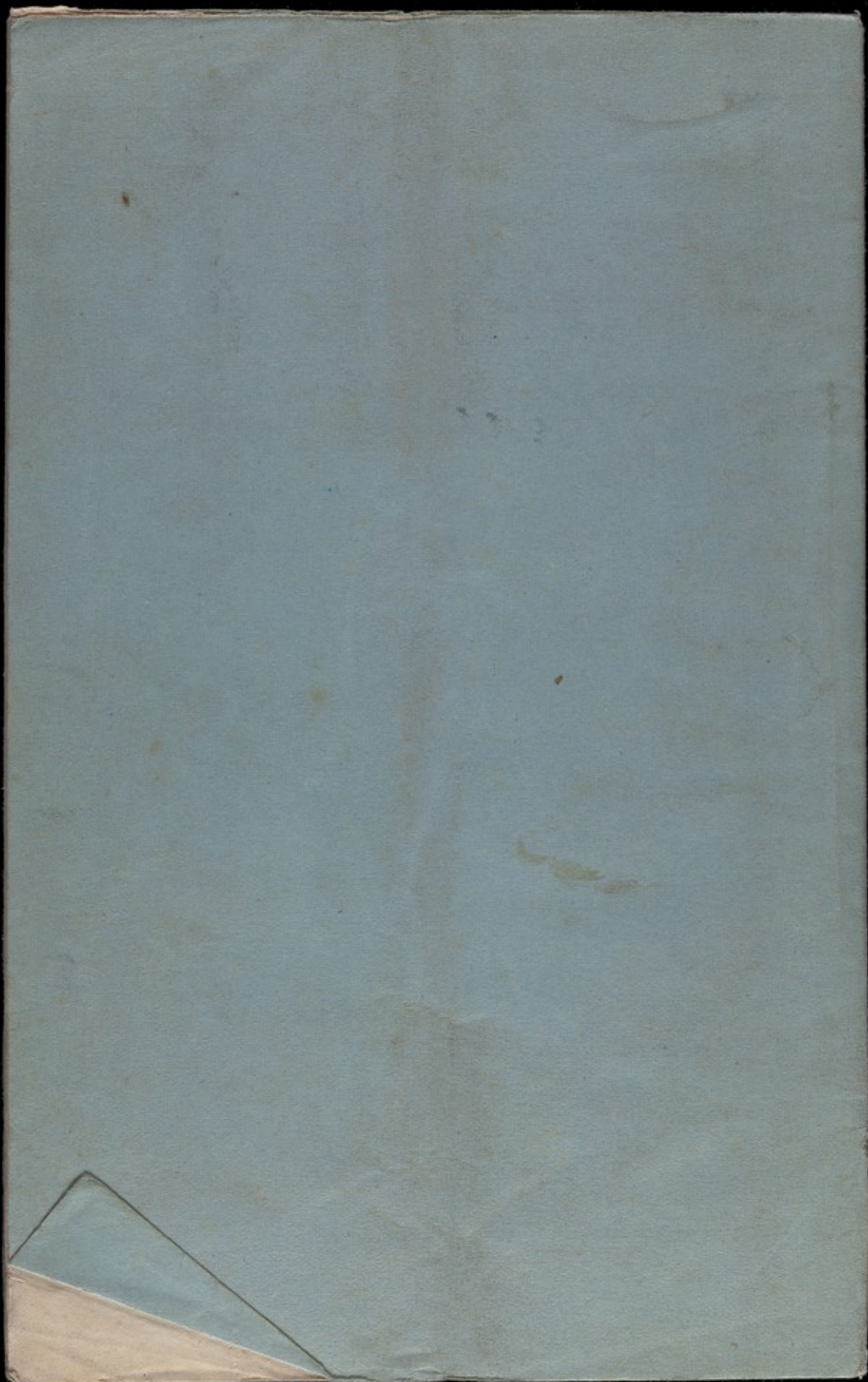
delicate constitutions will go; and if they do reach the destined haven, and do succeed in establishing their footing, they may, and are, laying the foundations of unhealthy generations.

Disease in our towns sends disease to our colonies; and if we would strengthen our young men ere they emigrate, let us cleanse our streets and bye-ways. It is for us, gentlemen, to investigate and rigidly search out the cause of epidemics and endemics. It is for us, as medical men, and as bound by all right and noble feeling toward our fellow-men, to set before the face of the nation what really does exist! Ignorance on the part of those who *can* alleviate, and indifference on the part of those who suffer, will draw down further curses in the shape of dread disease. We have good reason to believe that cleansing out all impurities can be of most signal service; that though cholera may alight on any one spot, and is not to be avoided, still its progress can be held in abeyance by strict sanatory measures.

If such, then, be the case, let us join heart and soul in doing away with that disgrace, that blot in our fair fame as a Christian and civilized nation. Let our paupers be cared for, and *kept* clean; let those who would willingly shut their eyes to the subject, hear and see what fashion and luxury bring on the lower orders. Make those who wear the gems understand at what a sacrifice of human life and of human happiness every luxury is obtained.

In so doing, we will confer a lasting benefit, not only on our fellow-creatures, but on the nation. We will be fulfilling a most important branch of our profession, and we will perhaps be able to lighten that curse that now hangs so heavy on us, and enable generations yet unborn to revere and honour them who roused the nation—too long asleep—to cherish and do justice to those who make our riches, and who fight our battles.

FINIS.



Law

M4/14

THE
CATTLE PLAGUE
AND
DISEASED MEAT,
IN THEIR RELATIONS WITH
THE PUBLIC HEALTH,
AND WITH THE
INTERESTS OF AGRICULTURE.

A Second Letter

TO THE
RT. HON. SIR GEORGE GREY, BART., G.C.B.
SECRETARY OF STATE FOR THE HOME DEPARTMENT.

BY
JOSEPH SAMPSON GAMGEE,
STAFF-SURGEON OF THE FIRST CLASS AND PRINCIPAL MEDICAL OFFICER OF THE BRITISH-
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UNIVERSITY COLLEGE, MEMBER OF VARIOUS LEARNED SOCIETIES,
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"On the profounder, more critical, and purer study of nature, rest the hopes of improvement in the medical art."—Sir John Forbes.

"For it is truth alone I seek, and that will always be welcome to me, when or whenever it comes."—John Locke, *On the Conduct of the Human Understanding*.

"The pathology of domestic animals is exceedingly imperfect; their diseases are badly characterized; and the effect of epidemic causes on the human race is little understood."—*The Registrar-General's Quarterly Report*, 25th April, 1857.

"The first and most essential step to improvement in any department of human action, is the exposure of fundamental errors."—Sir John Forbes.

THE CATTLE PLAGUE,

ETC.

TO THE RT. HON. SIR GEORGE GREY, BART., G.C.B.,

SECRETARY OF STATE FOR THE HOME DEPARTMENT.

SIR,—The Order in Council, relating to importation of cattle, which emanated shortly after the first letter I had the honour to address you on some of the chief questions involved in the production and supply of animal food to the people, tends to prove that I had not misstated the existence of one of the reasons for serious apprehension. But as that Order only relates to, and but partially provides against the possible invasion of a cattle plague, leaving unchecked the actual and greater evil of supply of diseased and putrid meat as human food, I have felt it necessary to bring to your notice all the facts elicited by my continued investigations in England and on the Continent, where I have just passed a fortnight for the express purpose of this inquiry.

It being of the first importance that the undefined but very considerable public alarm which this

subject has created, should be tested by facts, so as to allay exaggerated fear and acquire a correct knowledge of existing evils and dangers, as the first requisite to the adoption of measures required for their removal or abatement, it has been my constant endeavour to examine facts most rigidly; and I have noted none, nor shall I here state any, which are not intrinsically correct and capable of proof;—such proof I shall be happy to adduce whenever, and in whatever form, it may be necessary. I reflect with satisfaction that none of the material facts stated in my first letter have been denied; although, as I had not hesitated to demonstrate defects in institutions, and shortcomings in officers, the motives existed for such denial had it been possible. But, with deference, I believe it to be impossible. I refer more particularly to the defective management of the meat markets under the control of the City corporation, to the insufficiency of inspectors throughout the metropolis, and to the very unsatisfactory state of knowledge relating to the diseases of animals, attributable to non-observance of the very wise regulations framed by the founders of the Veterinary College of London.

Having assumed a responsibility in my first letter, I have shrunk from no part of it; and the new facts to be here stated, will be so with sole reference to the interest of truth. To their statement in detail, a prefatory exposition of the questions at issue may be found convenient.

The subjects under consideration are intimately connected with the whole question of the production and supply of meat, as one of the staple articles of human subsistence. They consequently affect the two first elements in the nation's wealth,—*the public health and the interests of agriculture*. In spite of the very great perfection to which the breeding and rearing of animals has been brought in this country,—a point of excellence best illustrated by the great efforts being made by the French Emperor and nation to emulate it,—we are far from producing sufficient animal food for home consumption; and were it not for the imports from the Spanish ports, from Rotterdam, the Hanseatic Towns, and intermediate stations, the price of meat would be even much higher than it now is. Free trade provides a remedy; but sanitary legislation has hitherto exposed the British farmer to importation of diseases, which, if once manifested in his flocks and herds, would spread sorrow through the land. The question is, how to ensure in the greatest measure the economic desideratum, importation of good food at the lowest possible price, with the least danger to the national sources of supply; this can only be done by legislation sufficiently provident, without being unduly restrictive; a standard of moderation for which only accurate knowledge of the evils to be guarded against, can constitute a sufficient basis.

Assuming, for the sake of argument, that the

recent murrain alarm had no foundation in fact, the vague manner in which it was received by the last Parliament, the ignorance respecting cattle diseases which was found generally to prevail, proved that British agriculturists are insufficiently protected. Foreign legislative codes long since provided for the contingent evil, on the investigations of scientific and practical men; and had we possessed their knowledge, even if destitute of their laws, these could readily have been framed. The first consideration is to acquire a thorough knowledge of cattle diseases as affecting the health of man, and on the basis of the correctly ascertained data, to provide such laws as shall ensure safety by their providence under all circumstances. The British people have what they require, free competition amongst the purveyors of their food throughout the world; British agriculturists should have what they deserve in recompense for their unrivalled spirit of enterprise,—such security from invasion of a pestilence, as the wisest sanitary legislation can afford.

But, as stated in my first Letter, the Cattle Plague, also known as the *Steppe murrain*, more properly the *contagious typhus* of cattle, is a contingent danger;—the actual evil is the supply of diseased and putrid meat to the people; the inadequacy of laws and officers to put an efficient check on such fraudulent and unwholesome practice. It must not be lost sight

of, however, that the two evils differ in degree rather than kind, and that the required legislative reforms must take cognizance of all the facts of the question. Restrictive measures on the importation of cattle must, by raising the price of animal food, offer an increased premium for the fraudulent sale of the bad article; and unless vigilance at home keep pace with watchfulness from abroad, the dishonest will gain advantage on the honest trader, and the consumers be proportionately mulcted in health and pocket.

With these preliminary observations I shall proceed to make a statement of the facts which have come to my knowledge from personal observation, since the publication of my first letter; still adhering to the arrangement therein adopted, as facilitating exposition.

- 1stly. *Statement of the existing evil.*
- 2ndly. *Statement of impending danger.*
- 3rdly. *The inefficiency of existing laws.*
- 4thly. *An exposition of the principles on which the urgently required legislation should be based.*

FIRSTLY,—STATEMENT OF THE EXISTING EVIL.

I entered Newgate Market at a quarter before twelve o'clock on Saturday night, the 28th March. Numerous little shops were open, and, with solitary exceptions, a large quantity of diseased and putrid meat was exposed in them for sale: stink-

ing legs of mutton, sour-smelling fragments of slipped calves, large quantities of beef and pork only fit to be buried. The buyers were a number of very poor people; the appearance of the sellers was such as would be expected, in men living by such disgraceful traffic. I saw a leg of mutton, weighing eight pounds four ounces, sold for 2s. 11d.: it had apparently belonged to a good sheep, but was obviously in an advanced stage of putrefaction. The salesmen were lustily crying out, "*Buy me out,*" "*buy me out;*" and the little throng of ragged and filthy poor tendered at the extempore auction, until the number of pence seemed to the unprincipled vender a sufficient temptation. I sought about the market for officers; but the beadle's closet was closed, and no beadle or inspector of meat anywhere to be found. I represented these facts to city policeman No. 287, on duty in the market. He had not seen the meat inspectors; the beadle had left at eleven—the appointed hour. On my pointing out to the policeman the large quantity of meat in the market unfit for human food, he stated that he had no power to interfere; *that* business belonged to the meat inspectors. He repeatedly saw the market in such a state on Saturday night; sometimes the stench from the shops was so great that he did not like to walk past them. Be it observed, a large quantity of the meat I saw was sold; but as the customers were not sufficient, and the night advancing

far into Sunday, the shops were closed and the putrid remnants in them. These would, of course, become much worse before passing under the wheel of the sausage maker,—their almost certain doom on the Monday morning.

Mr. Charles Fisher, inspector of City markets, states that up to eleven o'clock, the Saturday night just mentioned, he saw no meat unfit for human food in the market; that eleven o'clock at night is the time appointed for the beables and inspectors to leave off duty, and that the policeman had power under a certain act to seize the bad meat on my requesting him to do so. The fact that those officials' duties cease by law at eleven p.m., proves they were not culpable of neglect when I found the market without them at midnight; and it also affords an explanation of the reason, why I should find the stalls of the petty salesmen in a totally different state to what they were at eleven, when the inspectors retired to their homes. Business is carried on in Newgate Market until long after midnight on Saturday night; and if it be a fact of public notoriety, that inspection ceases at eleven, a premium is offered for the sale of the worst meat after that hour. At all time when there is a public duty to perform, duly appointed officers should be on the spot to perform it. I shall presently have occasion to state the result of my endeavour to test, by actual experience, the validity of Inspector Fisher's assertion,

that the City policemen have authority to seize meat, pointed out to them as unfit for human food. At midday on Sunday, the 29th March, slaughtering was being extensively carried on at the Islington Cattle Market, which is the property of the City corporation. But, as is usual if not invariable, no inspecting officer was on duty; that is, there was nothing to check the most extensive traffic being carried on in the worst meat.

I visited the City markets in Newgate, Leadenhall, and Whitechapel, at five a.m., the 31st of March. At half-past five, the assistant-beadle and City policemen 287 and 289, were on duty in Newgate Market, but no inspector of meat was. Large quantities of meat were coming in by railway and other vans, in hampers, cloths, or otherwise packed. The large salesmen were opening business, and, almost without exception, with magnificent meat. But in many petty shops very bad meat was to be seen, and I now learned practically that some of them mostly deal in bad meat! This fact nobody hides—no *habitud* of the market even pretends to ignore. At six a.m., City policeman 555 replaced 539 in Leadenhall Market: but neither here nor in Whitechapel could I see or hear of one of the inspectors of meat. In the latter market slaughtering was being actively carried on, and much of the inferior meat carted off to Newgate without chance of inspection.

On Friday morning, the 3rd April, I entered the

Islington Market at four o'clock, and remained there till five. The droves were coming in, and business was active in the Ram Inn Yard slaughter-house, but not an officer of the market was on duty; either to inspect the meat which was being carted off to Newgate Market in large quantities, or to restrain the brutality of the drovers—many of whom are respectable men; but the conduct of others calls for rigid discipline. At ten minutes to five, policeman 271 N, was walking his ordinary beat outside the market railings, but it was no part of his business to inspect the working of the market.

I again entered the cattle market at six minutes to seven the same morning. The clerk's office was closed, and I could hear nothing of that officer, of his assistant, or of the inspector, on inquiry. At ten minutes past seven, the carcasses of two sheep, bearing unmistakable signs of general disease, were carted off from the slaughter-house of the market. From the manner in which the two sheep were *trimmed* and *dressed*, there could be no doubt that they were destined for sale as human food. They were unquestionably unfit, but they might have been ten times worse without the least chance of the disreputable practice being checked; it would never have been discovered but for my unexpected investigation. In such a disgraceful state did I find these slaughter-houses, that I deemed it important to obtain confirmatory evidence; and ac-

cordingly Dr. Hillier, Officer of Health of St. Pancras, accompanied me at half-past ten o'clock the same morning.

We found the slaughter-houses in a most filthy state; we ascertained that horses are habitually stalled where the bullocks are killed and dressed,—a practice, to say the least, most filthy. Waiting to be slaughtered was an old cow, extraordinarily emaciated and in an advanced state of disease. The clerk of the market and the inspector alleged themselves unable to interfere with the slaughter-houses because destitute of authority. A Mr. Thatcher, keeper of one of the gates, stated that he sometimes looked to the slaughter-houses, but did not conceive that part of his duty; he admitted the state of filth, and to my remark that in plain English the market is badly managed, he rejoined, "I know it is."

At six minutes before twelve on Saturday night, the 4th April, I entered Newgate Market. Although the weather was very bad many little shops were open, and a considerable number of ragged poor, mostly women, were making purchases; bad meat abounded; veal and beef in large quantities were offered for sale at 2d. and 1½d. per pound;—there was no question in my mind, that this stinking meat was in such an advanced state of putrefaction as to be unfit for human food;—with a view to test the correctness of Inspector Fisher's interpretation of the laws regulating the inspection

of markets, I severally called upon City policemen 80, 88, 287, and 289, who were on duty, to seize the meat which I pointed out to them; but they refused to do so, stating that they conceived they had no power to seize it. They persisted in this opinion, even after my informing them of Mr. Fisher's interpretation. I thus acquired proof that meat unfit for human food is sold in large quantity in Newgate Market, and that the officers appointed to it, are either ignorant of their duty or unwilling to perform it. This alternative is inevitable,—Mr. Fisher or the policemen erred. While I was questioning and writing down the numbers and answers of the City constables, Mr. Robert Pocklington, of No. 7, York Place, City Road, collector and inspector of Newgate Market, made his appearance. On my informing him that putrid beef, unfit for human food, was being offered for sale at 1½d. per pound, at the shop of J. Pain, in Warwick Lane, Mr. Pocklington accompanied me there, but he refused to seize the meat or to order suspension of the sale; a person, who appeared to be the owner, alleged that the meat was good, and Mr. Pocklington coincided with him; but they both said that I was at liberty to take a piece of the meat and submit it to any authority I might select. A labouring man, William Willis, of No. 5, Whitehorse Court, Bunhill Row, volunteered from the crowd to carry a piece of the meat away with me, I being anxious to secure evidence as to

every particular. He accepted my offer of a shilling for his services. We left the market and were walking along Newgate Street, when Inspector Pocklington, who had followed us, seized Willis by the coat and endeavoured to get the meat from him. I intimated to Mr. Pocklington, that he had refused to seize the meat at my request in the market, that he had invited me to submit it to other judges, and that he was now using illegal violence, from which I summoned him to desist. On his persisting, I waited until the arrival of City policeman 251, who at my request took Inspector Pocklington in charge to the Smithfield Station. My accusation, amounting to a charge of assaulting William Willis, for the time being my servant, was taken down, and as I reserved myself the right to take out a summons, Mr. Pocklington was discharged, after declining to make any statement in reply. I then proceeded with William Willis, still bearer of the meat, directly to the residence of my friend Dr. Hillier, who expressed a most decided opinion as to the unfitness of the meat for human food; Dr. Hillier spontaneously remarked, the specimen was like a piece of putrid dissecting-room meat. Admitting that Mr. Pocklington acted to the best of his judgment in not seizing the meat, I hold the above reported facts to prove that he erred in judgment; admitting that his subsequent conduct might be accidentally irregular, I hold it to have been reprehensibly indis-

creet. Considering Mr. Pocklington's very advanced age and general excellent character, I very much regret being obliged to record my decided opinion, that he is destitute of the special qualifications which an efficient inspector of Newgate Market should unquestionably possess.

My numerous duties, and particularly a journey to Paris to confer with M. Renault, one of the French Emperor's Commissioners for the study of the Cattle Plague, prevented me taking out a summons against the Newgate Market Inspector; but, under all the circumstances, I must hold the silence he has preserved, confirmative of the correctness of my opinion as to his official inaptitude.

The following police report, which I transcribe from the *Morning Advertiser*, March 30th, is another proof of the kind of meat sometimes sold for food to the people.

"CLERKENWELL.

"UNWHOLESOME FOOD.—SAUSAGE-MAKING.—John Pallet, of 23, Chapel Street, Somers Town, was placed at the bar before Mr. Corrie, charged by James Newman, Sanitary Inspector of Nuisances to the parish of St. Pancras, with exposing for sale unwholesome meat, unfit for human food, which subjected him to heavy penalties, under the Nuisances Removal Act, 18th and 19th Victoria, chap. 26.

"Mr. Newman having been sworn, said that on

Saturday morning he was passing by the defendant's house, where he found thirteen quarters of veal, which was quite unwholesome, and perfectly unfit for human food. The defendant, it appeared, put the meat into his cart and brought it to this court, where it was deposited in the Station-house yard.

"In answer to Mr. Corrie, the witness said 'the meat stinks.'

"Mr. Corrie said that this seemed to be a wholesale proceeding on the part of the defendant, and asked him what he had to say to the charge?

"He said he had purchased the meat in the market at a cheap rate. He admitted that it was now bad, but the interior was good. He meant to cut off the outside, which was bad, and the inside would be good to eat.

"A voice.—For cats or dogs.

"Mr. Cook (solicitor to St. Pancras).—Sir, a gentleman by my side says that he will be cautious in future as to the purchase of sausages.

"Mr. Corrie (to Mr. Newman).—Pray, what do you mean to do with the meat?

"Mr. Newman.—I mean to bury it, or send it to a cat's-meat shop. (Laughter.)

"Mr. Corrie.—I shall convict you in the mitigated penalty of 20s., and the meat forfeited.

"The defendant paid the penalty and was liberated, when he conveyed the meat from the station in his cart."

This conviction unquestionably tended to warn vendors of bad meat; but the chances of detection and the penalty on conviction are so small, that the large gain from such traffic offers ample temptation. In the instance above mentioned the quantity of meat seized was very large—thirteen quarters of veal and one loin of beef; the loss of the property was altogether an insignificant matter, for, as the butcher admitted, he knew it to be bad, and had doubtless purchased it at a nominal value. The guilty knowledge proved, it would appear desirable to inflict heavier penalties. It is stated in the report of the above case, that after paying the fine, the butcher carried the meat from the police-court in his own cart. I am informed that Inspector Newman, who had effected the seizure, was prevented going to see the meat destroyed by the urgency of one of his innumerable official duties, which caused him to pay a man, whom he knew, a shilling to go with the meat to the knacker, and there see it destroyed. I submit that no valid guarantee existed to prevent the condemned meat being again sold and cut up into sausages or otherwise used. Its previous owner, who carried it from the police-court, had good reason to endeavour to recover the whole or part of the fine out of the carrion; the one shilling paid to the man who accompanied him, can scarcely be looked upon as a security for faithful service; while the third party concerned—the knacker, belonged to a class noto-

rious for practices of questionable purity. There is good reason to believe that knackers'-yards are harbours of much that is fraudulent, disgusting, and injurious to the health of the population:—certain it is, that the temptation for fraud is very great, and that practically it is unchecked.

SECONDLY,—STATEMENT OF IMPENDING DANGERS.

Without attempting to define the precise extent of the evil, the existence of which is proved by the facts above cited, it cannot but be regarded as very great, and as urgently requiring efficient provision. Neither do I think it possible to over-rate the danger of a pestilential invasion amongst cattle. It is now generally admitted, that in addition to the epidemic and contagious diseases prevalent amongst British cattle, a much more terrible, because more intensely contagious and fatal disease, prevails in some parts of the European continent, more particularly in its south-eastern portion. The comparative remoteness of the danger affords good reason for hoping that it may be averted by the adoption of efficient preventive measures; but, in my mind, it in no degree allays apprehension so long as we continue, as we now unquestionably are, but partially informed on the most important facts of the disease, and unprotected by sanitary legislation. The latter statement calls for evidence, which, according to the arrangement adopted, shall presently be adduced.

The recent discussion on the cattle plague, and my own researches, would afford opportunity for entering into considerable detail as to the history, anatomical characters, and general hygienic bearings of cattle diseases in themselves, and as affecting the health of the population. But such a work would be beyond my immediate purpose,—the demonstration of great public requirements, due to defective legislation and inefficient administration. Obviously the prevailing ignorance in cattle diseases is a matter of the most serious moment. It is forcibly dwelt upon in the last quarterly return of the Registrar-General, and under the circumstances it may not be unimportant to reiterate the statement in my first letter, that “after personally inspecting the veterinary schools of Belgium, France, Switzerland, Italy, Wurtemberg, Austria, and Prussia, my brother and myself have come to the conclusion, which we are prepared to prove, that whereas England’s wealth in animals by very far exceeds that of any other nation, it is very far inferior to all the countries of continental Europe in knowledge of the diseases of animals, and in means for instruction in that all-important branch of science, and public economy.” The apparent contradiction involved in this statement admits of explanation on the basis of fact. For centuries had the disease of animals been all but exclusively treated by ignorant persons. The revival of veterinary science is due to Bourgelat, a French barrister, who, in

the last century, founded the *first* veterinary school at Lyons. His labours were so successful, our deficiency was felt so great, that in 1791 several English gentlemen founded the Veterinary College in St. Pancras. Its first professor was a Frenchman, M. de Saint Bel, one of whose earliest literary productions on arriving in England, was an Essay on the Geometrical Proportions of Eclipse,—one of the most magnificent horses that the world had ever seen. Thus a distinguished member of the French bar had given life to veterinary science; a young Frenchman, learned in mathematics besides diseases of animals, was our first veterinary professor: but the innate love of Englishmen for animals, our natural preeminence as agriculturists, more particularly as rearers of live stock, had given us a superiority in the production and maintenance in health of beautiful animals, which other nations have as yet striven in vain to equal. These facts are worthy of reflection in their application to the health of man: it is remarkable that we have been most sedulous in breeding and rearing healthy cattle, and that our efforts have been crowned with such success as to inspire regret that it is only very recently that the preservation of the health of man has seriously engaged the public attention, as the most legitimate foundation of a sound medical philosophy. Vigorous bodies are the homes of healthy brains, these of generous and bright intellects; hence the intimate connexion of public

hygiene with the best interests of civilization; truths well known, by none denied, by too few practised. In the hope that this digression may not be deemed unwarranted by the facts and prove unfruitful, I revert to the main subject. Obviously it is of the first importance that all that science can do to insure and advance the national health should be done, and that with the utmost possible efficiency. As subsidiary to agricultural interests and to the public health, it is of the first importance that the present unsatisfactory state of veterinary science and education in England, should cease. I state my deliberate conviction that there is scarcely an institution in Europe in which wise laws are so violated, means of learning and instruction so neglected, as in the Veterinary College of London. I cannot make this statement, prepared as I am to substantiate it by facts in every particular, without expressing deep regret for being obliged to cause temporary pain, by unjustly reflecting on some deserving persons. But exculpation of some would demand inculpation of others, which at this stage would prejudice discussion on the public requirement, by introducing incidental considerations. When inquiry shall have been instituted to examine the evidence on which my charge is founded, it will afford me great pleasure to adduce proofs wholly exonerating certain officers of the institution, explaining, and, as far as possible attenuating, the fault attaching to others.

THE INEFFICIENCY OF EXISTING LAWS.

I submit, with deference, that the facts and comments contained in my first Letter on this subject, prove the inefficiency of existing laws to repress the actual evil and ward off that which is impending. My inspections of the City markets now reported, further demonstrate that, administered as the law is by the police and meat inspectors salaried by the City corporation, it does not afford an efficient guarantee for the health of the enormous population, which chiefly derives its animal subsistence from the City markets. Admitting, for the sake of argument, that the laws regulating the management of metropolitan slaughter-houses and places for the sale of meat beyond the City, would be equal to the requirement if efficiently administered, the case above cited as having occurred in the parish of St. Pancras, illustrates that the number of officers is unequal to the duty. As formerly stated, the parish of St. Pancras, numbering one hundred and ninety thousand inhabitants, has only one Inspector of Nuisances; his inability to exercise an effectual supervision must be obvious, and, as proved by fact, he may even be prevented efficiently following out cases, in which the magistrate convicts on his information, by the multitude of his occupations.

The Order of Her Majesty's Privy Council, which was issued the 2nd of April, recognizes the exist-

ence of a pestilential disease of cattle on the continent as requiring preventive legislation, and forbids the importation of cattle, whole or in parts, from the territories of the Free City of Lubeck, or any other port between it and the Gulf of Finland. As a prevention against the contagious typhus of cattle, the only disease calling for legislation, that Order in Council is inoperative; our imports from the condemned ports are small, indeed altogether insignificant compared to those from the free ports on the German Ocean; and unless these are in some manner controlled, the chances of pestilential invasion are only lessened in the small ratio represented by the trifling number of head of cattle with which the condemned ports would have supplied us. We have, it is true, the guarantee afforded by the strict police regulations of Prussia and Austria against the spread of the cattle plague in question across their frontiers, and consequently, to our shores; but I apprehend it is not intended to delegate to those governments the duty of protecting British interests, however much it be desirable to profit by their enactments, as subsidiary to the national welfare. It is equally true that regulations exist for inspecting foreign cattle when landed on our shores, and there is every reason to believe that the appointed veterinary inspectors perform that duty with the greatest efficiency which the circumstances admit of; but no zeal, no intelligence in the inspectors, can be effectual

in the present state of the law, even setting aside the great difficulty of determining the health of a cargo of oxen, necessarily in an unnatural state on being landed after a voyage. All authorities are agreed that the contagious typhus of cattle has a period of incubation of several days duration; consequently a ship-load of beasts might at the time of landing be in apparent health, and yet be the bearers of the seeds of contagion, which, once introduced into the country, it would almost be hopeless to attempt to eradicate. Difficult as it is to enforce all quarantine regulations, it is now very generally admitted, that inspection of cargoes at the time of landing is a measure of very doubtful utility, unless at the same time it be enjoined that the ship shall have a clean Bill of Health. On this consideration I shall take the liberty of enlarging in the following section.

FOURTHLY, — ADDITIONAL EXPOSITION OF THE PRINCIPLES ON WHICH THE URGENTLY REQUIRED LEGISLATION SHOULD BE BASED.

The observations and suggestions which I ventured to make on this head in my first Letter, have only acquired strength by more extended investigation. Certain it is, that the laws now in force relating to the sale of meat and to the mitigation of cattle epidemics are incomplete, and that so far

as they extend, such is their wording, and so incomplete the executive provisions, as to leave all but totally unfulfilled the great public requirements for which those laws were framed. For a complete reform an Act of Parliament only can provide; but as the preparation and passing such a measure unavoidably involve considerable time, I venture to make some suggestions within the provisions of existing acts, which, if put into execution, must materially tend to diminish existing evils and impending danger.

1stly. Inspectors should be on duty in the great live and dead meat markets whenever business is being carried on,—particularly at night, which, honest people should remember, is busy day with rogues;—and a multitude of rogues live in quasi-opulence by practising frauds on the food of the people; on no part of it so much as on meat.

Happily a large number of meat salesmen so conduct their business as to need little supervision, but this requires to be most active, to repress the fraud knowingly practised by others. In the City markets business begins long before daylight; the best time to exercise supervision is while the meat is being carried in; casual inspection in a full market must as completely fail to detect the hiding place of the bad meat, as occasional visits of one or two officers in a densely crowded hall would assuredly fail in detecting pickpockets. The present staff of officers is altogether unequal

to the duty of inspecting the City markets, a duty which would be greatly facilitated by instituting a system of licensed porters, over whom the inspectors might exercise control. The sanitary arrangement of the cattle market and adjoining slaughter-houses at Islington is so defective, as to demand most urgent inquiry.

2dly. Inspectors of nuisances in the metropolitan districts should be provided in number and character proportionate to the duties to be performed. Thus, for instance, it being preposterous to suppose that the 195,000 inhabitants of St. Pancras parish can be protected from filthy and abominable frauds by the one inspector now attached to the district, sufficient provision should be made. That officer is thoroughly zealous and worthy, but as matters now stand, many of the duties professedly dependant upon him cannot be fulfilled. Municipal authorities may reasonably anticipate that the requirements of the public health will daily become more apparent, and unless adequate provision be made, the question of centralization must necessarily force itself upon the government and the people: already indeed there are sufficient grounds for taking into consideration, as somewhat anomalous, the existing relations between the General Board of Health and the Officers of Health of the Metropolis. Such discussion will happily be avoided, if all pretext be removed by provision for public requirements on the existing basis.

3rdly. No cattle should be allowed to land on our shores without a clean Bill of Health, which Bill the British consuls at the places of export should be instructed to furnish only upon reliable information, such as could be gleaned from the excellent veterinary schools which abound on the continent. In such matters partial security only engenders false confidence; the guarantee must be the most complete that can be given under the circumstances.

These suggestions I venture to submit, as within the meaning of existing statutes, as easy of application, and calculated to do much practical good. But it is more particularly for the assemblage of facts embodied in these two letters that I claim consideration, as proving that our sanitary legislation, at least in the part to which I have referred, demands inquiry. The present system cannot be endured without disregard for the best established principles of social economy. I can only characterize the state of the poor in this metropolis as terrible, far beyond what is generally believed: in their misery they are the most defrauded; but as may be imagined, opportunities are not lost of defrauding the more wealthy. Honest tradesmen have as great interest as any part of the community in the detection of rogues; but for this, wise laws and an active executive are required. What is wanted is healthy food at the cheapest possible price. For this purpose we require the greatest

encouragement to home produce; the good market is a sufficient temptation; but care must be taken that the interests of our own agriculturists are not frustrated by culpable defects in any system of importation, which a wise sanitary legislation could remove. The health of towns requires immediate inquiry into the present system of slaughtering, and management of meat-markets; public health, as a science, calls for more extended inquiry into the laws governing the health and diseases of man as affected by the health and diseases of animals.

In the hope that her Majesty's Government may deem fit to institute inquiry into the facts I have adduced, I have but to renew expression of my readiness to substantiate every one of my statements by conclusive evidence.

I have the honour to be, Sir,

Your most obedient humble servant,

JOSEPH SAMPSON GAMGEE.

16, Upper Woburn Place, Russell Square.
May 1st, 1857.

T. EDWARDS, 27 GREAT QUEEN STREET.

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V.
THE CATTLE PLAGUE

AND
DISEASED MEAT,

In their relation with the Public Health and with the Interests of Agriculture.

A LETTER

TO THE

RIGHT. HON. SIR GEORGE GREY, BART., G.C.B.

"Mr. Gamgee has addressed a bold and admirable letter to Sir George Grey, on the subject of '*diseased animal food*.' . . . If anything could rouse a ministry to the exertion of ministerial power, this letter is the very thing to do it."—*The Sanitary Review and Journal of Public Health*.

"The whole subject is handled by Mr. Joseph Sampson Gamgee in a masterly way."—*The Scotsman*.

"Mr. J. S. Gamgee's communication is one of those cries of alarm to which no man can prove heedless."—*Lancet*.

"Mr. Gamgee has ably given the evidence of the existing evil."—*British Medical Journal*.

"A sturdy unflinching letter to the Home Secretary from the pen of Mr. Gamgee. . . . The most that the Government could do in reference to this meat question, would be to enlarge on the very plan which Mr. Gamgee has pursued."—*Medical Times and Gazette*.

"We trust that Sir George Grey may think and act a little on what Mr. Gamgee has to say."—*Mark Lane Express*.

"Mr. Gamgee has made his charge in a manful way, and it should be met as manfully."—*Spectator*.

"Mr. Joseph Sampson Gamgee's letter to Sir George Grey is worthy of the careful perusal of our public authorities and the community at large, as grappling in a masterly way with this most important subject."—*Edinburgh Daily Express*.

"Mr. Gamgee's work cannot be too widely known, nor instantly acted upon."—*The Caledonian Mercury*.

"Mr. Gamgee has demonstrated beyond doubt, that in this country, and especially in London, an immense quantity of diseased meat is annually slaughtered, which is utterly unfit for human food, but which, nevertheless, is sold to the public; that our institutions are most defective, and our laws totally insufficient to deal with the evil."—*Plymouth and Devonport Journal*.

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"This is one of the most important pamphlets ever issued from the press."—*Wilts and Gloucestershire Standard*.

M4/15

PROPOSED

MONUMENT TO DECEASED MEDICAL OFFICERS
OF THE ARMY

Who lost their Lives during the late War, *Crimea*

At a Special General Meeting of Military Medical Officers, held at the Army Medical Board, Whitehall, on Wednesday, the 15th ult., the Director-General in the Chair, it was decided unanimously by a series of Resolutions, "That a Monument should be erected as a lasting testimony of affectionate regard and esteem for those Medical Officers, Civil and Military (whose names will be inscribed on the tablet), who lost their lives in their country's service during the late campaign, and as an estimate which their surviving brethren entertain of their public labours."

The sum of £327 was announced to have been already subscribed by the Medical Officers in Turkey and the Crimea; but as the majority of Officers of the Department who may wish also to support the undertaking, have not yet had an opportunity of subscribing their names; and as a further sum is necessary, to enable the Committee to carry out the design proposed, Subscriptions will be received at the Army Medical Board in London, by John Wimbridge, Esq., the Secretary; by Messrs. McGregor, the Army Agents, at 17, Charles Street, St. James's Square; and by the principal Medical Officers at all stations, at home and abroad.

As it is very desirable that the Subscription List should be closed as speedily as possible, Medical Officers who are anxious to further the cause, will have the goodness to testify the same by forwarding their names to the Principal Medical Officer of each command without delay.

JOHN WYATT,

(COLDESTREAM GUARDS),

Provisional Secretary.

Names of Medical Officers belonging to the Army in Turkey, who have already subscribed.

Amount Subscribed.		Amount Subscribed.	
Inspector Gen of Hosp. Sir John Hall, K.C.B.	10 0 0	Asst. Asst. Staff Surg. J. R.	0 10 0
Deputy Ins. General J. E. Williams	0 10 0	Gen. Baly	0 10 0
" J. E. Taylor, C.R.	1 1 0	" P. Ekin	0 10 0
" T. Alexander, C.R.	2 2 0	" C. Hyde	0 10 0
" A. S. McDowell	1 8 0	" Wm. Hamilton	0 10 0
1st. Class Staff Surg. T. O. Logan	1 10 0	" Wm. H. Leslie	1 8 0
" H. Smith	1 0 0	" H. J. Rose	1 8 0
" S. W. Sall	0 10 0	" W. Bennett	0 10 0
" J. Connell	1 1 0	" G. L. Hinde	0 10 0
" Archd. Gordon, C.R.	2 2 0	" W. Stockwell	0 10 0
" W. Hume	1 1 0	" C. W. J. Moffatt	0 10 0
" J. Poynter	0 10 0	" A. O. Spink	1 8 0
" Frank Roberts	1 0 0	" Jas. J. Leach	1 8 0
" Frank Roberts	1 0 0	" Chas. O'Callaghan	0 10 0
" R. J. Burton	1 1 0	Ord. Medical Depart.	
" Geo. Taylor	1 10 0	Senior Surgeon	2 0 0
" J. Meach, C.R.	1 1 0	Assistant Surgeon	1 0 0
" J. Baines	3 0 0	" John H. Hearn	1 0 0
" J. E. Jameson	5 0 0	" Ed. Babb	1 0 0
" H. Haffey	1 0 0	" Wm. Hargrave	2 8 0
" N. O'Connor	0 10 0	" Jas. Barker	0 10 0
2nd. Class Staff Surg. Hy. R. Smith	2 2 0	" W. G. N. Manley	1 1 0
" Ed. Meunier	0 10 0	" Thos. Tarrant	1 0 0
" Francis Keyfield	1 0 0	" T. J. Orton	1 0 0
" E. W. Young	0 10 0	" C. Daniell	1 0 0
" J. Evans	0 10 0	" E. Burton	1 0 0
" R. C. Walsh	1 0 0	" J. H. Wright	0 10 0
" G. W. P. Sparrow	0 10 0	Gen. Guards, Surgeon	0 10 0
" W. T. Enoch	1 0 0	" J. Wadley	0 10 0
" J. W. Souter	1 0 0	" Asst. Surg. Henry Lawrence	0 10 0
" F. Matthews	1 0 0	" C. Reid	0 10 0
" J. H. Bews	1 0 0	" F. G. Hamilton	0 10 0
" Alex. McArthur	1 0 0	Cold. Gds., Surgeon	0 10 0
" T. M. Barnes	0 10 0	" Asst. Surg. P. Jones	0 10 0
" J. A. Fraser	2 10 0	" J. W. Trotter	0 10 0
" Wm. M. Dowling	1 10 0	" S. Rogers	0 10 0
" Matthew Combe	2 0 0	" John Wyllie	0 10 0
Asst. Staff Surgeon		" A. Ellington	0 10 0
" A. W. F. Fickerton	0 10 0	" G. Percy	0 10 0
" Jas. McN. Rusty	0 5 0	1st Foot	
" Wm. H. Mouchamp	0 10 0	" Asst. Surg. R. B. Smyth	0 5 0
" John Duffin	0 10 0	" Asst. Surg. J. Hawkins	0 5 0
" Geo. Parnock	1 0 0	" Alex. Reid	0 10 0
" Wm. Morris	1 0 0	" Wm. Dumbreck	0 10 0
" J. B. Cockburn	0 10 0	" Thos. Knox Bony	0 5 0
" Wm. Hy. Harris	0 10 0	" A. J. Mackley	0 10 0
" Wm. Ferguson	0 10 0	4th	
" T. Maize	0 10 0	" Surgeon	1 1 0
" Alex. C. Robertson	0 5 0	" Asst. Surg. J. H. Hinde	0 10 0
Asst. Staff Surg. Wm. De Fabock	1 0 0	" Asst. Surg. P. Ekin	0 10 0
" C. M. Young	1 0 0	" Thos. Shelly	0 7 0
" P. Allen	0 10 0	" C. Eickette	0 10 0
" J. Shipton	0 10 0	" Surgeon	0 10 0
" S. Follitt	0 10 0	" Asst. Surg. J. C. Johnston	0 7 0
" Wm. H. Brock	0 10 0	" T. U. Green	0 7 0
" Geo. Fair	0 10 0	" F. W. Madgwick	0 7 0
" Hy. R. Vane	0 10 0	12th	
" D. Grog	0 5 0	" Surgeon	0 10 0
" W. Sharp	1 0 0	" Asst. Surg. W. Brown	0 10 0
" S. Rock	1 0 0	" Surgeon	0 10 0
" Jas. Crockett	0 10 0	" Asst. Surg. T. N. Mackley	0 7 0
" Walker Chiff	0 10 0	" W. H. Price	0 7 0
" J. A. Fells	0 10 0	17th	
		" Surgeon	0 10 0
		" Asst. Surg. T. G. Bond	0 10 0

PROPOSED
MONUMENT TO DECEASED MEDICAL OFFICERS
OF THE ARMY

Who lost their Lives during the late War.

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As it is very desirable that the Subscription List should be closed as speedily as possible, Medical Officers who are anxious to further the cause, will have the goodness to testify the same by forwarding their names to the Principal Medical Officer of each command without delay.

JOHN WYATT,

(COLDESTREAN GUARDS),

Provisional Secretary.

Names of Medical Officers belonging to the Army in Turkey, who have already subscribed.

Amount Subscribed.		Amount Subscribed.	
Inspector, Gen of Hosp. Sir John Hall, K.C.B.	10 0 0	Act. Asst. Staff Surg. J. Rod 0 10 6	
Deputy Ins. General, J. R. Williams 0 10 0		Gen. Baly 0 10 6	
J. E. Taylor, C.B. 1 1 0		F. Eden 0 10 6	
T. Alexander, C.B. 2 2 0		C. Hyde 0 10 6	
A. S. Mc Donnell 1 8 0		Wm. Hamilton 0 10 6	
1st. Class Staff Surg. T. G. Logan 1 10 0		Wm. H. Leslie 0 10 6	
R. Smith 1 0 0		H. J. Rose 1 0 0	
S. W. Sall 0 10 0		W. Russell 0 10 6	
J. Connell 1 1 0		G. L. Hinde 0 10 6	
Archd. Gordon, C. B. 2 2 0		W. Stockwell 0 10 6	
W. Hume 1 1 0		C. W. J. Moffat 1 0 0	
J. Paynter 0 10 0		A. O. Swaine 0 10 6	
Frederick Roberts 1 0 0		Jas. J. Leask 1 0 0	
Frederick Foster 1 0 0		Chas. O'Callaghan 0 10 0	
E. J. Barton 1 1 0		Unt. Medical Depart.	
Gen. Taylor 1 1 0		Senior Surgeon R. C. Elliot 3 0 0	
J. Mount, C.B. 1 1 0		Assistant Surgeon R. Webb 1 0 0	
J. Houston 1 0 0		John H. Hearn 1 0 0	
T. T. Dunscomb 1 0 0		Ed. Babb 1 0 0	
H. Hadley 0 10 6		Wm. Haughton 1 0 0	
N. O'Connor 0 10 6		Joe. Barker 0 10 0	
2nd. Class Staff Surg. Hy. R. Smith 2 2 0		W. G. N. Masley 1 1 0	
Ed. Morley 0 10 0		Thos. Turner 1 0 0	
Francis Reynolds 1 0 0		T. J. Orton 1 0 0	
E. W. Young 0 10 0		C. Russell 1 0 0	
J. Forster 0 10 0		K. Brown 1 0 0	
H. C. Walsh 1 0 0		J. H. Wright 0 10 0	
C. W. T. Sparrow 0 10 0		Gen. Guards, Surgeon G. E. Hinkins 0 10 0	
W. T. Black 0 10 0		J. Wadrop 0 10 0	
J. W. Sander 1 0 0		Asst. Surg. Henry Lawrence 0 10 0	
C. B. Bussan 1 0 0		C. East 0 10 0	
P. Matthews 1 0 0		P. O. Hamilton 0 10 0	
J. H. Dore 1 0 0		Cold. Gds., Surgeon, Joe. Shelton 0 15 0	
Alex. Mr. Arthur 1 0 0		Asst. Surg. F. Brown 0 15 0	
T. M. Barrow 0 10 0		J. W. Trotter 0 15 0	
A. J. Frider 2 10 0		S. Rogers 0 15 0	
Wm. M. Dowling 1 10 0		John Wyatt 0 15 0	
Matthew Combe 2 0 0		Sub. Fus. Gds. As. Sur. F. Robinson 0 10 0	
Asst. Staff Surgeon A. W. P. Pickerton 0 10 0		A. Elkington 0 10 0	
Jas. McK. Barry 0 0 0		G. Pary 0 15 0	
Wm. H. Muschamp 0 10 0		1st Foot Surgeon, Hearn 1 0 0	
John Duffin 0 10 0		Asst. Surg. E. R. Smyth 0 0 0	
Geo. Forrester 1 0 0		Edm. Atkinson 0 0 0	
Wm. Morris 1 0 0		Alex. Bidd 0 10 0	
J. E. Cockburn 0 10 0		Wm. Dunbrack 0 10 0	
W. Hy. Harris 0 10 0		Thos. Kest. Bury 0 0 0	
Wm. Ramsay 0 10 0		A. J. Mackley 0 10 0	
Wm. Ferguson 0 10 0		Surgeon, R. V. Dalziel 1 1 0	
T. Miles 0 10 0		Asst. Surg. A. Hawkins 0 10 0	
Alex. C. Robertson 0 0 0		Surgeon, J. Mearhead 0 10 0	
Act. Asst. Staff Surg. Wm. De Fabock 1 0 0		Surgeon, J. E. Hale 0 7 6	
C. M. Jansop 2 0 0		Thos. Shesley 0 7 6	
P. Allen 0 10 0		C. Roberts 0 10 0	
J. Skipton 0 10 0		Surgeon, R. Thornton 0 12 0	
S. Fellott 0 10 0		Asst. Surg. J. C. Johnston 0 7 6	
Wm. H. Brock 0 10 0		T. C. Oren 0 7 6	
Geo. Fair 0 10 0		P. W. Meadows 0 7 6	
Hy. E. Vase 0 10 0		Surgeon, D. F. Barry 0 10 0	
D. Grog 0 10 0		Asst. Surg. W. Evans 0 10 0	
S. Ross 1 0 0		P. N. Jackson 0 10 0	
W. Sharp 1 0 0		Surgeon, W. Chabrey 0 12 0	
Jas. Craig 0 10 0		Asst. Surg. T. N. Blackley 0 7 6	
Walter Clagg 0 10 0		W. H. Price 0 7 6	
J. A. Fells 0 10 0		Surgeon, W. F. Ward 0 10 0	
		Asst. Surg. T. G. Bond 0 10 0	

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Names of Medical Officers belonging to the Army in Turkey, who have already subscribed.

Amount Subscribed.	£ s. d.	Amount Subscribed.	£ s. d.
Inspect. Gen of Hosp Sir John Hall, K.C.B.	10 0 0	Act. Asst. Staff Surg. J. Red.	0 10 0
Deputy Ins. General, J. R. Williams	0 10 0	Gen. Baly	0 10 0
J. R. Taylor, C.B.	1 1 0	P. Edin	0 10 0
T. Alexander, C.B.	2 2 0	C. Hyde	0 10 0
A. S. Mc Donnell	1 8 0	Wm. Hamilton	0 10 0
1st. Class Staff Surg. T. G. Logan	1 10 0	Wm. H. Leslie	0 10 0
E. Smith	1 0 0	H. J. Rose	0 10 0
S. W. Sall	0 10 0	W. Bennett	0 10 0
J. Connell	1 1 0	G. L. Hinde	0 10 0
Archd. Gordon, C.B.	2 2 0	W. Stockwell	0 10 0
W. House	1 1 0	A. W. J. Moffat	0 10 0
J. Forster	0 10 0	A. O. Swaine	1 6 0
Frederick Roberts	1 0 0	Jas. J. Leach	1 6 0
Frederick Fisher	1 0 0	Chas. O'Callaghan	0 10 0
R. J. Burton	1 1 0	Ordn. Medical Depart.	
Gen. Taylor	1 1 0	Senior Surgeon	E. C. Elliott
J. Meach, C.B.	1 0 0	Assistant Surgeon	L. Webb
J. Denton	1 0 0	John H. Hearn	1 0 0
J. R. Jones	0 10 0	Ed. Babb	1 0 0
H. Hadley	1 0 0	Wm. Hargrave	1 0 0
N. O'Connor	0 10 0	Jos. Barker	0 10 0
2nd. Class Staff Surg. Hy. B. Smith	2 2 0	W. G. N. Mackay	1 1 0
Ed. Menzies	0 10 0	Thos. Curran	1 0 0
Francis Reynolds	1 0 0	T. J. O'Connell	1 0 0
E. W. Young	0 13 0	C. Daniell	1 0 0
J. Deane	0 15 0	E. Bowen	1 0 0
H. C. White	1 0 0	J. H. Wright	0 10 0
G. W. P. Scurry	0 10 0	Ordn. Guards, Surgeon G. E. Hoskins	0 10 0
W. P. Black	0 10 0	J. Wardrop	0 10 0
J. W. Sander	1 0 0	Asst. Surg. Henry Lawrence	0 10 0
C. R. Hamson	1 1 0	C. Bond	0 10 0
P. Matthew	1 0 0	F. G. Hamilton	0 10 0
J. H. Bury	1 0 0	Cold. Gds., Surgeon J. Shalton	0 15 0
Alon. Mc Ariffin	0 10 0	Asst. Surg. J. Evans	0 15 0
T. M. Barrow	0 10 0	J. W. Trotter	0 15 0
J. A. Pryor	2 10 0	S. Rogers	0 15 0
Wm. M. Durling	1 10 0	John Wyatt	0 15 0
Matthew Combe	2 0 0	Sec. Fus. Gds. As. Sur. F. Robinson	0 10 0
Asst. Staff Surgeons		A. Ellington	0 10 0
A. W. P. Fisherton	0 10 0	G. P. P. P.	0 15 0
Jas. McN. Beatty	0 5 0	1st. Foot. Surgeon, Hearn	1 0 0
Wm. H. Macdonald	0 10 0	Asst. Surg. R. B. Smyth	0 5 0
John Duffin	0 10 0	Edm. Aldrich	0 5 0
Gen. Foxwell	1 0 0	Alex. Bell	0 10 0
Wm. Morris	1 0 0	Wm. Dunbar	0 10 0
J. R. Cockburn	0 10 0	A. J. Mackay	0 10 0
W. Hy. Harris	0 10 0	Surgeon, R. V. Deane	1 1 0
Wm. Ferguson	0 10 0	Asst. Surg. A. Hawkins	0 10 0
T. Miles	0 10 0	Surgeon, J. Macdonald	0 10 0
Alex. C. Robertson	0 5 0	Asst. Surg. E. Hale	0 10 0
Asst. Asst. Staff Surg. Wm. De Falock	1 0 0	Thos. Shuck	0 7 0
C. M. Jenop	1 0 0	C. Ricketts	0 10 0
P. Allen	0 10 0	Surgeon, E. Thordick	0 10 0
J. Shipton	0 10 0	Asst. Surg. J. C. Johnston	0 7 0
S. Pollock	0 10 0	T. C. O'Connell	0 7 0
Wm. H. Brock	0 10 0	P. W. Mearns	0 7 0
Gen. Fair	0 10 0	Surgeon, D. P. Barry	0 10 0
Hy. E. Vail	0 10 0	Asst. Surg. W. Brown	0 10 0
D. O'neil	0 5 0	P. N. Jackson	0 10 0
S. Smith	1 0 0	Surgeon, W. Chalmers	0 10 0
W. Sharp	0 10 0	Asst. Surg. T. N. Blackley	0 7 0
Jas. Cruise	0 10 0	W. H. Price	0 7 0
Walter Clegg	0 10 0	Surgeon, W. P. Ward	0 10 0
J. A. Falm	0 10 0	Asst. Surg. T. G. Bond	0 10 0

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Provisional Secretary.

Amount Subscribed			Amount Received		
	\$	c.		\$	c.
Inspectors, Genl. of Hvy. Sir John Hall, K.C.B.	1	0	Art. Asst. Staff Surg. J. Reid	2	0
Deputy Ins. General, J. E. Williams	0	10	"	0	10
" J. E. Taylor, C.B.	1	0	" C. Haly	0	10
T. Alexander, C.B.	1	0	" P. Egan	0	10
" A. S. McDaniel	1	0	" C. Hyatt	0	10
			" Wm. Hamilton	0	10
1st. Class Staff Surg. C. L. Logan	1	10	" Wm. H. Leslie	0	10
" R. Smith	1	0	" H. J. Rose	0	10
" S. W. Hall	1	0	" W. Bennett	0	10
" J. Connell	1	0	" O. L. Rinde	0	10
" Archd. Gordon, C. B.	2	0	" W. Beckwith	0	10
" W. Leslie	1	0	" C. W. J. Medhat	0	10
" J. Forster	0	10	" A. J. Perkins	1	0
" Fredk. Robert	1	0	" Jas. J. Leask	1	0
" Fredk. Fackler	1	0	" Chas. O'Callaghan	0	10
" E. J. Burton	1	0	Ord. Medical Depart.		
" Geo. Taylor	1	0	Sonic Surgeon, C. Elliott	2	0
" J. Mead, C.B.	1	0	Assistant Surgeon, E. Webb	1	0
" J. Beaton	1	0	" John H. Heam	1	0
" J. Jemmett	1	0	" Ed. Webb	1	0
" H. Hadley	1	0	" Wm. Hargrave	1	0
" N. O'Connor	0	10	" Jas. Jackson	0	10
			" W. G. N. May	0	10
2nd. Class Staff Surg. Hy. R. Smith	2	2	" Thos. Tarrant	1	0
" J. W. H. Jones	1	0	" T. Orton	1	0
" Francis Reynolds	1	0	" C. Dunning	1	0
" J. Young	0	13	" E. Brown	1	0
" J. Ewing	1	0	" J. H. Wright	1	0
" G. W. H. White	1	0	" J. W. P. Spross	0	10
" G. W. P. Spross	0	10	" W. T. Black	0	10
" W. T. Black	1	0	" W. T. Sumner	1	0
" W. T. Sumner	1	0	" C. Beaman	1	0
" C. Beaman	1	0	" P. Mathew	1	0
" P. Mathew	1	0	" J. H. Dew	1	0
" J. H. Dew	1	0	" Alex. McArthur	1	0
" Alex. McArthur	1	0	" T. M. Barrow	0	10
" T. M. Barrow	2	10	" J. A. Fraser	2	10
" J. A. Fraser	2	0	" Wm. M. Dowling	2	0
" Wm. M. Dowling	2	0	" Matthew Coomes	0	10
" Matthew Coomes	0	10	" W. A. F. Pickerton	0	10
Asst. Staff Surgeons - A. W. F. Pickerton	0	10	" Jas. M. Bouch	0	10
" Jas. M. Bouch	0	10	" Wm. H. Munchamp	0	10
" Wm. H. Munchamp	0	10	" John Duffin	0	10
" John Duffin	0	10	" Geo. Dawson	0	10
" Geo. Dawson	0	10	" Wm. Morris	0	10
" Wm. Morris	0	10	" J. C. Cockburn	0	10
" J. C. Cockburn	0	10	" W. H. Harter	0	10
" W. H. Harter	0	10	" Wm. Ramsay	0	10
" Wm. Ramsay	0	10	" Wm. Ferguson	0	10
" Wm. Ferguson	0	10	" T. Mince	0	10
" T. Mince	0	10	" Alex. C. Robertson	0	10
" Alex. C. Robertson	0	10			
Art. Asst. Staff Surg. Wm. De Fabock	1	0	" Thos. Sheehy	0	7
" Wm. De Fabock	1	0	" C. Eickette	0	10
" C. M. Finney	1	0	" H. Thorpe	0	10
" P. Allen	0	10	" Asst. Surg. J. Johnston	0	7
" J. Johnston	0	10	" T. Brink	0	10
" S. Bellott	0	10	" P. W. Mead	0	10
" Wm. H. Brock	0	10	" Surgeon - D. P. Barry	0	7
" Wm. H. Brock	0	10	" Asst. Surg. W. P. Hewa	0	10
" Geo. Fair	0	10	" N. J. Jackson	0	10
" H. R. Valleau	0	10	" Surgeon - W. Chalmers	0	13
" D. Grig	0	10	" Asst. Surg. W. H. Price	0	7
" R. Cook	1	0	" Asst. Surg. T. G. Ryan	0	10
" W. Sharp	0	10	" Surgeon - W. H. Price	0	7
" W. Sharp	0	10	" Asst. Surg. T. G. Ryan	0	

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(COLDSTREAM GUARDS),
Provisional Secretary.

Names of Medical Officers belonging to the Army in Turkey, who have already subscribed.

Amount Subscribed.		Amount Subscribed.	
Legation, City of Hong Kong, E.C.B.	10 0 0	Ant. Asst. Staff Surg. J. Red	0 10 0
Deputy Ins. General, J. E. Williams	0 10 0	Gen. Haly	0 10 0
J. R. Taylor, C.B.	1 10 0	F. Eaton	0 10 0
T. Alexander, C.B.	2 2 0	C. Hyde	0 10 0
A. S. McDaniel	1 8 0	Wm. Hamilton	0 10 0
1st Class Staff Surg. T. G. Logan	1 10 0	Wm. H. Leslie	0 10 0
R. Smith	1 0 0	H. J. Rose	0 10 0
S. W. Bell	0 10 0	W. Bennett	0 10 0
J. Connell	1 1 0	G. L. Hulse	0 10 0
Asst. Asst. Surg. C. B. R. R.	2 2 0	W. Stockwell	0 10 0
W. Hines	1 1 0	C. W. J. Moffatt	0 10 0
J. Paynter	0 10 0	A. O. Fawcett	1 6 0
Frank Roberts	1 0 0	J. J. Lusk	1 6 0
Frederick Fisher	1 0 0	Chas. O'Callaghan	0 10 0
E. J. Burton	1 1 0	Ord. Medical Depart.	
Geo. Taylor	1 1 0	Senior Surgeon R. C. Elliott	3 0 0
J. Mount, C.B.	1 1 0	Assistant Surgeon R. Webb	1 0 0
J. B. B. B.	1 0 0	J. H. H. H.	1 0 0
J. B. B. B.	5 0 0	Ed. Babb	1 0 0
H. Hadley	1 0 0	Wm. H. H. H.	1 0 0
N. O'Connor	0 10 0	J. B. B. B.	0 10 0
2nd Class Staff Surg. H. E. Smith	2 2 0	W. G. N. Manley	1 0 0
Ed. M. M.	0 10 0	Thos. T. T.	1 0 0
Francis Reynolds	1 0 0	C. D. D.	1 0 0
E. W. Young	0 11 0	E. B. B.	1 0 0
J. Ewing	0 15 0	J. H. Wright	0 10 0
H. C. W. W.	1 0 0	Gen. Guards, Surgeon G. E. Hinkins	0 10 0
G. W. P. P.	0 10 0	J. W. W.	0 10 0
W. T. Black	0 10 0	Asst. Surg. Henry Lawrence	0 10 0
J. W. S. S.	1 0 0	C. B. B.	0 10 0
C. B. B.	1 1 0	F. G. G.	0 10 0
P. M. M.	1 0 0	Cold. Gds. Surgeon J. S. S.	0 10 0
J. H. H.	1 0 0	Asst. Surg. F. F.	0 10 0
Alex. M. M.	1 0 0	J. W. W.	0 10 0
J. A. A.	2 10 0	S. S.	0 10 0
Wm. M. M.	1 10 0	John W. W.	0 10 0
Matthew C. C.	2 0 0	Son. Fox. Gds. As. Sur. P. P.	0 10 0
Ant. Staff Surgeon A. W. P. P.	0 10 0	A. E. E.	0 10 0
Jas. M. M.	0 5 0	1st Foot Surgeon H. H.	1 0 0
Wm. H. H.	0 10 0	Asst. Surg. R. E. E.	0 10 0
John D. D.	0 10 0	Ed. A. A.	0 10 0
Geo. F. F.	1 0 0	Wm. D. D.	0 10 0
Wm. H. H.	0 10 0	Thos. K. K.	0 10 0
Wm. F. F.	0 10 0	A. J. J.	0 10 0
T. M. M.	0 10 0	Surgeon R. V. V.	1 1 0
Alex. C. C.	0 10 0	Asst. Surg. A. H. H.	0 10 0
Ant. Asst. Staff Surg. Wm. De. De.	1 0 0	Asst. Surg. P. P.	0 10 0
C. M. M.	1 0 0	Thos. S. S.	0 10 0
P. P.	2 10 0	Surgeon R. T. T.	0 10 0
J. J.	0 10 0	Asst. Surg. J. C. C.	0 10 0
S. S.	0 10 0	T. C. C.	0 10 0
Wm. H. H.	0 10 0	P. W. W.	0 10 0
Geo. F. F.	0 10 0	Surgeon D. P. P.	0 10 0
Hy. E. E.	0 10 0	Asst. Surg. W. W.	0 10 0
D. D.	0 10 0	P. N. N.	0 10 0
S. S.	1 0 0	Surgeon W. C. C.	0 10 0
W. W.	0 10 0	Asst. Surg. T. N. N.	0 10 0
Walter C. C.	0 10 0	W. H. H.	0 10 0
J. A. A.	0 10 0	Surgeon W. P. P.	0 10 0
		Asst. Surg. T. G. G.	0 10 0

Amount Subscribed.		Amount Subscribed.	
17th Foot, Asst. Surg. Thos. H. Walker	0 10 0	62nd Foot, Asst. Surg. W. S. S.	0 10 0
18th " Surgeon R. C. C.	0 7 0	Asst. Surg. H. H.	0 10 0
Asst. Surg. J. E. E.	0 7 0	Asst. Surg. W. R. R.	1 0 0
Asst. Surg. W. M. M.	0 7 0	A. T. M. M.	0 10 0
20th " Surgeon Thos. Longmore	0 10 0	Peter S. S.	0 5 0
21st " Surgeon D. D.	0 10 0	Surgeon Thomas O'Leary	0 10 0
Asst. Surg. Jas. H. Smith	0 10 0	Asst. Surg. A. A.	0 5 0
John W. West	0 10 0	Edw. Y. Y.	0 10 0
Surgeon W. G. W.	0 11 0	Asst. Surg. K. O. O.	0 10 0
Asst. Surg. D. D.	0 10 0	A. H. H.	0 7 0
H. H.	0 10 0	W. T. T.	0 7 0
28th Foot, Surgeon R. W. W.	1 10 0	Surgeon T. G. G.	0 10 0
Asst. Surg. W. H. H.	0 10 0	Asst. Surg. A. K. K.	0 10 0
C. G. G.	1 10 0	James Nicholas Bell	0 10 0
Asst. Surg. Chas. H. Terry	0 10 0	John D. D.	0 10 0
Surgeon T. T.	0 15 0	Surgeon R. C. C.	0 10 0
Asst. Surg. W. W.	0 15 0	Asst. Surg. Douglas A. A.	0 7 0
R. H. H.	0 15 0	Edw. W. W.	0 7 0
J. J.	0 7 0	Chas. E. E.	0 10 0
Surgeon W. M. M.	0 13 0	Surgeon David Stewart	0 10 0
Asst. Surg. Thos. Clarke	0 7 0	Asst. Surg. Alex. O. O.	0 10 0
John O. O.	0 7 0	Sam. B. B.	0 10 0
Surgeon W. M. W.	0 13 0	Surgeon Wm. W.	0 10 0
Asst. Surg. R. C. C.	0 7 0	Asst. Surg. Robt. M. M.	0 10 0
E. M. M.	0 7 0	Wm. H. H.	0 10 0
Surgeon F. F.	0 11 0	Surgeon S. H. H.	0 10 0
Asst. Surg. D. D.	0 7 0	Asst. Surg. R. P. P.	0 10 0
J. H. H.	0 7 0	Asst. Surg. J. J.	0 7 0
Surgeon G. G.	0 7 0	E. M. M.	0 7 0
Asst. Surg. A. A.	0 12 0	Asst. Surg. Thos. D. D.	0 10 0
Asst. Surg. A. A.	0 7 0	Thos. T.	0 10 0
Surgeon J. J.	2 2 0	1st. Rifle Regt. Sur. R. R.	0 10 0
Asst. Surg. J. J.	1 0 0	Asst. Surg. R. S. R.	0 10 0
Asst. Surg. P. P.	0 10 0	J. F. F.	0 10 0
T. H. H.	0 10 0	J. P. P.	0 10 0
Asst. Surg. J. J.	0 10 0	2nd. Bat. de Surgeon J. J.	0 10 0
Asst. Surg. W. W.	0 10 0	Cavalry, 11th Hussars, R. M. M.	1 10 0
Asst. Surg. W. W.	0 10 0	2nd. Dragoon, T. R. R.	1 10 0
Asst. Surg. W. W.	0 10 0	4th Dragoon, Edw. C. C.	2 10 0
Asst. Surg. W. W.	0 10 0	13th Dragoon, F. H. H.	1 10 0
Asst. Surg. W. W.	0 10 0	Asst. Surg. P. W. P.	1 10 0
Asst. Surg. W. W.	0 10 0	C. C. C.	1 10 0
Asst. Surg. W. W.	0 10 0	11th Hussars, O. B. B.	1 10 0
Asst. Surg. W. W.	0 10 0	4th Dragoon, Wm. W.	1 10 0
Asst. Surg. W. W.	0 10 0	Civil Surgeon H. T. T.	1 10 0
Asst. Surg. W. W.	0 10 0	H. H.	1 10 0
Asst. Surg. W. W.	0 10 0	J. H. H.	1 10 0
Asst. Surg. W. W.	0 10 0	Wm. W.	1 10 0
Asst. Surg. W. W.	0 10 0	J. W. W.	1 10 0
Asst. Surg. W. W.	0 10 0	C. F. F.	1 10 0
Asst. Surg. W. W.	0 10 0	M. M.	1 10 0
Asst. Surg. W. W.	0 10 0	J. M. M.	1 10 0
Asst. Surg. W. W.	0 10 0	J. C. C.	1 10 0
Asst. Surg. W. W.	0 10 0	A. R.	2 10 0
Asst. Surg. W. W.	0 10 0	Pathologist Robt. D. D.	1 10 0
Asst. Surg. W. W.	0 10 0	Parvayer Chas. H. H.	2 0 0
Asst. Surg. W. W.	0 10 0	E. E.	0 10 0
Asst. Surg. W. W.	0 10 0	Medical Clerk Thos. C. C.	0 10 0
Asst. Surg. W. W.	0 10 0	J. J. J.	0 10 0
Asst. Surg. W. W.	0 10 0	Ed. H. H.	0 10 0
Asst. Surg. W. W.	0 10 0	Dispensary Jas. F. F.	0 5 0
Asst. Surg. W. W.	0 10 0	Ed. A. A.	0 5 0
Asst. Surg. W. W.	0 10 0	Robt. H. H.	0 5 0

Amount Subscribed.		Amount Subscribed.	
£ s. d.		£ s. d.	
Dispensary	John Brewer	0 7 0	
	A. W. Ward	0 10 0	
Dryers	E. M. Morgan	0 10 0	
	F. Rogers	0 10 0	
	B. L. Hawkins	1 0 0	
<i>Subscriptions from Societies.</i>			
Inspector Gen.	Wm. Linton, C.B.	5 0 0	
Deputy	W. Oakeshott	2 0 0	
	Edm. Laven	5 0 0	
	W. C. Humphrey	2 0 0	
1st Class Staff Surg.	J. D. McIlhenny	2 0 0	
	W. Dancy	1 0 0	
	E. W. Stone	1 0 0	
	Thos. Hunter	1 0 0	
	J. S. Treadwell	1 0 0	
	Geo. G. Robertson	1 0 0	
	J. T. Telford	1 0 0	
	J. O. C. Tice	1 0 0	
	Geo. Anderson	2 0 0	
	Hy. Davies	1 0 0	
2nd Class Staff Surg.	J. Summers	1 0 0	
	Thos. Guy	1 0 0	
	A. L. Adams	1 0 0	
	D. S. E. Bain	1 0 0	
	J. E. Harvey	1 0 0	
	Fairbairn	1 0 0	
	O. S. Donnell	1 0 0	
	Williamson	1 0 0	
Asst. Staff Surg.	G. M. Slaughter	1 0 0	
	E. H. Dickerson	1 0 0	
	P. Kilgus	0 10 0	
	Alfred J. L. Hewarth	0 10 0	
	Oliver Barnell	1 0 0	
	Chas. Bondy	1 0 0	
	David B. Hine	0 10 0	
	Thos. C. Bole	1 0 0	
	G. M. G. Carles	1 0 0	
	Edward Mc Gill	1 0 0	
	Leach	0 10 0	
Act. Assistant Surg.	Samuel Job	0 10 0	
	Edwin Wilson	0 10 0	
	George G. Robertson	0 10 0	
	George F. Barton	0 10 0	
	W. R. Mackley	0 10 0	
	John O. Campbell	1 0 0	
	Charles Buckley	1 0 0	
	John D. Healy	0 10 0	
	James Gray	1 0 0	
	Mitchell	1 0 0	
	Wm. Alex. Barr	1 0 0	
	John Lloyd	0 10 0	
	Tortius Ball	0 10 0	
	W. H. Jenkins	0 10 0	
Dep. In. General	Thos. D. Hunt	1 0 0	
1st Class Staff Surg.	Dr. E. Tompkins	0 10 0	
2nd Class Staff Surg.	H. D. Fowler	0 10 0	
	Asst. Surg. E. Jacob	0 7 0	
Art. Assistant Surg.	H. J. Phillips	1 0 0	
Regd. Art. Asst. Surg. Samuel Cook		0 7 0	
8th Foot Asst. Surg. Wm. Carlew Row		0 7 0	
2nd Class Staff Surg. Geo. S. King		1 0 0	
2nd Class Staff Surg. J. Jackson		1 0 0	
<i>Since Subscribed.</i>			
Director General	Dr. Smith	10 0 0	
2nd Foot Surg.	Dr. D. Fowler	25 0 0	
Dep. Inspector Gen.	Dr. Forrest, C.B.	3 0 0	
	Dr. Dan	3 0 0	
Colonel McMurdo	Dr. Danbrook, C.B.	1 0 0	
Staff Surgeon	McGinger	2 0 0	
	C. R. McGinger, Esq.	20 0 0	
	2nd Class Staff Surg. Dr. Lilling	1 0 0	
	Dr. Dims	2 0 0	
	Dr. Dims	1 0 0	
	Dr. Danbrook, C.B.	1 0 0	
	Staff Assistant Surg. T. Fitzgerald	1 0 0	

Amount Subscribed.		Amount Subscribed.	
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17th Foot Asst. Surg. Thos. H. Walker		0 10 0	
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Amount Subscribed.		Amount Subscribed.	
Dispersers	John Brewer	2 7 0	
Dressers	A. W. Warden	0 10 0	
	F. M. Morgan	0 10 0	
	F. Baynes	0 10 0	
	B. L. Hawkins	1 0 0	
Subscriptions from Soldiers.			
Inspector Gen.	Wm. Linton, C.B.	5 0 0	
Deputy	W. C. Crankshaw	2 0 0	
	Edie Lavers	2 0 0	
	W. C. Humphrey	2 0 0	
1st Class Staff Surg.	J. D. McIlhenny	2 0 0	
	W. Denny	1 0 0	
	E. W. Stone	1 0 0	
	Thos. Hunter	2 0 0	
	J. S. Fenderson	1 0 0	
	Geo. D. Robertson	1 0 0	
	J. T. Teller	1 0 0	
	J. G. C. Tate	1 0 0	
	Geo. Anderson	2 0 0	
	Hy. Downes	1 0 0	
2nd Class Staff Surg.	J. Sumner	1 0 0	
	Thos. Guy	1 0 0	
	A. L. Adams	1 0 0	
	D. S. E. Bidd	1 0 0	
	J. E. Harvery	1 0 0	
	Parham	1 0 0	
	O. S. Donnell	1 0 0	
	Wellington Poole	1 0 0	
Asst. Staff Surgeon.	G. M. Slaughter	1 0 0	
	E. H. Pickerson	1 0 0	
	P. Kiger	1 0 0	
	Alfred J. L. Hayward	1 0 0	
	Oliver Russell	1 0 0	
	Chas. Benney	1 0 0	
	David B. Hise	1 0 0	
	Thos. C. Beale	1 0 0	
	G. M. O. Carlsen	1 0 0	
	Edward Mc Gill	1 0 0	
	Leach	1 0 0	
Art. Assistant Surg.	Samuel Job	0 10 0	
	Edwin Wilson	0 10 0	
	George G. Robertson	0 10 0	
	W. B. Mackey	0 10 0	
	John O. Campbell	1 0 0	
	Charles Buckley	1 0 0	
	John D. Healy	0 10 0	
	James Cressy	1 0 0	
	Michael	1 0 0	
	Wm. Alex. Barr	1 0 0	
	John Grant	0 10 0	
	Tortice Hall	0 10 0	
	W. H. Jenkins	0 10 0	
Dep. In. General.	Thos. D. Hume	1 0 0	
1st Class Staff Surgeon.	Dr. E. T. Truett	0 10 0	
2nd Foot Surgeon.	H. D. Fowler	0 10 0	
	Asst. Surg. A. E. Jacob	0 7 0	
Asst. Assistant Surg. H. P. Taylor		0 7 0	
Asst. Art. Surg. Samson Rich		0 7 0	
Asst. Foot Surg. Wm. Corder Roe		0 7 0	
2nd Class Staff Surg. Geo. S. King		1 0 0	
2nd Class Staff Surg. J. Jackson		1 0 0	
Since Subscribed.			
Director General.	Dr. Smith	10 0 0	
	Sir Jas. McGregor, Bart.	25 0 0	
Dep. Charles Minto Clark, Bart.		10 0 0	
Dep. Inspector Gen.	Dr. Forrest, C.B.	3 0 0	
	Dr. Dumbreck, C.B.	3 0 0	
Colonel McMurdo		1 0 0	
Staff Surgeon	McGregor	2 0 0	
Cavalry.			
Royal Dragoon Surgeon.	A. Fortsch	1 0 0	
Asst. Surg. H. Sherlock		1 0 0	
2nd Dragoon Gds.	C. J. White	0 10 0	
4th Light Dragoon Surg.	E. Knoll	1 0 0	
Asst. Surg. David Cullen		0 10 0	
8th Hussars Surgeon.	A. F. Lockwood	1 0 0	
10th	Fraser	1 0 0	
13th Lt. Dragoon	A. D. Hume	1 0 0	
15th Lancers	G. A. Tombell	1 0 0	
	Dudley E. Wolworth	1 0 0	
17th Lancers Surgeon.	H. Massey	1 0 0	
Asst. Surg. St. John Stanley		1 0 0	
King's Dr. Gds.	Edm. F. Andrews	1 0 0	
Civil Surgeon			
	Robt. Mason	1 0 0	
	P. Pincoff	2 0 0	
	Thos. Nicholas	1 0 0	
	Chas. Bryce	2 0 0	
	Chas. D. Donohoe	1 0 0	
	Wm. Knight	1 0 0	
	John L. Jardine	1 0 0	
	Dr. Robinson	1 0 0	
	E. Woulston	1 0 0	
	H. B. Hall	1 0 0	
	R. L. Malin	1 0 0	
R. I. C. Service	Dr. McRae	1 0 0	
Pathologist	Dr. Aldin	2 0 0	
Sanitary Com.	Dr. Milroy	2 0 0	
Artillery Surgeon	R. S. Prochaps	1 0 0	
	John A. McKinn	1 0 0	
	J. Little	0 10 0	
	J. H. Halahan	0 10 0	
2nd Queen's As. Surg. Dr. Nelson		1 0 0	
30th	S. M. Webb	2 0 0	
60th	Jas. Macartney	0 10 0	
72nd	Edmond H. Roberts	0 10 0	
95th	John Clarke	1 0 0	
Purveyor	P. O. Hagger	1 0 0	
Clerk	Chas. E. Wrench	1 0 0	
	Wm. Moss Parks	1 0 0	
Dispersers	J. Thomas	0 10 0	
	Chas. Mount	0 10 0	
	Loren Harvey	0 10 0	
	W. Hy. Dunsford	0 10 0	
	Wm. J. Barker	1 0 0	
	Mr. Baskely	0 10 0	
Dressers	E. H. Elliot	1 0 0	
	Walter John	0 10 0	
	John Stewart	1 0 0	
	Mr. Winkson	0 10 0	
2nd Class Staff Surg. H. Black		0 10 0	
Asst. Staff Surgeon	J. C. Knapp	0 10 0	
Asst. Assistant	H. J. Mayhew	0 10 0	
Dispenser	Alfred James	0 10 0	
Apothecary	F. Fennenden	0 10 0	
Book-keeper M. Sturvell	J. H. Black	0 10 0	
Dispenser	F. Philpot	0 10 0	
	J. E. Kenney	1 0 0	

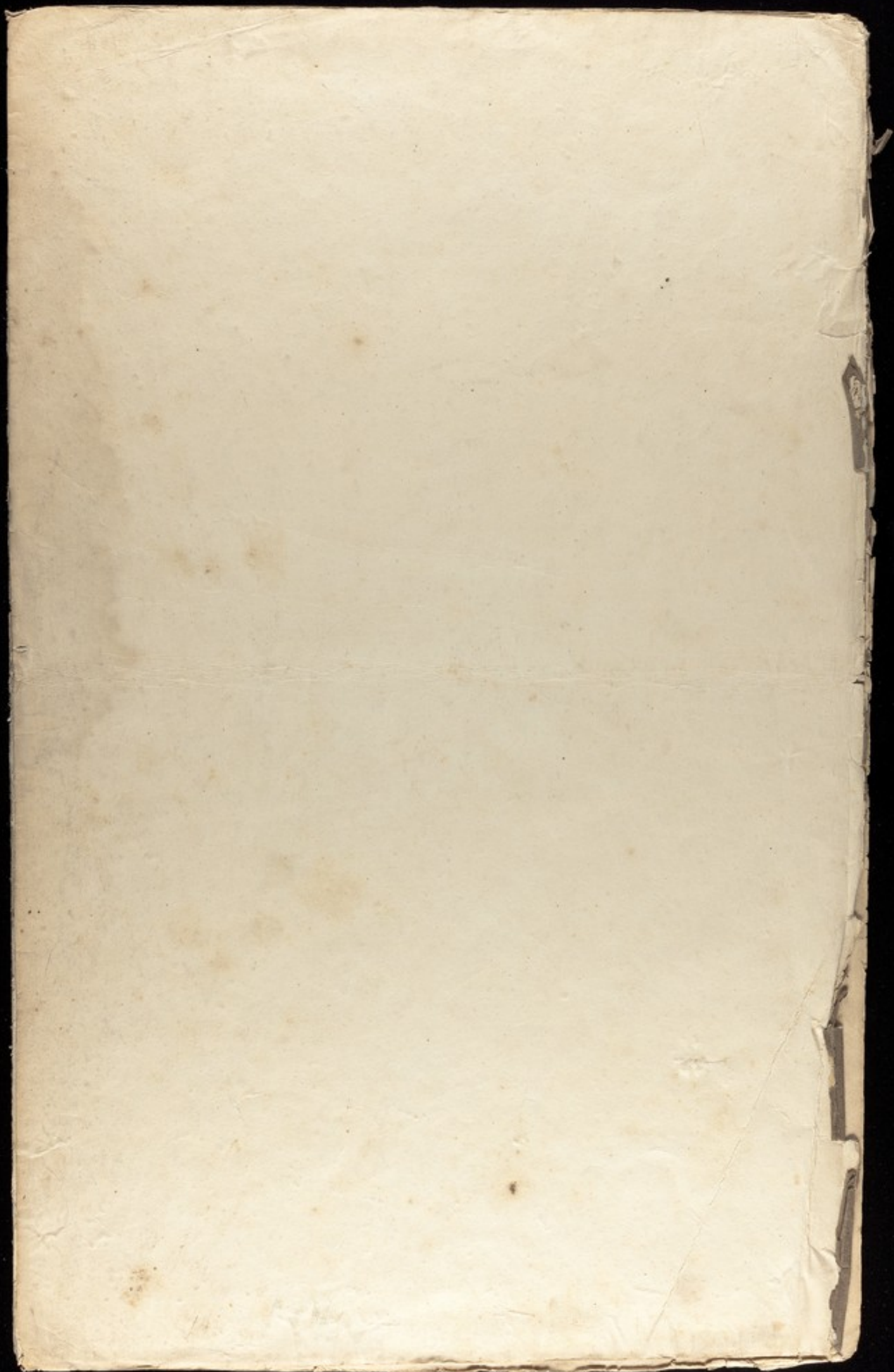
Amount Subscribed.		Amount Subscribed.	
17th Foot.	Asst. Surg. Thos. H. Walker	0 10 0	
18th	Surgeon.	E. C. Ryall	0 7 0
	Asst. Surg. J. R. Philip	0 7 0	
19th	Surgeon.	Thos. Coopers	0 10 0
	Asst. Surg. W. M. Webb	0 7 0	
20th	Surgeon.	Ed. Howard	0 10 0
	Asst. Surg. H. W. Carter	0 5 0	
21st	Surgeon.	D. McKinnon	0 10 0
	Asst. Surg. Jas. H. Smith	0 5 0	
22nd	Surgeon.	W. G. Watt	0 10 0
	Asst. Surg. D. Woods	0 7 0	
	H. Sylvester	0 7 0	
23rd Foot.	Surgeon.	R. W. Melow	1 0 0
	Asst. Surg. W. H. Beise	0 7 0	
	C. O. Irwin	1 0 0	
	F. P. Stewart	1 0 0	
24th	Asst. Surg. Chas. H. Tovey	0 10 0	
25th	Surgeon.	T. Allison	0 15 0
	Asst. Surg. W. Grant	0 15 0	
	R. H. Bask	0 15 0	
26th	Surgeon.	W. M. Muir	0 13 0
	Asst. Surg. Thos. Clarke	0 7 0	
	John Ogilvy	0 7 0	
27th	Surgeon.	J. H. Dwyer	0 13 0
	Asst. Surg. R. C. Worthington	0 7 0	
	Wm. Howard	0 7 0	
28th	Surgeon.	E. M. French	0 7 0
	Asst. Surg. D. Lawler	0 7 0	
29th	Surgeon.	F. F. Wall	0 13 0
	Surgeon.	G. Woodman	0 13 0
	Asst. Surg. A. Humphrey	0 7 0	
	F. P. Stewart	0 7 0	
30th	Asst. Surg. Thos. Lightwood	2 0 0	
31st	Surgeon.	J. E. Scott	0 0 0
	Asst. Surg. J. Brown	0 10 0	
	R. Hungerford	0 10 0	
	A. D. Gollard	0 10 0	
32nd	Surgeon.	J. S. Purling	1 0 0
	Asst. Surg. W. A. McKinnon	0 10 0	
	Alex. MacLenn	0 10 0	
33rd	Surgeon.	J. H. Hooper	0 10 0
	Asst. Surg. L. Butler	0 7 0	
34th	Surgeon.	V. Vith	1 0 0
	Asst. Surg. Chas. Dunsford	0 10 0	
	R. R. Scott	0 10 0	
35th	Surgeon.	W. M. Veld	0 10 0
	Asst. Surg. H. G. G. White	0 10 0	
36th	Surgeon.	Geo. Rabin	0 10 0
	Asst. Surg. Jas. Hansen	0 10 0	
	Wm. M. Ockler	0 10 0	
37th	Surgeon.	P. S. Warren	0 10 0
	Asst. Surg. F. G. Davis	0 7 0	
38th	Asst. Surg. W. I. Randall	0 10 0	
	Jas. M. H. Cowan	0 10 0	
39th	Surgeon.	W. Deale	0 10 0
	Asst. Surg. P. Knox	0 7 0	
	R. C. Taylor	0 7 0	
	S. S. Skipton	0 7 0	
40th	Surgeon.	William Mc Andrew	0 10 0
	Asst. Surg. Thomas Brady	0 10 0	
	E. Williams	0 5 0	
41st	Asst. Surg. G. Young	0 7 0	
42nd	Surgeon.	D. Hainley	1 0 0
	Asst. Surg. J. Young	0 10 0	
	Sidney Alder	0 10 0	
43rd Foot.	Asst. Surg. W. S. Randall	0 10 0	
44th	Surgeon.	H. Crisp	0 10 0
	Asst. Surg. W. E. Mills	1 0 0	
	A. T. M. O'Connell	0 10 0	
	Peter S. Hony	0 5 0	
45th	Surgeon.	Thomas O'Leary	0 10 0
	Asst. Surg. A. Johnson	0 5 0	
	Edward Y. Kellott	0 5 0	
46th	Surgeon.	James	0 10 0
	Asst. Surg. H. O. Burton	0 7 0	
	J. Hony	0 7 0	
	W. T. Polidanos	0 7 0	
47th	Surgeon.	J. O. Scott	0 13 0
	Asst. Surg. A. R. Drisdale	0 10 0	
	James Nicholas Bell	0 10 0	
	R. L. Lindy	0 10 0	
48th	Surgeon.	John Dunlop	0 13 0
	Surgeon.	R. C. Anderson	0 15 0
	Asst. Surg. Douglas A. Reid	0 7 0	
	Robt. W. Jackson	0 7 0	
	Chas. R. Nelson	0 10 0	
49th	Surgeon.	David Stewart	0 10 0
	Asst. Surg. Alex. Grier	0 10 0	
	Saml. B. Roe	0 10 0	
50th	Surgeon.	Wm. Murray	0 10 0
	Asst. Surg. Robt. Menzies	0 10 0	
	Wm. Hy. Fullard	0 10 0	
	Surgeon.	S. H. Patten	0 10 0
	Asst. Surg. L. Ferguson	0 10 0	
	Asst. Surg. J. Purdie	0 7 0	
	F. M. Sinclair	0 7 0	
	Asst. Surg. Thos. Deane	0 10 0	
	Thos. Trevan	0 10 0	
	Asst. Surg. R. S. R. F. De Chamant	0 10 0	
	J. Longhead	0 10 0	
	J. P. Williams	0 10 0	
	Asst. Surg. J. Fraser	0 15 0	
51st	Surgeon.	G. H. Finley	0 7 0
	Cavalry.	H. H. Howard	1 0 0
	Asst. Surg. W. R. M. Cross	1 0 0	
52nd	Dr. Dragoon.	T. R. Bush	1 0 0
53rd	Dr. Dragoon.	Robt. Cooper	2 0 0
	F. H. Butler	1 0 0	
	Asst. Surg. F. W. E. Grylls	1 0 0	
54th	Dr. Dragoon.	C. C. Buchanan	1 0 0
	O. E. Miller	1 0 0	
	Wm. Mansel	1 0 0	
Civil Surgeon			
	H. T. Roche	1 0 0	
	H. Eakin	1 0 0	
	J. H. Lakin	1 0 0	
	Wm. Edlows	1 0 0	
	C. F. Hulse	1 0 0	
	C. F. Mansel	1 0 0	
	J. Murray	1 0 0	
	J. C. Woodworth	1 0 0	
	A. E.	2 0 0	
Pathologist	Robt. D. Lyons	1 0 0	
Purveyor	Chas. H. Teller	2 0 0	
Medical Clerk	E. Morris	0 10 0	
	J. J. Morris	0 10 0	
	Ed. H. Michael	0 10 0	
Dispersers	Jas. Fitz	0 5 0	
	Ed. Albery	0 10 0	
	Robt. Harrison	0 5 0	

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Amount Scheduled		Amount Paid	
17th Foot	Aust. Surg. Thos. H. Walker	0 10	0 10
18th	Surgon, C. R. Bryant	0 10	0 10
	Aust. Surg. E. E. Phillip	0 7 6	0 7 6
	Surgon, Thos. Longmore	0 13 6	0 13 6
	Aust. Surg. W. W. W. W.	0 13 6	0 13 6
20th	Surgon, Ed. Howard	0 10	0 10
	Aust. Surg. J. J. J. J.	0 10	0 10
21st	Surgon, D. McKinnon	0 10	0 10
	Aust. Surg. Jas. H. Smith	0 10	0 10
	John W. W.	0 10	0 10
22nd	Surgon, W. G. Watt	0 13 6	0 13 6
	Aust. Surg. D. Woods	0 13 6	0 13 6
	H. Blythe	0 13 6	0 13 6
23rd Foot	Surgon, W. W. Marlow	0 13 6	0 13 6
	Aust. Surg. J. J. J. J.	0 13 6	0 13 6
	C. O. Irwin	1 10	1 10
	Aust. Surg. Jas. H. Stewart	0 13 6	0 13 6
24th	Surgon, Thos. A. H. Thompson	0 10	0 10
30th	Surgon, T. Atkinson	0 13 6	0 13 6
	Aust. Surg. W. G. Watt	0 13 6	0 13 6
	H. Blythe	0 13 6	0 13 6
31st	Surgon, W. W. Marlow	0 13 6	0 13 6
	Aust. Surg. J. J. Stewart	0 13 6	0 13 6
32nd	Surgon, W. W. Marlow	0 13 6	0 13 6
	Aust. Surg. Thos. Clarke	0 7 6	0 7 6
34th	Surgon, J. H. P. P.	0 7 6	0 7 6
	Aust. Surg. R. C. Worthington	0 7 6	0 7 6
	W. W. W.	0 7 6	0 7 6
	E. M. Wrench	0 7 6	0 7 6
35th	Surgon, J. F. Wall	0 13 6	0 13 6
	Aust. Surg. J. J. Stewart	0 13 6	0 13 6
	J. H. P. P.	0 13 6	0 13 6
39th	Surgon, G. Goodman	0 12 6	0 12 6
	Aust. Surg. A. Humphrey	0 12 6	0 12 6
	J. P. Street	0 12 6	0 12 6
40th	Aust. Surg. Longmore	0 10	0 10
41st	Surgon, J. E. Scott	0 10	0 10
	Aust. Surg. F. Abbott	0 10	0 10
	R. H. H.	0 10	0 10
	A. D. Gifford	0 10	0 10
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	Alfred McLean	0 10	0 10
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	Aust. Surg. R. L. Butler	0 7 6	0 7 6
	Surgon, C. V. V.	0 7 6	0 7 6
	Aust. Surg. Chas. Dempster	0 10	0 10
	E. E. E.	0 10	0 10
47th	Surgon, W. W. W.	0 10	0 10
	Aust. Surg. H. Gray	0 10	0 10
	Wm. Alex. H.	0 10	0 10
48th	Surgon, Geo. Hession	0 10	0 10
49th	Aust. Surg. Jas. Hamlin	0 10	0 10
	J. F. F.	0 10	0 10
	Wm. M. Cahler	0 10	0 10
50th	Surgon, H. W. W.	0 7 6	0 7 6
	Aust. Surg. F. G. Davis	0 7 6	0 7 6
53th	Aust. Surg. W. L. Bredell	0 10	0 10
	Jas. Mc. L.	0 10	0 10
54th	Surgon, W. Debbie	0 12 6	0 12 6
	Aust. Surg. F. K.	0 7 6	0 7 6
	D. C. Taylor	0 7 6	0 7 6
	S. S. S.	0 7 6	0 7 6
	Aust. Surg. Thomas Brady	0 2 0	0 2 0
	R. Williams	0 2 0	0 2 0
60th	Surgon, D. Young	1 0	1 0
62nd	Surgon, D. Hamby	1 0	1 0
	Aust. Surg. J. Young	0 10	0 10
	Silber Alder	0 10	0 10
62nd Foot	Aust. Surg. W. S. Bland	0 10	0 10
63rd	Surgon, W. S. Bland	0 10	0 10
	Aust. Surg. W. S. Bland	0 10	0 10
	A. F. M. Corbett	0 10	0 10
	Peter Lory	0 10	0 10
64th	Surgon, Thomas O'Leary	0 10	0 10
	Aust. Surg. A. J. J.	0 10	0 10
	Edw. N. Kellie	0 10	0 10
	Surgon, James	0 10	0 10
72nd	Surgon, James	0 10	0 10
77th	Surgon, James	0 10	0 10
	A. H. H.	0 7 6	0 7 6
	A. H. H.	0 7 6	0 7 6
	W. T. T.	0 7 6	0 7 6
79th	Surgon, T. G. Scott	0 13 6	0 13 6
	Aust. Surg. A. K.	0 13 6	0 13 6
	James Nicholas Bell	0 13 6	0 13 6
	E. L. Lundy	0 13 6	0 13 6
80th	Surgon, Jas. H. H.	0 13 6	0 13 6
	Surgon, R. C. Anderson	0 13 6	0 13 6
	Aust. Surg. Douglas A. Bell	0 7 6	0 7 6
	R. W. W.	0 7 6	0 7 6
	Chas. R. Nelson	0 7 6	0 7 6
92nd	Surgon, David Scott	0 10	0 10
	Aust. Surg. Alex. Riser	0 10	0 10
	Saml. R. Groe	0 10	0 10
93rd	Surgon, Wm. Marlow	0 10	0 10
	Aust. Surg. Robt. Menzies	0 10	0 10
	W. T. T.	0 10	0 10
95th	Surgon, S. H. Farnes	0 10	0 10
	Aust. Surg. B. Ferguson	0 10	0 10
97th	Aust. Surg. J. Porter	0 7 6	0 7 6
	E. M. Sinclair	0 7 6	0 7 6
	"The Buff" Surgon, Jos. Burke	0 10	0 10
	Aust. Surg. Thos. A. H.	0 10	0 10
	Thos. Twopen	0 10	0 10
1 Bat. 8th Light	Surg. B. B. B.	0 10	0 10
	Aust. Surg. B. B. B.	0 10	0 10
	J. F. Longhead	0 10	0 10
	J. W. W.	0 10	0 10
2nd Bat. 8th Foot	Surg. J. Fraser	0 15 0	0 15 0
	G. H. Flisy	0 15 0	0 15 0
Cavalry, 11th Hussars	R. M. G. G.	1 10	1 10
2nd Reg. Sargon	T. B. Beach	1 10	1 10
4th Reg. Sargon	C. G. B. B.	1 10	1 10
6th Dragoon	F. H. Baxter	1 10	1 10
	Aust. Surg. W. W. H. Grylls	1 10	1 10
2nd	C. G. B. B.	1 10	1 10
11th Hussars	O. B. Miller	1 10	1 10
4th Reg. Gds.	Wm. Mansmann	1 10	1 10
Civil Sargon	H. T. Rocks	1 10	1 10
	H. T. Rocks	1 10	1 10
	J. H. Lakin	1 10	1 10
	W. W. W.	1 10	1 10
	W. W. W.	1 10	1 10
	C. F. Mansner	1 10	1 10
	McLeod	1 10	1 10
	J. Murray	1 10	1 10
	J. C. Wordsworth	1 10	1 10
	A. A.	1 10	1 10
Pathologist	Robt. D. Lyons	1 10	1 10
Paraphrase	Chas. H. Toller	2 0 0	2 0 0
	E. Morris	0 10 6	0 10 6
Medical Clerk	Thos. Carlin	0 10 6	0 10 6
	J. J. Morris	0 10 6	0 10 6
	Ed. H. Mischel	0 10 6	0 10 6
Dispensary	Jas. Pitt	0 5 0	0 5 0
	Ed. H. Mischel	0 5 0	0 5 0
	Robt. Harrison	0 5 0	0 5 0

		Amount Subscribed.				Amount Subscribed.	
		£	s. d.			£	s. d.
Dispensers	John Brewer	0	7 0	Cavalry.			
	A. W. Warden	0	10 6	Royal Drag. Surgeon.	A. Forteach	1	0 0
Dressers	E. M. Morgan	0	10 6		Asst. Surg. H. Sherlock	1	0 0
	F. Bayntun	0	10 6	3rd. Drag. Gds.	C. J. White	0	10 0
	B. L. Hawkins	1	0 0	4th Light Drag. Surg.	R. Kendall	1	0 0
<i>Subscriptions from Scutari.</i>					Asst. Surg. David Cullen	0	10 0
Inspector Gen.	Wm. Linton, C.B.	5	0 0	8th Hussars Surgeon.	A. F. Lockwood	1	0 0
Deputy	W. Cruikshank	2	0 0	10th	— Frazer	1	0 0
	Robt. Lawson	5	0 0	13th Lt. Drag.	A. D. Home	1	0 0
	W. C. Humphrey	2	0 0	12th Lancers	G. A. Turnbull	1	0 0
1st Class Staff Surg.	J. D. Mc Ilbree	2	0 0		Dudley E. Wodsworth	1	0 0
	W. Denny	1	0 0	17th Lancers Surgeon.	H. Massey	1	0 0
	E. W. Stone	1	0 0		Asst. Surg. St. John Stanley	1	0 0
	Thos. Hunter	2	2 0	King's Dg. Gds.	Robt. F. Andrews	1	0 0
	J. S. Prendergast	1	1 0	Civil Surgeon	Robt. Mason	1	1 0
	Geo. G. Robertson	1	1 0		P. Pincoff	2	2 0
	J. T. Telfer	1	1 0		Thos. Nicholas	1	0 0
	J. G. C. Tice	1	1 0		Chas. Bryce	2	2 0
	Geo. Anderson	2	0 0		Chas. D. Domborg	1	0 0
	Hy. Downes	1	1 0		Wm. Knight	1	1 0
2nd Class Staff Surg.	J. Summers	1	0 0		John L. Jardine	1	1 0
	Thos. Guy	1	0 0		Dr. Brabazon	1	0 0
	A. L. Adams	1	0 0		R. Woolaston	1	0 0
	D. S. E. Bain	1	0 0		H. B. Hall	1	0 0
	J. E. Harvery	1	0 0		R. L. Madox	1	0 0
	Fairbairn	1	0 0	E. I. C. Service	Dr. McEgan	1	0 0
	O. S. Donnell	1	0 0	Pathologist	Dr. Aitkin	2	2 0
	Wellington Poole	1	0 0	Sanitary Com.	Dr. Milroy	2	2 0
Asst. Staff Surgeon.	G. M. Slaughter	1	0 0	R. Artillery Surgeon.	E. S. Protheroe	1	0 0
	E. H. Dickerson	1	1 0		John A. McMunn	1	0 0
	P. Kilgour	0	10 0		J. Little	0	10 0
	Alfred J. L. Hepworth	0	10 0		J. H. Halahan	0	10 0
	Oliver Barnell	1	0 0	2nd Queen's; As. Sur.	Dr. Holton	1	0 0
	Chas. Beaufoy	1	1 0	36th	S. M. Webb	1	1 0
	David B. Hine	1	0 0	60th	Jas. Macartney	0	10 0
	Thos. C. Beale	1	1 0	72nd	Edmond H. Roberts	0	10 0
	G. M. G. Carolan	1	1 0	95th	John Clarke	1	1 0
	Edward Mc Gill	1	1 0	Purveyor	F. O. Hagger	1	1 0
	Leach	0	10 0		Clerk. Chas. E. Wrench	1	1 0
Act. Assistant Surg.	Samuel Job	0	10 0		Wm. Moss Parks	1	1 0
	Edwin Wilson	0	10 0	Dispensers	J. Thomas	0	10 0
	George G. Robertson	0	10 0		Chas. Mount	0	10 0
	George P. Barton	0	10 0		Logan Harvey	0	10 0
	W. B. Mackley	0	10 0		W. Hy. Dunsford	0	10 0
	John G. Campbell	1	1 0		Wm. J. Barker	1	1 0
	Charles Buckley	1	0 0		Mr. Blakely	0	10 0
	John D. Healy	0	10 0	Dressers	E. H. Elliot	1	1 0
	James Creasy	1	1 0		Walter John	0	10 0
	Mitchell	1	1 0		John Stewart	1	1 0
	Wm. Alex. Barr	1	1 0		Mr. Wilkinson	0	10 0
	John Grant	0	10 0	2nd Class Staff Surg.	H. Huish	0	10 6
	Tertius Ball	0	10 0	Asst. Staff Surgeon.	J. C. Knipe	0	10 6
	W. H. Jenkins	0	10 0	Act. Assistant	H. J. Mayhew	0	10 0
Dep. In. General.	Thos. D. Hume	1	1 0	Dispenser	Alfred James	0	10 6
1 C. Staff Surgeon.	Dr. R. Templeton	1	1 0	Apothecary	F. Fernandez	0	10 6
82nd Foot Surgeon.	H. D. Fowler	0	10 0	Book-keeper	M. Stores H. J. Blelock	0	10 6
	Asst. Surg. A. E. Jacob	0	7 6	Dispensor.	F. Philpot	0	10 6
Act. Assistant Surg.	H. J. Phillips	1	1 0		J. E. Kersey	1	1 0
Royal. Art. Asst. Surg.	Samson Roch	0	7 6	Since Subscribed.			
89th Foot, Asst. Surg.	Wm. Cardew Roe	0	7 6	Director General	Dr. Smith	10	0 0
2nd Class Staff Surg.	Geo. S. King	1	1 0		Sir Jas. McGregor, Bart.	25	0 0
2nd Class Staff Surg.	J. Jackson	1	1 0	Sir Charles Mansfield Clarke, Bart.	10	10 0	
				Dep. Inspector Gen.	Dr. Forrest, C.B.	3	3 0
					Dr. Dumbreck, C.B.	3	3 0
				Colonel McMurdo	1	1 0	
				Staff Surgeon	McGregor	2	2 0
				C. R. McGregor, Esq.	20	0 0	
				2nd Class Staff Surg.	Dr. Laing	1	1 0
					Dr. Dane	2	2 0
					Francis Reid	1	1 0
				Surgeon Bostock, Fusilier Guards.	1	1 0	
				Staff Assistant Surg.	T. Fitzgerald	1	1 0

DR. ELLIOTSON
ON THE
DISEASES OF THE HEART.



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THE FANTOM DREAMS
THE HEART

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THE HEART

THE VARIOUS DISEASES

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THE HEART

ON
The Recent Improvements
IN THE
ART OF DISTINGUISHING
THE VARIOUS DISEASES
OF
THE HEART,

BEING THE
LUMLEYAN LECTURES

DELIVERED BEFORE THE ROYAL COLLEGE OF PHYSICIANS IN THE YEAR 1829.

By **JOHN ELLIOTSON, M.D. CANTAB. F.R.S.**

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS; PHYSICIAN TO, AND LECTURER ON THE PRACTICE
OF MEDICINE IN, THE ROYAL HOSPITAL OF ST. THOMAS; VICE-PRESIDENT OF
THE MEDICAL AND CHIRURGICAL SOCIETY OF LONDON,
Ac. Ac. Sc.

LONDON:

PUBLISHED BY LONGMAN, REES, ORME, BROWN, AND GREEN,
PATERNOSTER ROW.

1830.

McNeill
21 May 1852

The Recent Improvements

ART OF DISTILLING

THE VARIOUS DISEASES

THE HEART.

LECTURE I

DELIVERED BEFORE THE ROYAL COLLEGE OF PHYSICIANS IN THE YEAR 1820

BY JOHN ELLIOTSON, M.D. CANON F.R.S.

LECTURE II

LECTURE III

LONDON:

PUBLISHED BY LONGMAN, REES, ORME, BROWN, AND GREEN,

STATIONERS' HALL.

PRINTED BY W. ARNOLD, 22, BEDFORD STREET, QUEEN SQUARE.

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PRELIMINARY OBSERVATIONS.

DISEASES OF THE EXTERNAL MEMBRANE OF THE HEART.

LECTURE II.

DISEASES OF THE INTERNAL MEMBRANE OF THE HEART.

LECTURE III.

DISEASES OF THE SUBSTANCE OF THE HEART AND OF THE AORTA.

ADVERTISEMENT.

It was at the particular request with which I was unexpectedly honoured by the President, that I engaged to deliver the LUMLEYAN LECTURES.

When they were composed, I had no idea of printing them. After the delivery, however, of those upon the heart, in the first year of my office, some of my friends who had favoured me with their attendance urged me to the measure. Yet I do not know that I should have followed their advice, but for the singularly handsome offer of one of them,—Mr. Alcock, to whom I am under many obligations, to make for me drawings of any of the morbid specimens which I had exhibited, if I conceived that the work would be more acceptable to the profession with illustrations.

To resist under these circumstances was impossible; and, whatever are the defects of my own portion of the work, I trust that they will be atoned for by the extreme accuracy and general excellence of the drawings, to which I endeavoured to render justice by engaging the talent of Mr. Skelton, who also executed the engravings of Dr. Baillie's work on Morbid Anatomy.

ADVERTISEMENT.

It was at the particular request with which I was respectfully honored by the President, that I engaged to deliver the following discourse.

When they were completed, I had no time to peruse them. After the delivery, however, of them upon the hour, to the first part of my discourse, my friends who had followed me with their attentions urged me to the discourse. For I do not know that I should have allowed them to do so, for the thoroughly bad condition of one of them. All I think to whom I am under many obligations to make for the drawings of any of the world's greatest which I had exhibited, if I perceived that the work would be more acceptable to the public with illustrations.

To render under these circumstances was impossible; and, whatever was the defect of my own portion of the work, I trust that they will be atoned for by the common economy and general excellence of the drawings, to which I venture, and to render justice by engaging the talent of Mr. Schell, who also executed the engravings of the Hall's work on Heraldic Armory.

LECTURE I.

THE art of medicine is to be perfected, I conceive, by improvements in our knowledge of the nature of diseases—by improvements in diagnosis—and by improvements in our acquaintance with remedies and their application.

I. Improvements in our knowledge of the nature of diseases must be obtained through the cultivation of anatomy and physiology, and of morbid anatomy and morbid physiology—or, in other words, of the derangements of structure and function that take place.

It is self-evident, that no one can be acquainted with a disease unless he is acquainted, more or less, with the part diseased, its situation, form, and structure; and, the more accurate and minute his acquaintance with these, the greater, *ceteris paribus*, will generally be his knowledge of the nature of its lesions. I say *ceteris paribus*, because a knowledge of mere anatomy, however accurate and minute, does not imply a knowledge of disease, its symptoms, history, and causes, nor skill in treating it, any more than a knowledge of the alphabet, and the ability to read, imply a literary character: and nothing can be more absurd than for the public to presume that a man is a good practitioner *merely* because he is a good anatomist. An anatomist is not necessarily even a physiologist: and Mery was accustomed to say, "We anatomists are like the porters of Paris, who are all well acquainted with all its streets, as well as all its lanes and alleys, but know nothing of what passes within the houses."^{*} The most assiduous examination of only the dead body can disclose but little of the functions and properties of the living. The structure of the brain would never teach that it is the organ of our feelings and thought, or of the kidney, that it produces a fluid containing lithic acid and urea; the sympathy of the nasal membrane and diaphragm, of the kidneys and surface, the curious phenomena resulting from contagions and malaria, the various morbid actions to which various parts are liable, for instance, the innumerable diseases of the nervous system; the susceptibility of various parts to the operation of various agents during health,—of the mouth, to the operation of mercury,—of the stomach, to that of ipecacuanha; the peculiar power of certain substances over certain diseases, as of quinine over intermittent fever,—would never be suspected at the dissecting-table. And I cannot refrain from remarking, that, for any one to pride himself upon his knowledge of established anatomy, would be exceedingly weak, as it requires no preparatory philosophical education, and no intellectual exertion, but the bare possession of eyes and memory, and a willingness to employ them. Dr. McCulloch apologises in his recent powerful, though, I must be pardoned in saying, occasionally extravagant, work, for not arranging his cases anatomically, on the ground, that

it would have savoured of pedantry,—"a small pedantry," he says, "far too common; as if any man could not make himself master of the human anatomy in a few weeks, as well as of any other tangible and demonstrable substances."^{*} But, if it would be laughable for any one to pride himself on his knowledge of anatomy, it is culpable in a physician not to be a good anatomist. He otherwise cannot comprehend the phenomena of many diseases; cannot, for example, understand why, in partial paralysis of the head, sometimes certain muscles only cease to obey the will;—why loss of sensation sometimes occurs alone, and why to only a certain extent;—why the pain of neuralgia takes a particular course;—or why, in disease of the heart, unusual varieties of sound and impulse are observable in particular portions of the cardiac region. He cannot otherwise possess any but the most superficial knowledge of morbid anatomy, the cultivation of the far greater and more important part of which is peculiarly the duty of the physician, who treats the chief morbid states of the most important organs of the body, and not of the surgeon, who does not even witness their symptoms; and he will, therefore, either neglect to complete the investigation of his unsuccessful cases, by examination *post mortem*, or be unable to appreciate what presents itself, and perhaps be indebted to an active surgeon for information. He cannot otherwise be a good physiologist; for, although anatomy alone will seldom teach the operations of an organ, these can manifestly not be known, unless the organ itself is understood.

The importance of physiology requires no argument, as, except in obvious structural or mechanical changes, the symptoms of disease are chiefly morbid physiology, and therefore, to quote the familiar passage of Galen, "The magnitude of a disease is proportionate to its deviation from the natural state; and he only knows the extent of the deviation who knows exactly what is the natural state." *εἰς ὅσον γὰρ ἐκτρέπεται τῆς φύσεως ἵσταται, εἰς τοσούτῃ καὶ μεγέθει ἔχει. Τὸ δ' ὅσον ἐκτρέπεται, γινώσκει δυνατόν μόνον τὸ κατὰ φύσιν, ἀκριβῶς ἐπισταμένῳ.*† And again, *μη δύνασθαι τίνα καλῶς λέγεσθαι τὰ νοσήματα, τὴν δὲ τὴν φύσιν ἐπιστάσθαι τὴν φύσιν.*‡ Without a thorough acquaintance with both the natural structure and the functions, a thousand highly-interesting deviations will never be recognised in the cases which come daily before us.

If such is the importance of anatomy and physiology to every physician, the importance of perfecting these sciences, to the progress of our knowledge of the nature of diseases, will not be disputed.

* On Marsh Fever and Neuralgia, vol. II. page 104.

† Methodus Medendi ad Glaucomen, lib. I. cap. I.

‡ Methodus Medendi, lib. I. cap. 2.

* Bee's Cyclopædia.—Art. Mery.

But, however necessary these foundations of anatomy and physiology, the grand source of this knowledge is the observation of the phenomena of diseases, their symptoms, history, and causes,—in other words, pathology, and of their structural lesions—in other words, morbid anatomy.

No one expresses a doubt respecting the importance of pathology,—the importance of observing the symptoms and tracing the history of diseases, and investigating their peculiarities, analogies, and causes. Yet, in all this, how liable are we to error! How patient and searching an eye is required to note all the phenomena of a disease, to perceive what is essential to its existence—what incidental! How profound a judgment to reason upon these phenomena, and to investigate their causes!—to discern the analogies between affections, at first sight perfectly distinct! and, at the same time, how cool should be the judgment to appreciate all fanciful analogies, all hypothetical suggestions! Exactly the same difficulties surround morbid anatomy, but in its case are alleged by some as objections to its prosecution. Yet, how could any affection under the surface of the body have been understood without an ocular investigation of the parts affected? How could pain of the chest, with dyspnoea, cough, and pyrexia, have been known as signs of inflammation of the lungs or their membranes, unless the examination of persons, who died under these symptoms, had proved such a lesion to be frequently their cause? If knowledge can be thus obtained, why not obtain the utmost possible? True it is, that incidental morbid appearances have often been mistaken as necessary and constant, and that some even pretty constant appearances have often been absurdly announced as the essence of the disease, when they were merely its effect, or, at the utmost, only among the number of its phenomena. Equally true it is, that changes after death have been mistaken for morbid appearances, as pointed out by Dr. John Davy in the case of redness from imbibition of blood.* But such errors are surely no reason for neglecting careful and extensive examinations of diseased parts, and drawing just inferences as to the connexion of the change of colour or structure with the disease—no reason for not cultivating so ample a field of knowledge scientifically. If a disease is accompanied by a change of structure or appearance *within* the body, surely this change, as a fact in the disease, is worthy of notice,—as worthy as visible changes in the skin, the mouth, or the eyes, that are always carefully described by these objectors, even when merely secondary effects, but differ from the facts of morbid anatomy, in the accident only of being cognisable without dissection, are not a whit more necessary to a perfect history of a disease, and are of infinitely smaller number, from the circumstance of nearly all our organs being concealed from view. After some diseases, indeed, no change of structure or appearance is discernible. But even here, extensive anatomical investigation is important, for it often prevents us from forming groundless hypotheses as to the seat and nature of such affections. Hydrophobia might be referred to the stomach, were not the red patches, sometimes seen in this organ after

the disease, frequently not to be detected. Tetanus might be thought always to arise from an inflammation of the spinal marrow, were not this part frequently found free from inflammation in tetanic patients. It discloses to us a fact which we might otherwise have doubted,—that diseases may be functional only as well as structural; that, in the words of one of the most intelligent and industrious cultivators of pathology and morbid anatomy, —Dr. Andral, “it is one of the most serious errors to which the ill-directed study of morbid anatomy can lead, to admit no other alteration in the economy than those which are discoverable by the scalpel.”† We learn, in short, to form a just estimate of morbid anatomy,—that it is an important part of the basis, but by no means the “main basis” of pathology.

II. But, if our art is to be perfected by a better acquaintance with the nature of diseases, it is not less to be perfected by improvements in distinguishing them—in diagnosis. The diseases of the lungs and their membranes are as well understood as any of the body; yet the best practitioners continually fail in distinguishing them,—for instance, one form of chronic bronchitis from hydrothorax, the treatment of which two may be totally different. So important is diagnosis, that it has become proverbial to say, “the knowledge of a disease is half the cure.”

It also is to be improved, not only by a better acquaintance with the symptoms and history of diseases, but by a better acquaintance with morbid anatomy; so that the correspondence of symptoms and local lesions may be established, and the affection thus clearly ascertained; and, as healthy anatomy is the foundation of morbid, and physiology of pathology, the importance of these also to improvements in diagnosis is apparent.

I purpose the subject of these lectures, during the two years that I have the honour of delivering them, to be illustrative of some modern, and for the most part recent, improvements in diagnosis, and to speak chiefly in this point of view at present of diseases of the heart—next year of those of the lungs.

The discoveries made by Laennec in the symptoms of these disorders are great enough to entitle him to all the honours which have ever been acquired in our profession. He has enabled us to judge of diseases, often not otherwise with certainty distinguishable or not at all, and this with an accuracy inconceivable to those who are unacquainted with his investigations:—to distinguish diseases of the heart, which were formerly, and are still, too often all either expressed by the easy term, disease of the heart, without a specification of the part affected in this complicated organ, or as often passed over entirely, while the case is mistaken for hydrothorax or some pulmonary affection; and to distinguish diseases of the lungs which in many cases could not be pronounced upon with accuracy, in others of which the diagnosis was always uncertain; and moreover to point out the very part affected.

But the very accuracy of Laennec's discoveries is objected to. We are asked *cui bono*? The answer is plain. It is universally allowed that every disease should be described and its nature ascertained as accurately as

* Transactions of the Med. and Chir. Society of London, vol. x.

† Clinique Médicale, vol. III. p. 519.

nosis was correct. The diagnosis, it is true, did not lead to a cure; but it prevented me from plaguing the patient with medicines on an erroneous idea of the nature and seat of the disease; and it enabled me to give a correct prognosis.

When even there can exist no doubt in the mind of an able practitioner as to the seat and nature of the disease, auscultation may prove an useful aid. Another practitioner in consultation may, from a peculiar bias towards the heart, consider the symptoms, though evidently pulmonic, perhaps even phthisical, to arise from that organ, and *vice versa*; or perhaps refer unquestionable symptoms of organic pectoral disease in general to the liver or the digestive organs, according to the reigning folly of the day, as is done continually with affections of the head and spine. It may be impossible clearly to refute him by the ordinary means of diagnosis, and yet auscultation may furnish some symptoms so decisive as to silence him.

Auscultation, however, can never justify us in the least neglect of the general symptoms and history of a disease. This would indeed be unphilosophical; for the symptoms of auscultation are but one set among a number of others. But if to neglect the general symptoms were unphilosophical, it would be equally so to despise those which present themselves to the ear. If the functions of the heart and lungs are naturally performed with peculiar sounds, and in diseases the sounds are altered, these deviations surely demand equal attention with those which are discernible by the other senses. Surely the physician requires all his senses for the acquisition of knowledge, as much as other prosecutors of natural science. We employ our eyes to discern the countenance and general aspect of our patients, the changes of the pectoral, intestinal, and renal secretions; the alterations of the colour, size, and figure of various parts. We employ our touch to examine the pulse, to ascertain the preternatural presence of fluid, preternatural enlargement, diminution, and induration. Our smell gives us information as to the depraved secretions of fever, as to supuration, and gangrene; even some have recourse to the sense of taste in diabetes. Nay, certain symptoms observable by the ear only, are always carefully dwelt upon. Borborygmi enter into the definition of hysteria; all the varieties of cough and wheezing are described. Why then should such sounds as are elicited by striking the chest, or require the ear to be brought either in contact with it or in connexion by a solid medium, be despised?

The celebrated Hook not only did not despise the ear as an inlet of knowledge, but looked forward to the invention of acoustic instruments which would enable it to make important discoveries, and almost prophesied the stethoscope. "There may be a possibility," says he, "of discovering the internal motions and actions of bodies by the sound they make; who knows but that as in a watch we may hear the beating of the balance, and the running of the wheels, and the striking of the hammers, and the grating of the teeth, and multitudes of other noises; who knows, I say, but that it may be possible to discover the motions of the internal parts of bodies, whether animal, vegetable, or mineral, by the sound they make; that one may discover the works performed in the several offices and shops of a man's body, and thereby discover what engine is out of order, what works are

going on at several times, and lie still at others, and the like." "I could proceed further, but methinks I could hardly forbear to blush, when I consider how the most part of men will look upon this. But yet again, I have this encouragement, not to think all these things utterly impossible, though never so much derided by the generality of men, and never so seemingly mad, foolish, and fantastic, that as the thinking them impossible cannot much improve my knowledge, so the believing them possible may perhaps be an occasion for taking notice of such things as another would pass by without regard as useless. And somewhat more of encouragement I have also from experience, that I have been able to hear very plainly the beating of a man's heart, and 'tis common to hear the motion of the wind to and fro in the guts and other small vessels; the stopping in the lungs is easily discovered by the wheezing." "As to the motion of the parts one amongst another," "to their becoming sensible, they require either that their motions be increased, or that the organ be made more nice and powerful to sense and distinguish them as they are, for the doing of both which, I think it not impossible but that in many cases there may be helps found."*

Far be it from the defenders of auscultation and percussion to assert that the diagnosis of thoracic diseases can never be doubtful. Skill in auscultation requires much application, and, with the greatest, doubt will frequently exist. The stethoscope does not render the parietes of the chest transparent. Percussion and auscultation merely open a new set of symptoms to our notice, and, as diagnosis is certain in proportion to the number and nature of the facts on which it is founded, and the percussor and auscultator with all the same means of judging as his opponents possesses others in addition, he is better qualified to form an opinion, and, though he still may sometimes regret his want of certainty, he knows that by shutting his ears,—by levelling himself with his opponents, he augments his uncertainty a hundred-fold.†

The alleged errors of those who practice auscultation are no arguments against it. Many tales of this description, like those of the errors of phrenologists, have proved inaccurate, or even altogether destitute of truth, when traced to their origin: and eagerly to catch at them would show a mind hoping that no fresh knowledge is to be attained. Persons, it must be remembered, will pretend to skill who have none, and the skilful will sometimes

* Method of Improving Natural Philosophy.—Pott's Works, p. 39, sq.

† Dr. Andral, who no where shows a disposition to overrate the value of auscultation, and is a highly-informed practical physician of the soundest judgment, says, in the preface to the second part of his *Clinique Médicale*, "Thanks especially to the wonderful discovery of professor Laennec, the diagnosis of a great number of thoracic affections may be frequently established with as much accuracy as that of the least complicated laceration, or the simplest fracture."

"There is a certain number of pneumonic inflammations in which we are able to follow the different phases of the alteration of the lungs and their return to the healthy state, with as strict precision, as the eye externally follows the different periods of the cicatrization of a wound. There are affections of the heart, in which the nature of the organic lesion may be determined by the sense of hearing, almost as accurately as the state of a cutaneous tumour may be ascertained by the eye, or of the neck of the womb by the touch. Clinical observation, however, meets with many cases in which diagnosis is still very obscure; and others, in which the very nature of the affection is still a matter of dispute."

give a hasty judgment. But, as in the case of phrenology, nature is open to us all. Let us examine for ourselves—examine carefully and patiently: not anxious to find auscultation a deception, but hoping to find the promise of new information fulfilled; not unwilling to learn because we are no longer *in statu populi*; not so high in our own estimation as to feel indisposed to be taught by others; not unphilosophical enough to have a hostile opinion upon a matter which observation must decide; not guilty of the inconsistency of lamenting the imperfection of our art, of whining about its sad claim to the title of *ars conjecturalis*, and yet too indolent to investigate a method which professes to remove much of its uncertainty, is recommended by men of the greatest talent and the most intense application to the study of their profession, bears upon itself the stamp of probability, and the results of which are indeed capable of being proved physically necessary.*

* I said upon another occasion, "that the greatest discoveries have generally been at first ridiculed, and their authors, no less than all the trust benefactors of the human race, despised and rejected of men."

"Bonitas, et Liber Pater, et cum Castore Pollux,
Dum terras hominumque colant genus, aspera bella
Composant, agris assignant, oppida condunt,
Florere sole non respondere furoribus,
Sperant meritis."—Horace, Epist. lib. ii. ep. 2.

"Let us remember that Harvey, whose memory we honour, was dishonoured at first by his contemporaries, for the discovery which immortalised his name,—that he lost his practice, and, so far from finding comfort among his brethren, left the country, and was imposed upon one end of Europe to the other, and that no English physician who had attained the age of forty at the time, ever to the end of life, acknowledged the circulation of the blood. Let us remember that Sydenham, whose memory we also honour, was, by many of his contemporaries, whose names, whatever battle they made during their existence, have never once been mentioned since their death, called a quack and a murderer. That the discovery of the lacteals was at first rejected with contempt,—that Bartholin, in a letter, says, 'There is not one among the doctors of Montpellier who acknowledges the lacteal vessels, so wedded are they to the authority of Galen, for which they contend as though *pro aris et focis*, and disregard the experiments of the moderns.' That even old Harvey, when the thoracic duct was afterwards discovered, could not at once loosen himself from the bonds of early prejudice, and give up the prevailing belief that the lacteals all terminated in the liver: and that the very Bartholin, who saw the folly of the doctors of Montpellier, never believed exclusively in the office of the thoracic duct.

"Let us remember, that, if our illustrious father of modern philosophy was not vilified and imprisoned, like Galileo, for announcing truth, he was represented by Cecil to Elizabeth, when she thought of making him her solicitor-general, 'as a man of mere speculation—as one wholly given up to philosophical enquiries, now indeed and amusing, but fanciful and unpractical, and therefore more likely to distract her affairs, than to serve her carefully and with proper judgment.'

"In ancient times, Horace saw his odes despised, because they were new. The public, he said,

"Nil quæ terribis semota, vulgus
Temporibus defuncta videt, fastidia et odit."
"Est vetus atque probus, centum qui perdidit annos."

"But, like the illustrious Gall, Linnæus is no more,

"Extinctus analiter idem."

I cannot forbear from making the following extract from the first volume of Gall's work *Sur les Fonctions du Cerveau*.

"The followers of the different schools of philosophy among the Greeks accused each other of impiety and perjury. The people, in their turn, detested the philosophers, and accused those who investigated principles with presumptuously encroaching upon the rights of the deity. The novelty of the opinions of Pythagoras caused his banishment from Athens; those of Anaxagoras threw him into prison; the Abderites treated Democritus as a madman, because he dissected dead bodies to discover the cause

III. With respect to the third mode in which I conceive that our art must be perfected,—improvements in our knowledge of remedies and their application, I must be brief. Much remains to be accomplished in the discovery both of the virtues of medicines already in use, and of new medicines or such modifications of old ones as almost entitle them to the epithet new. Every advance in our knowledge of the essential nature of diseases will no doubt enable us to improve our application of remedies upon general principles,—to improve our general indications. But without any additional knowledge of the nature of diseases, cautious trial, guided by the best analogy we may discern, or by some fortuitous occurrence, will enable us, if we are disposed to labour, to effect much in extending our knowledge of the powers of particular remedies over particular diseases. Lord Bacon regrets that physicians apply themselves so exclusively to general indications, neglecting the peculiar

of insanity; and Socrates, for demonstrating the unity of God, was condemned to drink hemlock.

"The same scandal has been renewed at all times and in all nations. Many of those who distinguished themselves in the fourteenth century by their knowledge of natural things were put to death as magicians. Galileo, for proving the earth's motion, was imprisoned at the age of seventy. Those who first maintained the influence of climate upon the intellectual character of nations were suspected of materialism.

"Universally, nature treats new truths and their discoverers in a singular but uniform manner. With what indignation and animosity have not the greatest benefits been rejected? For instance, potatoes, Peruvian bark, vaccination, &c. As soon as Varolius made his anatomical discoveries, he was derided by Sylvius as the most infamous and ignorant madman. *Præsum, litterarum imperitissimum, arrogantissimum, calumniosissimum, maledicacissimum, rerum omnium ignorantissimum, transfigum, impius, ingratus, monstrum ignominiarum, impietatis exemplum perniciolosissimum, quod postulat hactenus Europam emoret*, &c. Varolius was reproached with dazzling his auditors by a seductive eloquence, and artificially effecting the prolongation of the optic nerves as far as the thalamus. Harvey, for maintaining the circulation of the blood, was treated as a visionary; and depravity went so far as to attempt his ruin with James and Charles the First. When it was no longer possible to shorten the optic nerve, or arrest the course of the blood in its vessels, the honour of these discoveries was all at once given to Hippocrates. The physical truths announced by Linnæus, Buffon, the pious philosopher Bonnet, by George Le Roy, were represented as impieties likely to ruin religion and morality. Even the virtuous and generous Lazzar was treated as a fatalist and materialist. Every where do fatalism and materialism, placed before the sanctuary of truth, make the world retire. Every where do those, upon whose judgment the public relies, not merely ascribe to the author of a discovery the absurdities of their own prejudices, but even renounce established truths if contrary to their purposes, and revive ancient errors, if calculated to ruin the man who is in their way.

"This is a faithful picture of what has happened to me. I have, therefore, some reason to be proud of having experienced the same lot as men to whom the world is indebted for so great a mass of knowledge. It seems that nature has subjected all truths to persecution, in order to establish them the more firmly, for he who can snatch one from her always presents a front of brass to the darts hurled against him, and has always force enough to defend and establish it. History shows us that all the efforts and sophisms which are directed against a truth once drawn from darkness, fall like dust blown by the winds against a rock.

"The instance of Aristotle and Descartes should particularly be quoted, when we wish to display the influence of prejudice upon the good or bad fortune of new doctrines. The opponents of Aristotle burnt his books: afterwards, the books of Ramus, who had written against Aristotle, were burnt, and the opponents of the philosopher of Stagira declared heretics; and it was even forbidden by law to dispute his doctrines, under pain of being sent to the galleys. Now there is no longer any discussion about the philosophy of Aristotle. Descartes was persecuted because he taught the immortality of the soul, and the University of Paris burnt his books. He had written the most sublime thoughts upon the existence of God; Voltaire, his enemy, accused him of atheism. Afterwards, this same university declares itself in favour of innate ideas; and when Locke and Condillac

properties of remedies in particular diseases. "Medici hujusce ætatis," he says, "licet generales intentiones curationum non male persequantur, particulares tamen medicinas quæ ad curationes morborum singulorum, proprietate quadam spectant, aut non bene norunt, aut non religiose observant." He remarks that they merely go on in their prescriptions, "addendo, et demendo, et mutando, circa medicinas, pro ut iis libitum fuerit, et fere pharmacopœorum more, quid pro quo substituendo;" and he advises that some physicians "et eruditione et practica insignes, opus aliquod conficiant de medicinis probatis et experimentalibus ad morbos particulares."⁸

Such experimental facts, however insulated they may at first appear, gradually arrange themselves with others into general principles, and thus, what is at first little better than empiricism becomes science. I confess that I look with more hope to this source of improvement than to any other.[†]

I now proceed to the consideration of the recent improvements in the diagnosis of the diseases of the heart.

attacked innate ideas, the cry of materialism and fatalism resounded on all sides.

"Thus, the same opinions have at one time been regarded as dangerous because they were new, and at another as useful because they were ancient. We must, therefore, pity mankind, and conclude that the opinions of contemporaries as to the truth or error, and dangerous or innocent tendencies of a doctrine, are very suspicious, and that the author of a discovery should be anxious only to ascertain whether he has really discovered a truth or not." p. 221. sq.

Gail might have added, in the words of Professor Playfair, that, notwithstanding "the splendour of Newton's discoveries, the beauty, the simplicity, and grandeur of the system they unfolded, and the demonstrative evidence by which that system was supported," "the Cartesian system of Vortices kept its ground for more than thirty years after the publication of those discoveries," and that actually "the Newtonian philosophy first entered the University of Cambridge under the protection of the Cartesian," by a statement of Dr. Samuel Clark, who quietly explained the views of Newton, without any appearance of argument or controversy, in the form of notes to a new translation which he published of the French Cartesian work long established as a text-book by the tutors of the University.

Dr. Chalmers, speaking of the first reception of the Newtonian philosophy, says, "authority scowled upon it, and taste was disgusted by it, and fashion was ashamed of it."

* *Instauratio Magna*.—First part.

† To such investigations I have therefore sedulously applied myself, and those of my results which were successful are before the profession.

Cases illustrative of the efficacy of the Hydrocyanic Acid in affections of the stomach, with a general report upon its medical powers—some facts respecting the inertness of ordinary antimonial powder—the use of Opium in diabetes, and the necessity of varying the doses of medicines under various circumstances, 1829.—On the medical properties of Quinine, —On the use of the Subcarbonate of Iron in chorea, and its general properties, —Ditto in tetanus, —On the use of the Sulphate of Copper in chronic diarrhoea, —Papers all four published, together with three of a pathological nature, in the 12th, 13th, 14th and 15th volumes of the *Medico-Chirurgical Transactions*. The pathological papers are upon Rupture of the Stomach, —Fallopian tube pregnancy, —and the Glands communicated by the horse to the human subject.

I make this statement for the purpose of easy reference, as some of my friends wish me to collect these,—the whole of my professional attempts, besides the English edition of Blumenbach's Physiology and an Introductory Lecture upon State-Medicine, into one volume, and I feel disinclined to follow their advice.

DISEASES OF THE PERICARDIUM.

Pericarditis, the first disease of which I purpose speaking, would never be selected to show the advantages of auricular examination; in the acute form at least this is for the most part of only negative utility. But the consideration of it will prove the injustice of those who assert that auscultators both regard auscultation as an universal light, and neglect the general investigation of symptoms.

The acute inflammation which occurs in the region of the heart is usually situated in the pericardium, and pericarditis is a very common disease.

The anatomical characters are little different from those of the inflammation of other serous membranes. There is either a partial redness,—patches, sometimes as if the membrane were injected, at others as if dyed red,—or groups of red points. The redness is seldom deep, and, in the most violent cases, often very faint. The membrane was never in a single instance observed by Laennec thickened, though Dr. Baillie declares this to be frequently the case; but upon it lies a quantity of fibrine, thicker and more consistent than in pleurisy, and differing from the fibrine of pleurisy also in being generally irregular on its surface, sometimes with minute pores, sometimes with depressions so large as to give it the appearance of the second stomach of the calf, sometimes knobbed like butter spread upon two slabs, to use Laennec's comparison, first approximated and then suddenly separated from each other. Dr. Baillie says that the fibrine never adheres firmly; Laennec that it adheres more firmly than in pleurisy. Although the redness is partial, this exudation is most frequently general, and often very abundant when the redness is slight. It is of the ordinary pale colour.

The serum effused is in far less proportion to the fibrine than in pleurisy, seldom amounting to a pint, though it has amounted to four; and sometimes scarcely any is found. It is of the common whitish lemon colour; rarely limpid; sometimes very turbid, containing larger or smaller flocculi of lymph, or absolutely curdled, as if only one kind of effusion had taken place. Sometimes it is bloody, sometimes puriform: Dr. Baillie once saw a quart of pus in a pericardium violently inflamed, but free from ulceration.

In the chronic disease, the redness is more intense and more diffuse, and the inflammation is almost always general. If any fibrine exist, and it seldom does, it is thinner and softer. There is always the turbid serous effusion.

As time elapses after the acute attack, the liquid effused is absorbed, the fibrine grows to the cardiac and parietal portions of the pericardium, and adhesions more or less partial or general of cellular or serous membrane are produced, thinner usually and stronger, like those of other serous sacs, the older their date. The adhesions are sometimes very thick and fibrous, as it were fleshy, and cartilaginous or bony. I have frequently seen the whole cardiac and parietal pericardium coherent, (and even the proper auricles concreted to the ventricles) so that no pericardial cavity existed, the serum being entirely absorbed, and the fibrine nearly so:

cases have occasionally been mistaken for in-

the substance of the heart, as I have mentioned, become diseased. From these circumstances, the connexion between rheumatism and affection of the heart was first

of organic disease, and rheumatism inflammation but disease of the heart, pericardium may not be affected, and in a secondary manner: yet of this I am nearly all the cases of affections of the heart, tism, are originally pericarditis, and that, membrane is thus affected from the first, so pericardium. Among the cases of organic dis- heart connected with rheumatism, published nearly twenty years ago, in the Transactions for the Improvement of Medical and Chi- owledge, those which proved fatal displayed abolition of the pericardial cavity, or strong at partial adhesions, and those which did fatal were marked by decided symptoms of is. In nearly all those mentioned by Sir

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very violent but really dispo. chronic
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and such cases have occasionally been mistaken for instances of the absence of the pericardium.

Both when the pericardium is very coherent, and when it is only thickened, the morbid action may be more intense in particular spots; for we often find knobs of cartilage at different parts, some of which dip deep into the substance of the heart.

Sometimes the fibrine effused becomes cellular, and, contracting no adhesions, lies pale, like lace, upon the surface of the heart; sometimes merely an opaque white patch remains, which can be peeled off; and sometimes, instead of smooth patches, we have granulations.

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Handwritten notes and a table of numbers:

What is the benefit?
What is the penalty?
In case I should say so

69	56	36	77
62	53	50	84
49	60	57	58
47	57	51	60
56	60	61	52
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59	52	44	56
50	48	44	36
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46	56	59	49
52	56	47	47
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If the inflammation has been severe, lymph is often found in more or less quantity on even the external surface of the pericardium, uniting it by bands to the pleura.

The reason is not obvious why the fibrine within the pericardium sometimes adheres, and sometimes contracts no adhesions. The degree of serous effusion and consequent proportionate separation of parts affords no explanation, because, first, we often see one portion of lymph adherent, while another by its side is not; and secondly, there is often a total absence of adhesion without sufficient serous effusion to account for it.

The substance of the heart after pericarditis may be unchanged, or redder or paler than usual, yellowish or brown, hardened or softened. After the chronic disease it has been found hypertrophied. When the organ is softened it usually is that we observe the effused serum to be bloody. In the disease of softening of the heart I have almost always found bloody serum in the pericardium.

Not only the substance of the heart, but its lining membrane, especially at the valves, is also frequently affected, sometimes in the acute form,* but generally in the chronic if very long continued.

We shall see in the two following lectures, that the majority of cases of disease of both the substance of the heart and the valves, arise from, or at least are coetaneous with, or spring up during, inflammation of the pericardium.

Pericarditis is occasioned by all the causes of the inflammation of serous membranes in general. But the most frequent is either exposure to cold, especially after a warm temperature and if rheumatism is also induced; or sympathy with the fibrous membranes of joints attacked by rheumatism. It will occur simultaneously with the rheumatism; or not till the rheumatism has existed for a longer or shorter period, has even gradually declined, or altogether ceased for some time; and, though the metastasis is comparatively rare, when the rheumatism suddenly disappears.

If pericarditis becomes chronic, and it is usually not very violent but really disposed to assume the chronic form, and frequently steals on as a chronic disease from the abuse of fermented liquors, the valves and finally

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persons from about the age of puberty to near thirty. We occasionally see it in the younger; rarely for the first time in the older. I once saw it in an infant. With neither of Dr. Baillie's remarks,—that pericarditis is not very common, and that it chiefly attacks persons who have been some time adults, does my experience at all agree.

The French do not appear aware of the connexion of pericarditis with rheumatism, except as an ordinary instance of internal inflammation upon the sudden retrocession of an external disease.

Acute pericarditis is of course attended by more or less pyrexia. There is a pain in the region of the heart, sometimes severe and lancinating: generally darting through to the left scapula, upwards to the left clavicle and shoulder, and down the arm a certain way, and, what is remarkable, rarely extending quite so far as the elbow. I lately had a case in which the pain extended down the fore arm, but it did not quite reach the wrist. The pain is increased by pressing forcibly upon or between the ribs and cartilages over the heart, and by pressing with the points of the fingers upwards against the diaphragm, under the cartilages of the left false ribs, frequently even by pressing the epigastrium and left hypochondrium in the usual manner. The pain is often increased on inspiration, and by lying on the left side. I think patients are usually easiest upon their back. The respiration is rapid, but less so than in affections of the lungs. There is sometimes a cough, which is dry. Nearly always palpitation, frequently violent, at least upon exertion. Sometimes, though more rarely, a disposition to syncope. The pulse varies exceedingly. It is necessarily quick; and often, but not always, small, in proportion to the heart's action; and only sometimes intermittent and irregular; neither is it always hard or even very full. The countenance is described as anxious, and the features contracted: but this I imagine happens only when the pain is acute, and is equally the case in pleuritis.

On examination by the ear, the *whole* heart is found acting more forcibly, and with a clearer sound, than in health. But this is all. Auscultation appears to me, however, of negative use. We do not discover the loud murmur nor the sonorous or sibilous rattle of bronchitis, the crepitous rattle or obscure respiratory murmur of pneumonia, nor the ergophony of pleuritic effusion, unless these diseases are combined with pericarditis. Neither have we the partially excessive or defective impulse or sound, or preternatural sounds, of organic diseases of the heart. In all uncombined cases, therefore, light is thrown on the disease. I remember once having found auscultation of great use in the diagnosis of a disease which might have been considered clearly pericarditis. The patient was a poor Irishman, and the Irish are by no means happy in their attempts at lucid history and description of their diseases. He complained of pain in the region of the heart, increased on pressure, palpitation, dyspnoea, and declared he had been ill but a few days. The case appeared pericarditis. The pulse was full, and the constitution good. There appeared every reason to bleed him freely and put the whole antiphlogistic plan in force. But on listening to the heart's action, the left ventricle gave a violent dead noiseless blow against the

chest, and the case was evidently one of hypertrophy of the left ventricle. I insisted to the man that he had long been ill, and it was ascertained from his own mouth and from his wife, that he had suffered palpitation and dyspnoea for a great length of time, and that the error of his history arose from his having been compelled to leave off work for a few days only before. He died in a fortnight, and great hypertrophy of the left ventricle was discovered.

M. Collier says that the action of the heart is accompanied by a sound resembling that of new leather. Laennec does not mention it, but remarks the occasional occurrence of a sort of click, which some persons mistake for a *bruit de soufflet*.

The diagnosis of pericarditis is thought by many to be extremely difficult. Laennec declares that he has frequently suspected it where it was not found, and found it where he had not suspected it. By close inquiry into the existence of all the marks just mentioned, I confess the diagnosis has never proved difficult to me. I would particularly lay stress upon the extension of the pain from the region of the heart to the scapula, shoulder, and a certain way down the arm—symptoms which patients will not always mention unless questioned respecting them: and its increase on strong pressure upon or between the ribs and cartilages over the heart, and upwards under the cartilages of the left false ribs. These two points I do not remember to have seen mentioned any where, and the others are not dwelt upon in some of the best books. In Andral's *Clinique Medicale*, pain of the epigastrium on pressure is said to have occurred in some cases, but the point is not spoken of as if inquired into: in one case only is the extension of pain to the arm mentioned: and its extension even to the shoulder does not seem to have formed an object of inquiry.

I am certain that, by a scrutinizing examination, the existence of pericarditis will very rarely be mistaken: and from this conviction, and the frequency of its occurrence during acute rheumatism, I make it as invariable a rule to examine the cardiac region by the touch and hearing in every case of acute rheumatism as the usual seats of hernia are examined by us all in cases of colic and intestinal inflammation. Were this rule universally observed, practitioners would not be occasionally surprised by the death of patients in what had been considered merely acute rheumatism.

Although the consideration of treatment forms no part of my purpose, I may be permitted to remark, that I think I have observed free local bleeding more serviceable than general; and that mercury is of equal efficacy in acute pericarditis as in other acute inflammations, over which, wherever they may be situated, a very extensive experience of many years has fully satisfied me, conformably with the observations of so many able physicians, that it possesses far, very far, more power than any other medicine. Bleeding and other ordinary measures cure cases of severe inflammation every day, and, in cases of little danger, may be relied upon. But they frequently fail in cases of intensity; and I know that if, in addition to suitable bleeding, mercurial ptyalism is quickly induced, active inflammation will very rarely destroy, and that, not only is fatality almost always prevented, but far less bleeding is required. This has been my practice from the commencement of my professional life, and I have