

Account of a new anæsthetic agent, as a substitute for sulphuric ether in surgery and midwifery / by J.Y. Simpson.

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ACCOUNT
OF A
NEW ANÆSTHETIC AGENT,
AS A
SUBSTITUTE FOR SULPHURIC ETHER
IN
SURGERY AND MIDWIFERY,

BY
J. Y. SIMPSON, M.D., F.R.S.E.,

PROFESSOR OF MIDWIFERY IN THE UNIVERSITY OF EDINBURGH;
PHYSICIAN-ACCOCHEUR TO THE QUEEN IN SCOTLAND, ETC.

"I esteem it, the office of a Physician, not only to restore health, but to mitigate
pain and dolours."—BACON.

COMMUNICATED TO THE MEDICO-CHIRURGICAL SOCIETY OF EDINBURGH,
AT THEIR MEETING ON 10TH NOVEMBER 1847.

THIRD THOUSAND.

EDINBURGH:
SUTHERLAND AND KNOX, PRINCES STREET.
LONDON: SAMUEL HIGHLEY, 32 FLEET STREET.

MDCCCXLVII.

6

THE

NEW APOSTOLIC AGENT

SUBSTITUTE FOR SALT-PETRE

MURRAY AND GIBB

EDINBURGH

THE NEW APOSTOLIC AGENT

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THE NEW APOSTOLIC AGENT

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EDINBURGH

SUTHERLAND AND KNOX, PRINTER

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EDINBURGH

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TO

M. J. DUMAS,

MEMBER OF THE INSTITUTE,

DEAN OF THE FACULTY OF SCIENCES, PARIS,

&c. &c. &c.

INSTITUTION

M. J. DUNN

RECEIVED
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LIBRARY OF THE
MUSEUM OF COMPARATIVE ZOOLOGY
AT HARVARD UNIVERSITY

ON CHLOROFORM.

FROM the time at which I first saw Ether-Inhalation successfully practised in January last, I have had the conviction impressed upon my mind, that we would ultimately find that other therapeutic agents were capable of being introduced with equal rapidity and success into the system, through the same extensive and powerful channel of pulmonary absorption. In some observations, which I wrote and published in February last, relative to the inhalation of sulphuric ether in midwifery, I stated that, in several obstetric cases, I had used ergot of rye in this way, along with ether.—(See *Monthly Journal of Medical Science*, pp. 724; and 795, case of successful inhalation of opium, to arrest the vomiting of pregnancy.)

With various professional friends, more conversant with chemistry than I am, I have, since that time, taken opportunities of talking over the idea which I entertained of the probable existence or discovery of new therapeutic agents, capable of being introduced into the system by respiration, and the

possibility of producing for inhalation vaporizable or volatile preparations of some of our more active and old established medicines: and I have had, during the summer and autumn, ethereal tinctures, &c., of several potent drugs, manufactured for me, for experiment, by Messrs Duncan, Flockhart, & Co., the excellent chemists and druggists of this city.

Latterly, in order to avoid, if possible, some of the inconveniences and objections pertaining to sulphuric ether,—(particularly its disagreeable and very persistent smell, its occasional tendency to irritation of the bronchi during its first inspirations, and the large quantity of it occasionally required to be used, more especially in protracted cases of labour,)—I have tried upon myself and others the inhalation of different other volatile fluids, with the hope that some one of them might be found to possess the advantages of ether, without its disadvantages. For this purpose, I selected for experiment and have inhaled several chemical liquids of a more fragrant or agreeable odour, such as the chloride of hydro-carbon (or Dutch liquid), acetone, nitrate of oxide of ethyle (nitric ether), benzin, the vapour of iodoform, &c.*

* In talking over, with different chemists, what fluids might be sufficiently volatile to be respirable, and hence deserving of being experimented upon, Mr Waldie first named to me the Perchloride of Formyle as worthy, among others, of a trial;—Dr Gregory suggested a trial of the chloride of hydrocarbon, &c. I have been deeply indebted to Dr

I have found, however, one infinitely more efficacious than any of the others, viz., Chloroform, or the Perchloride of Formyle, and I am enabled to speak most confidently of its superior anæsthetic properties, having now tried it upon upwards of thirty individuals. The liquid I have used has been manufactured for me by Mr Hunter, in the laboratory of Messrs Duncan, Flockhart, & Co.

Chloroform was first discovered and described at nearly the same time by Soubeiran (1831), and Liebig, (1832); its composition was first accurately ascertained by the distinguished French chemist, Dumas, in 1835.—See the *Annales de Chimie et de Physique*, vols. xlvi. xlvii. and lvi. It has been used by some practitioners internally; Guillot prescribed it as an anti-spasmodic in asthma, exhibiting it in small doses, and diluted 100 times.—(See Bouchardat's *Annuaire de Therapeutique* for 1844, p. 35.) But no person, so far as I am aware, has used it by inhalation, or discovered its remarkable anæsthetic properties till the date of my own experiments.

It is a dense, limpid, colourless liquid, readily

Gregory and Dr Anderson, for their kindness in furnishing me with the requisite chemical agents for these experiments;—and also to my assistants, Dr Keith and Dr Duncan, for the great and hearty zeal with which they have constantly aided me in conducting the inquiry.

evaporating, and possessing an agreeable, fragrant, fruit-like odour, and a saccharine pleasant taste.

As an inhaled anæsthetic agent, it possesses over sulphuric Ether the following advantages :—

1. A greatly less quantity of Chloroform than of Ether is requisite to produce the anæsthetic effect; usually from a hundred to a hundred and twenty drops of Chloroform only being sufficient; and with some patients much less. I have seen a strong person rendered completely insensible by six or seven inspirations of thirty drops of the liquid.

2. Its action is much more rapid and complete, and generally more persistent. I have almost always seen from ten to twenty full inspirations suffice. Hence the time of the surgeon is saved; and that preliminary stage of excitement, which pertains to all narcotizing agents, being curtailed, or indeed practically abolished, the patient has not the same degree of tendency to exhilaration and talking.*

* In practice I have found that any such tendency, even with ether, is avoided by, 1st, giving the patient from the first a large and overwhelming dose of the vapour, and 2ndly, by keeping him perfectly quiet and still, and preventing all noise and talking around him. I have elsewhere insisted on the importance of these points. (See the numbers of the *Monthly Journal of Medical Science* for March, 1847, p. 726, and for September, p. 154). In the paper last re-

3. Most of those who know from previous experience the sensations produced by ether inhalation, and who have subsequently breathed the Chloroform, have strongly declared the inhalation and influence of Chloroform to be far more agreeable and pleasant than those of Ether.

4. I believe, that considering the small quantity requisite, as compared with Ether, the use of Chloroform will be less expensive than that of Ether;

ferred to, I took occasion, when discussing the conditions requisite for insuring successful etherization, to observe, "*First*, The patient ought to be left, as far as possible, in a state of absolute quietude and freedom from mental excitement, both during the induction of etherization, and during his recovery from it. All talking and all questioning should be strictly prohibited. In this way any tendency to excitement is eschewed, and the proper effect of the ether inhalation more speedily and certainly induced. And, *Secondly*, with the same view, the primary stage of exhilaration should be entirely avoided, or at least reduced to the shortest possible limit, by impregnating the respired air as fully with the ether vapour as the patient can bear, and by allowing it to pass into the lungs both by the mouth and nostrils, so as rapidly and at once to superinduce its complete and anæsthetic effect; * * * a very common but certainly a very unpardonable error being to exhibit an imperfect and exciting, instead of a perfect and narcotizing dose of the vapour. Many of the alleged failures and misadventures are doubtless entirely attributable to the neglect of this simple rule;—not the principle of etherization, but the mode of putting it in practice being altogether to blame. But, *Thirdly*, whatever means or mode of etherization is

more especially, as there is every prospect that the means of forming it may be simplified and cheapened.

5. Its perfume is not unpleasant, but the reverse ; and the odour of it does not remain, for any length of time, obstinately attached to the clothes of the attendant,—or exhaling in a disagreeable form from the lungs of the patient, as so generally happens with Sulphuric Ether.

6. Being required in much less quantity, it is much more portable and transmissible than Sulphuric Ether.

7. No special kind of inhaler or instrument is necessary for its exhibition. A little of the liquid diffused upon the interior of a hollow-shaped sponge, or a pocket-handkerchief, or a piece of linen or paper, and held over the mouth and nostrils, so as to be fully inhaled, generally suffices in about a minute or two to produce the desired effect.*

adopted, the most important of the conditions required for procuring a satisfactory and successful result from its employment in surgery, consists in obstinately determining to avoid the commencement of the operation itself, and never venturing to apply the knife *until* the patient is under the full influence of the ether-vapour, and *thoroughly and indubitably soporized by it.*" In fulfilling all these indications, the employment of Chloroform evidently offers great and decided advantages, in facility and efficiency, over the employment of Ether.

* When used for surgical purposes, perhaps it will be found to be

I have not yet had an opportunity of using Chloroform in any capital surgical operation, but have exhibited it with perfect success, in tooth-drawing,*

most easily given upon a handkerchief, gathered up into a cup-like form in the hand of the exhibitor, and with the open end of the cup placed over the nose and mouth of the patient. For the first inspiration or two, it should be held at the distance of half an inch or so from the face, and then more and more closely applied to it. To insure a rapid and perfect anæsthetic effect—more especially where the operation is to be severe—one or two teaspoonfuls of the Chloroform should be at once placed upon the hollow of the handkerchief, and immediately held to the face of the patient. Generally a snoring sleep speedily supervenes; and when it does so, it is a perfect test of the superinduction of complete insensibility. But a patient may be quite anæsthetic without this symptom supervening.

* A young dentist who has himself had two teeth extracted lately,—one under the influence of Ether, and the other under the influence of Chloroform,—writes me the following statement of the results:—“About six months ago I had an upper molar tooth extracted whilst under the influence of Ether, by Mr Imlach. The inhalation was continued for several minutes before I presented the usual appearance of complete etherization; the tooth was then extracted; and, although I did not feel the least pain, yet I was conscious of the operation being performed, and was quite aware when the crash took place. Some days ago I required another molar extracted on account of tooth-ache, and this operation was again performed by the same gentleman. I inhaled the vapour of Chloroform, half a drachm being poured upon a handkerchief for that purpose, and held to my nose and mouth. Insensibility took place in a few seconds; but I was so completely *dead* this time, that I was not in the very slightest degree aware of any thing that took place. The subsequent stupifying effects of the Chloroform went off more rapidly than those of the Ether; and I was perfectly well and able again for my work in a few minutes.”

opening abscesses, for annulling the pain of dysmenorrhœa and of neuralgia, and in two or three cases where I was using deep, and otherwise very painful galvano-puncture for the treatment of ovarian dropsy, &c. I have employed it also in obstetric practice with entire success. The lady to whom it was first exhibited during parturition, had been previously delivered in the country by perforation of the head of the infant, after a labour of three days' duration. In this, her second confinement, pains supervened a fortnight before the full time. Three hours and a-half after they commenced, and, ere the first stage of the labour was completed, I placed her under the influence of the Chloroform, by moistening, with half a tea-spoonful of the liquid, a pocket handkerchief, rolled up into a funnel shape, and with the broad or open end of the funnel placed over her mouth and nostrils. In consequence of the evaporation of the fluid, it was once more renewed in about ten or twelve minutes. The child was expelled in about twenty-five minutes after the inhalation was begun. The mother subsequently remained longer soporose than commonly happens after Ether. The squalling of the child did not, as usual, rouse her; and some minutes elapsed after the placenta was expelled, and after the child was removed by the nurse into another room, before the patient awoke. She then turned round and

observed to me that she had "enjoyed a very comfortable sleep, and indeed required it, as she was so tired,* but would now be more able for the work before her." I evaded entering into conversation with her, believing, as I have already stated, that the most complete possible quietude forms one of the principal secrets for the successful employment of either Ether or Chloroform. In a little time she again remarked that she was afraid her "sleep had stopped the pains." Shortly afterwards, her infant was brought in by the nurse from the adjoining room, and it was a matter of no small difficulty to convince the astonished mother that the labour was entirely over, and that the child presented to her was really her "own living baby."

Perhaps I may be excused from adding, that since publishing on the subject of Ether Inhalation in Midwifery, seven or eight months ago,† and then for the first time directing the attention of the medical profession to its great use and importance in natural and morbid parturition, I have employed it, with few and rare exceptions, in every case of labour that I have attended; and with the most delightful results.

* In consequence of extreme anxiety at the unfortunate result of her previous confinement, she had slept little or none for one or two nights preceding the commencement of her present accouchement.

† See *Monthly Journal of Medical Science* for February, p. 639; for March, p. 718 and 721; and April, p. 794, &c.

And I have no doubt whatever, that some years hence the practice will be general. Obstetricians may oppose it, but I believe our patients themselves will force the use of it upon the profession.* I have never had the pleasure of watching over a series of better and more rapid recoveries; nor once witnessed any disagreeable result follow to either mother or child; whilst I have now seen an immense amount of maternal pain and agony saved by its employment. And I most conscientiously believe that the proud mission of the physician is distinctly twofold—namely, to alleviate human suffering, as well as preserve human life.

CHEMICAL CONSTITUTION OF CHLOROFORM.

Formyle is the hypothetical radical of Formic acid. In the red ant (*Formica rufa*) formic acid was first discovered, and hence its name. Gehlen pointed it out as a peculiar acid; and it was afterwards first artificially prepared by Doebereiner.

* I am told that the London physicians, with two or three exceptions only, have never yet employed ether-inhalation in their Midwifery practice. Three weeks ago, I was informed in a letter from Professor Montgomery of Dublin, that he believed that in that city, up to that date, it had not been used in a single case of labour.

Chemists have now devised a variety of processes, by which formic acid may be obtained from starch, sugar, and, indeed, most other vegetable substances.

A series of Chlorides of Formyle are produced when chlorine and the hypochlorites are brought to act on the chloride, oxide, and hydrated oxide of methyle, (pyroxylic or wood spirit). In the same way as formic acid may be artificially procured from substances which do not contain Formyle ready formed,—so also are the Chlorides of this radical capable of being procured from substances which do not originally contain it.

Chloroform, Chloroformyle, or the Perchloride of Formyle, may be made and obtained artificially by various processes,—as by making milk of lime, or an aqueous solution of caustic alkali act upon chloral,—by distilling alcohol, pyroxylic spirit, or acetone, with chloride of lime,—by leading a stream of Chlorine gas into a solution of caustic potass in spirit of wine, &c. The preparation which I have employed, was made according to the following formula of Dumas:—

“ R Chloride of lime in powder, . . .	lb. IV.
Water,	lb. XII.
Rectified Spirit,	f 3 XII.

“Mix in a capacious retort or still, and distill as long as a dense liquid, which sinks in the water with which it comes over, is produced.”—(Gray’s *Supplement to the Pharmacopœia*, 1846, p. 633).

The resulting Perchloride of Formyle consists of two atoms of Carbon, one of Hydrogen, and three of Chlorine. Its specific gravity is much greater than that of water, being as high as 1.480. It boils at 141° . The density of its vapour is 4.2. It is not inflammable; nor changed by distillation with potassium, potash, sulphuric, or other acids.—(See Turner's *Elements of Chemistry*, 8th edition, p. 1009; Gregory's *Outlines of Chemistry*, part ii. p. 401; Fownes' *Manual of Elementary Chemistry*, p. 419; Thomson's *Chemistry of Organic Bodies*, p. 312; Loewig's *Organische Chemie*, vol. i. p. 498).

It is now well ascertained that three compound chemical bodies possess, when inhaled into the lungs, the power of superinducing a state of anæsthesia, or insensibility to pain in surgical operations, &c., namely, Nitrous Oxide, Sulphuric Ether, and Perchloride of Formyle. The following tabular view shows that these agents are entirely different from each other in their chemical constitution, and hence that their elementary composition affords no apparent clue to the explanation of their anæsthetic properties:—

	Propor. of Nitrogen.	Propor. of Oxygen.	Propor. of Carbon.	Propor. of Hydrogen.	Propor. of Chlorine.
Nitrous Oxide, }	1 Atom.	1 Atom.
Sulphuric Ether, }	...	1 Atom.	4 Atoms.	5 Atoms.	...
Chloroform,	2 Atoms.	1 Atom.	3 Atoms.

It is perhaps not unworthy of remark, that when Soubeiran, Liebig, and Dumas engaged, a few years back, in those inquiries and experiments by which the formation and composition of Chloroform was first discovered, their sole and only object was the investigation of a point in philosophical Chemistry. They laboured for the pure love and extension of knowledge. They had no idea that the substance to which they called the attention of their chemical brethren could or would be turned to any *practical* purpose, or that it possessed any physiological or therapeutic effects upon the animal economy. I mention this to show, that the *cui bono* argument against philosophical investigations, on the ground that there may be at first no apparent practical benefit to be derived from them, has been amply refuted in this, as it has been in many other instances. For I feel assured, that the use of Chloroform will soon entirely supersede the use of Ether; and, from the facility and

rapidity of its exhibition, it will be employed as an anæsthetic agent in many cases, and under many circumstances, in which Ether would never have been had recourse to. Here then we have a substance which, in the first instance, was merely interesting as a matter of scientific curiosity and research, becoming rapidly an object of intense importance, as an agent by which human suffering and agony may be annulled and abolished, under some of the most trying circumstances in which human nature is ever placed.

POSTSCRIPT.

SINCE the above observations were sent to the press, I have—through the great kindness of Professor Miller and Dr Duncan—had an opportunity of trying the effects of the inhalation of Chloroform, to-day, in three cases of operation in the Royal Infirmary of Edinburgh. A great collection of professional gentlemen and students witnessed the results, and among the number was Professor Dumas of Paris, the chemist who first ascertained and established the chemical composition of Chloroform. He happened to be passing through Edinburgh, engaged along with Dr Milne Edwards, who accompanied him, in an official investigation for the French Government,—

and was, in no small degree, rejoiced to witness the wonderful physiological effects of a substance with whose chemical history his own name was so intimately connected.

I append notes, obligingly furnished to me by Professor Miller and Dr Duncan, of the three cases of operation. The two first cases were operated on by Professor Miller; the third by Dr Duncan. In applying the Chloroform in the first case, I used a pocket-handkerchief as the inhaling instrument; in the two last I employed a hollow sponge.

CASE I.—“A boy, four or five years old, with necrosis of one of the bones of the fore-arm. Could speak nothing but Gaelic. No means, consequently, of explaining to him what he was required to do. On holding a handkerchief, on which some Chloroform had been sprinkled, to his face, he became frightened, and wrestled to be away. He was held gently, however, by Dr Simpson, and obliged to inhale. After a few inspirations he ceased to cry or move, and fell into a sound snoring sleep. A deep incision was now made down to the diseased bone; and, by the use of the forceps, nearly the whole of the radius, in the state of sequestrum, was extracted. During this operation, and the subsequent examination of the wound by the finger, not the slightest evidence

of the suffering of pain was given. He still slept on soundly, and was carried back to his ward in that state. Half an hour afterwards, he was found in bed, like a child newly awakened from a refreshing sleep, with a clear merry eye, and placid expression of countenance, wholly unlike what is found to obtain after ordinary etherization. On being questioned by a Gaelic interpreter who was found among the students, he stated that he had never felt any pain, and that he felt none now. On being shown his wounded arm, he looked much surprised, but neither cried nor otherwise expressed the slightest alarm."

CASE II.—"A soldier who had an opening in the cheek—the result of exfoliation of the jaw—was next made to inhale. At first he showed some signs of moving his hands too freely; but soon also fell into a state of sleep and snoring. A free incision was made across the lower jaw, and from this the dense adhering integuments were freely dissected all round, so as to raise the soft parts of the cheek. The edges of the opening were then made raw, and the whole line of incision was brought together by several points of suture. This patient had previously undergone two minor operations of a somewhat similar kind; both of them had proved unsuccessful, and he bore them very ill—proving unusually un-

steady, and complaining bitterly of severe pain. On the present occasion, he did not wince or moan in the slightest degree; and, on the return of consciousness, said that he had felt nothing. His first act, when apparently about half awake, was suddenly to clutch up the sponge with which the Chloroform was used, and re-adjust it to his mouth, obviously implying that he had found the inhalation from it any thing but a disagreeable duty.

“This case was further interesting as being one of those operations in the region of the mouth, in which it has been deemed impossible to use ether,—and certainly it would have been impossible to have performed the operation with any complicated inhaling apparatus applied to the mouth of the patient.”

CASE III.—“A young man, of about twenty-two years of age, having necrosis of the first phalanx of the great toe, and ulceration of the integuments, the consequence of injury. The ulcerated surface was exceedingly tender to the touch—so much so, that he winced whenever the finger was brought near to it; and the slightest pressure made him cry out. After the removal of the dressings, which caused some pain and fretting, the inhalation was commenced, and the patient almost immediately* became insensible,

* Dr Christison, who was watching the result, informs me that this patient was affected in half a minute.

and lay perfectly still, while the diseased mass was being removed by amputation of the toe through the middle of the second phalanx. The inhalation was now stopped. The edges of the wound were then brought together with three stitches, and the wound dressed. The patient shortly afterwards awoke, looked round him, and gratefully declared his entire and perfect freedom from all pain and uneasiness during the operation."

The whole quantity of Chloroform used in these three operations did not exceed half an ounce,—and, as Professor Miller afterwards observed to the students that were present, if ether had been used, several ounces of it would have been requisite to produce the same amount of anæsthetic effect.

The following case occurred also to-day, to Mr Miller, in private practice. The notes of it and the subsequent remark are in his own words.

CASE IV.—“A young lady wished to have a tumour (encysted) dissected out from beneath the angle of the jaw. The Chloroform was used in small quantity (about a drachm), sprinkled upon a piece of operation sponge. In considerably less than a minute she was sound asleep, sitting easily in a chair, with her eyes shut, and with her ordinary expression

of countenance. The tumour was extirpated, and a stitch inserted, without any pain having been either shown or felt. Her sensations, throughout, as she subsequently stated, had been of the most pleasing nature ; and her manageableness during the operation was as perfect as if she had been a wax doll or a lay figure.

“ No sickness, vomiting, headache, salivation, uneasiness of chest, in any of the cases. Once or twice a tickling cough took place in the first breathings.”

I have, up to this date, exhibited the Chloroform to about fifty individuals. In not a single instance has the slightest bad result of any kind whatever occurred from its employment.

EDINBURGH, *15th November* 1847.

FINIS.

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Exhibition, 15th November 1847.

FINIS.

THE
C L I M A T E
OF
TORQUAY,

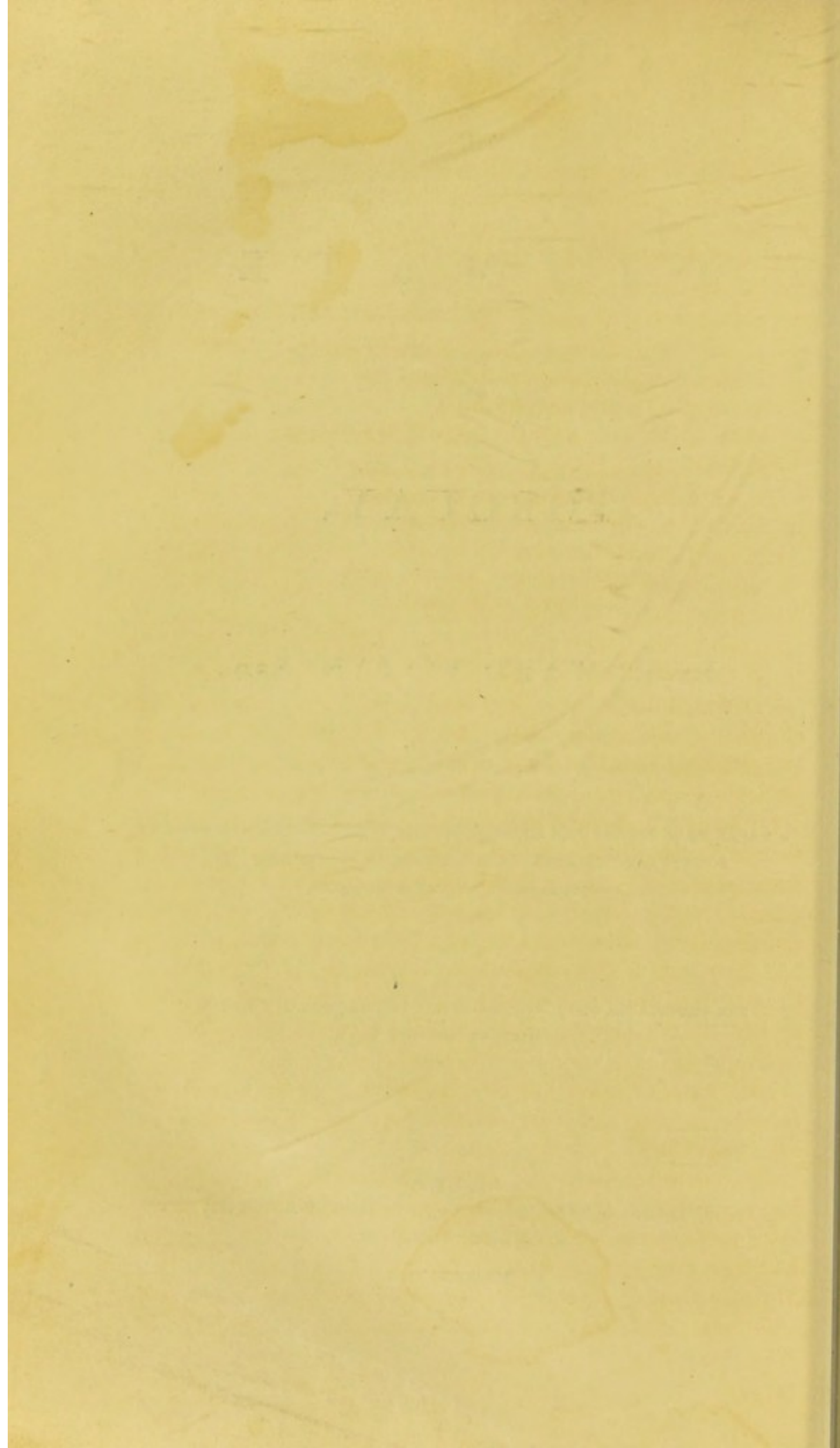
By EDWARD VIVIAN, Esq.,

A PAPER READ BEFORE THE MEMBERS OF THE TORQUAY NATURAL HISTORY
SOCIETY, AT THEIR MONTHLY MEETING IN SEPTEMBER, 1846,
AND PUBLISHED AT THEIR REQUEST.

THE PROFITS (IF ANY) WILL BE GIVEN TO THE TORQUAY NATURAL
HISTORY SOCIETY.

LONDON:
SIMPKIN, MARSHALL, & Co., STATIONER'S COURT,
COCKREM, TORQUAY.

MDCCCXLVI.



CLIMATE OF TORQUAY.

—— Sunny Devon, moist with rills,
A nunnery of cloistered hills,
The elements presiding.

* * * * *

For here all summers are comprised,
The nightly frosts shrink exorcised,
Before the priestly moonshine.
And every wind with stolid feet,
In wandering down the alleys sweet,
Steps lightly on the sunshine.

MISS BARRETT.

Celebrated as Torquay has long been for its mild winter climate, it is singular, that, even on this point, so little has hitherto been known of its statistics, and that in other important particulars such erroneous impressions should still prevail.

Sir James Clark, who has paid more attention to this subject than any other writer, was compelled to omit Torquay altogether from most of the tables in the former editions of his work on climate ; and in reference to the winter temperature, which was the only point upon which he could give any information, he had no ground for his calculations, but the occasional observations of Drs. Barry, Foot, and Coldstream, during the winters of 1827-29-30, and the imperfect tables given in the Panorama of Torquay.

Dr. Shapter, in his Climate of Devon, equally regrets the absence of any sufficient observations, and follows those of Sir James Clark.

Dr. Granville, whose visit of a few hours could have afforded him no means of personal observation, and who does not appear, even to have made himself acquainted with the tables which had then been published in the Environs of Torquay, and the Torquay Guide, relies upon the same Authorities, together with some unpublished observations made at Bath and Clifton.

The following statements are founded principally upon the Tables in the last edition of Sir James Clark's work on Climate, which contain the observations, made during the last five years at East Braddons and Woodfield, the Reports of the Registrar General, Dr. Shapter's Climate of Devon, the observations taken at the Bristol Institution, and the Parochial Registers of this parish.

MEAN TEMPERATURE.

	Annual	Winter	Spring	Summer	Autumn
Torquay, (Woodfield)..	52.1	44.0	50.0	61.2	53.1
Cove	51.9	44.1	50.1	61.3	52.0
Penzance	51.8	44.0	49.6	60.2	53.3
Undercliff	51.3	41.8	49.6	60.6	53.5
Clifton	51.2	39.9	49.7	63.8	51.4
Exeter	51.2	41.4	49.5	62.0	51.9
Hastings	50.4	39.0	47.4	61.7	52.2
London	50.3	39.1	48.7	62.3	51.3
Sidmouth	50.1	40.3	48.1	60.2	51.6
Chiswick	49.9	38.6	48.5	62.2	50.1
Newport, (I. of White)	49.7	38.5	48.1	61.1	50.6
Nice	59.4	47.8	56.2	72.2	61.6
Rome.. .. .	"	46.8	"	"	"
Madeira	64.9	60.6	62.3	69.5	67.3

MEAN EXTREME RANGE OF TEMPERATURE.

	Annual	Winter	Spring	Summer	Autumn
Torquay, (Woodfield)..	51	29	42	30	38
Cove	48	26	39	34	32
Penzance	49	27	33	27	32
Undercliff	57	29	43	35	42
Clifton	59	33	44	30	46
Exeter	59	29	43	36	43
Hastings	61	33	44	39	41
London.. .. .	64	32	46	48	48
Sidmouth	57	31	43	35	43
Chiswick	67	38	54	44	53
Newport	59	31	48	41	52
Nice	60	32	36	29	39
Rome	62	31	43	31	46
Madeira	31	21	22	24	25

THE HIGHEST AND LOWEST DEGREES OF TEMPERATURE DURING
THE QUARTER ENDING THE 30TH JUNE, 1846.

	Highest	Lowest	Difference
Bath	94	26	68
Uckfield	92 $\frac{1}{2}$	29	63 $\frac{1}{2}$
Highfield, Notts.	91	33	58
Thwaite, Suffolk	89 $\frac{1}{2}$	34	55 $\frac{1}{2}$
Cambridge	87	30	57
London	87	33	54
Derby	85	28	57
Oakham, Rutland	85	42	43
Newcastle	84	32	52
Helston	84	49	35
Chichester	83	34	49
Whitehaven	83	33 $\frac{1}{2}$	49 $\frac{1}{2}$
Durham	83	31	52
Harraby, Carlisle	83	27	56
North Shields	82	31	51
Gosport	81	31	50
Torquay	80	38	42
Falmouth	78	38	40
Truro	77	38	39

AVERAGE NUMBER OF DAYS UPON WHICH RAIN FALLS.

	Annual	Winter	Spring	Summer	Autumn
Torquay	132	35	30	32	35
Cove	131	37	29	30	35
Penzance	178	50	40	39	48
Undercliff	146	39	32	33	42
Clifton	169	45	36	41	45
Exeter	162	42	36	41	41
Hastings	153	39	31	33	49
London	178	48	43	44	43
Sidmouth	141	40	33	32	35
Newport	185	49	45	42	49
Grassmere	196	56	39	47	57
Rome	117	35	30	17	34
Madeira	70	23	18	6	22

QUANTITY OF RAIN IN INCHES.

	Annual	Winter	Spring	Summer	Autumn
Torquay ..	28.20	6.82	5.61	6.38	9.39
Cove	33.25	10.54	4.05	7.05	11.92
Penzance ..	44.66	12.64	9.35	9.34	13.33
Undercliff ..	23.48	4.65	4.06	4.29	9.48
Clifton ..	32.56	8.43	5.69	9.44	9.00
Exeter ..	31.90	9.10	6.55	7.10	9.20
Hastings ..	32.81	7.59	5.80	6.40	13.02
London ..	24.80	5.85	4.80	6.67	7.43
Sidmouth ..	22.68	5.29	5.57	5.66	7.46
Chiswick ..	24.04	4.66	4.58	6.79	8.01
Newport ..	33.60	7.87	6.45	6.48	12.90
Grassmere ..	121.00	40.88	18.66	21.28	40.04
Nice	26.81	7.30	6.64	2.75	10.12
Rome	31.11	9.49	6.29	4.16	11.17
Madeira ..	29.23	11.40	5.77	1.45	10.61

AVERAGE NUMBER OF DAYS UPON WHICH RAIN FALLS.

Torquay	132	35	30	32	35
Average of other Places	160	43	36	37	43
Difference in favour of Torquay. .. }	28	8	6	5	8

QUANTITY OF RAIN IN INCHES.

	Annual	Winter	Spring	Summer	Autumn
Torquay.	28.20	6.82	5.61	6.38	9.39
Average of other places	30.37	7.66	5.69	6.92	10.17
Difference in favour of Torquay }	2.17	0.84	0.08	0.54	0.78

Grassmere is not included in this Average, the fall of rain in the lake districts being so excessive.

THE MEAN DEW-POINT AND MEAN TEMPERATURE, FOR THE
QUARTER ENDING THE 30TH OF JUNE, 1846.

	Temp.	Dew.	Diff.
Chichester	56.5	37.1	19.4
Torquay	57.5	48.1	9.4
Whitehaven	54.9	46.9	8.0
London	55.2	48.3	6.9
Brighton	56.7	49.9	6.8
Uckfield	55.9	49.7	6.2
Helston	56.0	50.6	5.4
Newcastle	53.1	51.7	1.4

As compared with Clifton, which Dr. Chisholm describes as possessing "an atmosphere elastic, vivifying, *not humid*," and which Sir James Clark pronounces to be "the driest climate in the West of England," Torquay appears to great advantage. The following Table is compiled from observations taken at the Bristol Institution and at Woodfield Torquay, during the years 1842—3—4—5, and at Exeter, from 1832 to 1836, as given by Dr. Shapter in his *Climate of Devon*.

TORQUAY.					
	Winter	Spring	Summer	Autumn	Annual
Temperature	43.5	55.4	59.9	49.5	52.7
Dew-point	39.4	47.4	53.6	45.3	45.9
	—	—	—	—	—
Difference	4.1	8.0	6.3	4.2	6.8
	—	—	—	—	—
BRISTOL.					
	Winter	Spring	Summer	Autumn	Annual
Temperature	41.3	56.8	62.4	47.6	52.2
Dew-point	38.7	51.5	57.7	46.5	48.6
	—	—	—	—	—
Difference	2.6	5.3	4.7	1.1	3.6
	—	—	—	—	—
EXETER.					
	Winter	Spring	Summer	Autumn	Annual
Temperature	41.0	54.8	60.8	45.8	50.6
Dew-point	38.6	48.0	53.6	43.5	45.9
	—	—	—	—	—
Difference	2.4	6.8	7.2	2.3	4.7
	—	—	—	—	—

By this statement Torquay is *sensibly* drier than Clifton by 1.6 degrees in Summer and *absolutely* drier by 4.1 degrees, whilst it is cooler as regards the mean temperature by 2.5 degrees in Summer, and much more so at the extremes, if we may judge from Bath which was 94 degrees whilst Torquay was only 80, during the past quarter.

The Dew-point, it may be necessary to observe, is that degree of temperature at which the air is saturated, and shews the *absolute* amount of moisture in the atmosphere; the difference between the dew-point and the temperature, shews the *sensible* dryness of the air, and is by far the most important index of

climate ; for the same absolute quantity of moisture in the air at a low temperature would produce a fog, whilst with a high temperature the air would be dry and parching, though containing the same amount of aqueous vapour. The absolute amount of moisture in the air is, however, of considerable importance, as, the interior of the house or sick room being kept at nearly the same temperature, the introduction of air with a low dew-point, will occasion a great difference between the temperature and dew-point of the room, although the difference out of doors might not have been great. In its effect upon the lungs the actual dew-point is the principal consideration. Air saturated with moisture at the external temperature, on its introduction into the body, which possesses at all seasons nearly the same animal heat, rapidly absorbs moisture as its temperature rises, affording a beautiful compensation for the suppression of perspiration by cold, but occasioning a very serious disturbance in the action of delicate lungs, when the transfer of this important function is sudden, or to any great extent. A cubic foot of air at the freezing point contains, when saturated, 2.5 grains of water—at blood heat it is capable of absorbing 18.5 grains ; so that at every breath in frosty weather, several grains of moisture are abstracted from the lungs. In this respect the humidity of our winter climate is of great service, provided it does not amount to absolute saturation, which is very rarely the case.

The range of the Dew-point in Torquay is very small as compared with other parts of the country, this arises partly from its equability of temperature, and principally from its geographical position. The East wind is always dry, from passing over the Continent, whilst the West is saturated with moisture from the Atlantic, and the vapours arising from the gulph stream. This inequality is corrected, in a great measure, on this coast from there being a great extent of sea on the East, and on the West the high range of moors which abstract the surplus moisture, the fall of rain being about a third more in the central parts of Devon and Cornwall than in Torquay ;—the East wind on the contrary is tempered in its passage through the whole length of the Channel, an advantage peculiar to this portion of the coast.

The drying quality of the air is greatly increased by its being in motion, and in this respect Torquay is greatly favoured : although screened from the violence of every wind, there is never

an entire calm: whether this is owing to the circling course of the tides in our bay, itself within the great western bay, or our situation upon a promontory in the great peninsula of the Western Counties, which affords the alternations of a sea and land wind on nearly three-quarters of the compass—the fact is unquestionable, —there is a breeze in Torquay even when vessels are lying becalmed in the offing, and the clouds are resting motionless on Dartmoor.

The advantage which has been shown to exist in regard to the ordinary fall of rain and proportion of wet days, is felt in a still more remarkable degree in our almost entire exemption from thunder storms; not a pane of glass has, I believe, ever been broken, in this immediate neighbourhood, by hail—certainly not within the last fifteen years; and although an occasional thunder shower passes within a short distance, there is no record of any injury having been occasioned by lightning; this exemption is very remarkable, and is doubtless owing to some peculiarity in the course of the electrical currents of which very little is known;—whatever may be the cause, it conduces in no small degree to the enjoyment of the country, and is of the greatest importance to invalids who are frequently affected by the slightest changes in the electrical condition of the atmosphere. During the late severe storms which raged with destructive fury, on two occasions, as near as the coast of Exmouth and Sidmouth, a slight thunder-shower was all that was experienced in Torquay.

From the great advantages which Torquay possesses in regard to situation and climate, we should naturally anticipate a corresponding superiority in the returns of mortality and health.

In a population so fluctuating as that of Torquay, and so rapidly increasing, by the accession in a great measure of invalid families, it is difficult to obtain the data for a safe estimate. In the following statement, the returns for Torquay are deduced from the deaths recorded in the Parish Register, from the years 1813 to 1830 inclusive, which present more faithfully than any of a more recent date the mortality of the native inhabitants; the returns for other places are taken from the reports of the Registrar General:—

The proportion out of 1000 deaths which have occurred at various ages, in England and Wales, in Devon, and in the Parish of Tormoham.

		England and Wales.	Devon.	Tormoham.
Under 20 years		586	514	569
20	50	194	185	187
60	70	80	92	75
70	80	83	122	88
80	90	49	73	69
90	100	8	14	12

This statement shews the superior longevity of the inhabitants of Devon as compared with those of England and Wales generally. The actual returns for Tormoham would appear to be below the average of the County, but if the rapid increase of the population and mortality (from 1350 in A.D. 1811, to 3582 A.D. 1831, and from 15 deaths in A.D. 1813 to 53 in 1830,) be taken into account, and the effect produced upon the averages by a great proportion of those who imigrate into the parish being below the middle age of life, this calculation would unquestionably place the longevity of Torquay as far above the average of the County, as that is above other parts of the kingdom.

The following statement shews the number out of every 1000 deaths, in the different districts of England and Wales, which occurred above the age of 60 years:—

Cumberland &c.	306	Leicester	241
Devon	300	Durham, mining parts	227
Durham &c.....	291	Lincoln &c.	224
Dorset &c.	284	Stafford &c.....	220
Norfolk &c.	279	London	184
Sussex &c.	264	York, West Riding..	181
Somerset	264	Stafford, mining parts	150
Wales	263	Lancashire, except	
Hertford &c.	260	Manchester&Liver-	
Essex	255	pool	147
Oxford &c.	254	Liverpool.....	118
Cornwall	250	Manchester	104
York City and East		England and Wales..	220
Riding	244		

The proportion out of every 1000 who exceeded 70 years in England and Wales generally is 140, in Devon 208.

Mean annual Mortality per cent. occasioned by different classes of disease in England and Wales, (E. & W.); the Western Counties, (W. C.) viz. Wilts, Dorset, Somerset, Devon, and

Cornwall; Devonshire, (D.); and in Torquay and the 38 adjoining Parishes included in the Newton Union, (T.)

	E. & W.	W.C.	D.	T.
Epidemic and Contagious	45	42	38	34
Nervous System	33	22	23	19
Respiratory Organs } 60	51	48	43	
including Pthisis. } [39	34	31	28]	
Digestive Organs	13	09	08	08
Other Causes	69	69	72	68
<hr/>				
Total Mortality ..	2.20	1.93	1.89	1.72

From this Table it appears that the Annual Mortality of the Newton Union, in which Torquay is situated, is about one eleventh below the average of Devonshire, one ninth below that of the five Western Counties, and nearly a quarter below the general average of England and Wales. That deaths from Consumption (including strangers,) are less in this district in the proportion of 28 to 39, and those from diseases of the liver and digestive organs, in the proportion of 8 to 13 as compared with the same general average.

The following table shews that the same advantage exists on a comparison with those places which are usually recommended in this latter class of affections.

	Diseases of the Digestive Organs.			Diseases of the Nervous System.		
	Total.	Males.	Fem.	Total.	Males.	Fem.
Brighton	9.2	8.1	10.4	13.3	14.0	12.7
Leamington	8.0	8.6	7.4	10.6	12.6	8.6
Clifton	7.2	7.1	7.4	15.1	17.0	7.4
Cheltenham	7.0	6.9	7.2	9.0	10.8	7.5
Hastings	6.3	7.8	4.9	17.7	17.0	18.5
Isle of Wight	6.1	7.2	5.1	13.5	12.7	14.3
Torquay & Newton	5.3	6.0	4.6	9.2	10.3	8.2
<hr/>						
England	6.8	7.1	6.6	14.0	15.5	12.6

This statement shews the proportion out of a given number of deaths which was occasioned by these maladies, the proportion as compared with the population would be still more striking, as the total mortality in Torquay is remarkably small.

Number of persons out of whom one dies on an average in every year—

Torquay	1 in 61
Newton Union	— 58
Devon	— 53
South-Western Counties	— 52
South-Eastern ditto	— 52
Welsh ditto	— 51
Eastern ditto	— 49
South Midland ditto	— 48
North Midland ditto	— 48
Northern ditto	— 46
Western ditto	— 45
York ditto	— 45
Metropolis ditto	— 39
North-Western ditto	— 37
England and Wales	— 45
France	— 42
Prussia	— 38
Austria	— 33
Russia	— 28

The quotation for Torquay is given on the assumption that the present population is 8000, and the average for the last five years 7000, (the numbers at the census in 1841 were 5982, and in 1831, 3582.) also that from the annual average of 127 deaths 12 may be deducted as invalid strangers.

From the preceding statements it appears—1. That the mean annual temperature of Torquay, even at Woodfield, is higher than at any other place in Great Britain or Ireland; that this advantage is felt in the cold months, the summers being cooler than at most other places, in about the same proportion that the winters are warmer—the climate being more equable. The mean annual temperature however affords but an inadequate idea of this advantage, being frequently almost the same in climates where the extremes greatly vary; for instance, the difference between the means of Torquay and Chiswick is only 2.2 whilst the difference of range between the extremes is 16 degrees. During the last quarter the temperature of Bath was 14 degrees higher, and also 12 degrees lower than in Torquay. The difference of range being 26 degrees!

2. That the number of days upon which rain falls is less in Torquay than in any other place in England; and that the total

amount is 16 inches less than at Penzance, 4 inches less than at Clifton, and two inches below the general average.

3. That Torquay possesses a drier air than any place mentioned in the Registrar-General's report, except Chichester, exceeding Brighton by nearly 3 degrees, London by more than 2, during the last quarter, and Clifton on an average of years by more than 3 degrees annually. That the east wind is a sea breeze—an advantage peculiar to this coast.

4. That the mean annual mortality in Torquay is only 1.60, whilst in the Newton Union generally it is 1.72, in Devonshire 1.89, in the five Western Counties 1.93, and in England and Wales 2.20. That this superiority exists in the Newton Union in regard to diseases of the nervous system and digestive organs, for which this climate has generally been considered unfavourable, in the proportion of 8 to 13, and in consumption (including strangers) of 28 to 39, as compared with the general average.

5. That in regard to the longevity of its inhabitants the county of Devon is inferior only to Cumberland, and above the general average of England and Wales in the proportion of 300 to 220, as shewn in the numbers of deaths out of every thousand which occurred above the age of 60 years.

As compared with Penzance, Undercliff, Clifton, and Hastings, places which most resemble Torquay, the result is as follows :—

Torquay is warmer than Penzance throughout the year by 0.3 degrees, the winter temperature being precisely the same, even at Woodfield, and in the more sheltered parts of the town considerably higher. The number of days upon which rain falls are 46 less at Torquay than Penzance, and the total amount in inches 16.46, or nearly two fifths less. Penzance has the advantage of Torquay in equability of temperature by two degrees, being as 49 to 51.

Torquay (Woodfield) is warmer than the Undercliff in the Isle of Wight by 0.8 of a degree throughout the year, the advantage being confined to the spring, the temperature of Undercliff is somewhat higher during the autumn and winter than Woodfield, but lower than in the more sheltered parts of the town. Rain falls in Torquay on 14 days less than at Undercliff, but the amount in inches is 4.72 more.

Torquay (Woodfield), is warmer than Clifton in winter by 4.1 degrees, whilst it is cooler in summer by 2.6 degrees mean temperature, the spring and autumn being also in favour of Torquay. Rain falls at Torquay on 37 days less than at Clifton, and the total amount is less by 4.36 inches.

Torquay (Woodfield), is warmer than Hastings by 5.0 degrees in winter, and cooler by 0.5 degrees in summer. The number of days upon which rain falls is 21, and the amount in inches 4.61 less in Torquay.

Cove, in the South of Ireland, most closely resembles Torquay, being 0.1 of a degree warmer both in winter, spring, and summer, the difference in autumn being 1.1 degree in favour of Torquay. The number of days on which rain falls is also nearly the same, the excess being in winter at Cove and in summer at Torquay.

From this it appears that the winter temperature of Torquay, even on the north-western aspect of one of the hills, is superior to any other place in England, with the single exception of the limited district of the Undercliff in the Isle of Wight, whilst in the more sheltered portions of the town, and warmer aspects it is decidedly superior even to this. That the climate of Undercliff is merely local is obvious on comparing the temperature of Newport with that of Exeter and the surrounding districts, the difference in winter being greatly in favour of Devonshire. Indeed the principal advantage of Torquay consists in the great extent of country around, where the climate is almost equal to its own.

The singular discrepancy between the generally received opinion upon these points, and the facts, as now proved by accurate observations, may readily be accounted for. It was naturally inferred, that if Torquay was warm in winter, it must be hot in summer, and the confined situation and character of the original town confirmed this idea; the contrary is however the fact;—the sea breeze, always equable in its temperature, which produces a mild winter, necessarily occasions a cool summer;—an island, or a peninsula is always more temperate than a continent in the same latitudes. In regard to the fall of rain in Devonshire, the amount being very great in Dartmoor, the only spot where it had formerly been registered, was naturally taken as the estimate of the county. Observation has proved,

on the contrary, that the proximity of the high range of Dartmoor causes the amount which falls in the lower districts to be considerably below the average. The humidity of our atmosphere was inferred from the prevalence of the sea breeze, under the idea, that air passing over water must always be more charged with moisture than that which passes over land; in winter this is the case, but in summer less evaporation takes place from the cool surface of the sea, than from the heated soil,—the effect is that an equable dew point is produced at all seasons.

Upon the same principle we may account for the summers in Torquay being cool, whilst the winters are mild; an overland wind is heated in summer by the radiation from an arid soil, and chilled in winter by its passage over a frozen surface—the sea breeze on the contrary is equable. The east and south-east winds, which are generally the hottest, are in Torquay a sea breeze, giving us a great advantage over the North of Devon and the inland districts, which, in ignorance of this fact, are frequently recommended as affording a cool summer residence. When Torquay consisted of only the confined houses around the harbour, the complaint might have been true, from the local radiation, which in winter is so valuable; but as the town now extends almost to the summit of the surrounding hills, there is not a spot on the coast where so free a circulation of air, and so cool a temperature can be enjoyed, or where the diversities of aspect and luxuriance of foliage afford such refreshing shade.

In the tables which are appended to the last edition of Sir James Clark's justly celebrated work on Climate are embodied the observations which have been taken during the last five years at Woodfield. These place Torquay in its just position, but unfortunately a corresponding alteration has not always been made in the text, and as the generality of readers are satisfied with the opinions expressed in the body of a work, without troubling themselves to examine the tabular statements, the erroneous opinions which had been hazarded in former editions, being retained in this, will tend to confirm the error from their appearing to rest upon statistical data.

At page 139 it is stated, "although at Torquay the temperature sometimes rises higher, it likewise sinks lower than at Undercliff, giving the latter the advantage in point of equability of temperature." Now on referring to the tables it appears that the

extreme range of temperature at Torquay and at Undercliff during an average of years was as follows :—

	Annual.	Winter.	Spring.	Summer.	Autumn.
Torquay.....	51	29	42	30	38
Undercliff	57	29	43	35	42

So that instead of the difference being in favour of Undercliff, it is six degrees in favour of Torquay. This is confirmed by Table III of the previous edition, which stated the absolute highest and lowest points registered by the thermometer, the quotations for Undercliff being $81^{\circ} 26''$,—Torquay (Woodfield 1842 to 1845 which does not appear in that edition) $77^{\circ} 26''$.

This also shews that the extreme heat of Summer at Undercliff is four degrees higher than at Torquay, notwithstanding which fact Sir James Clark adds “Up to the middle of August the climate of the Undercliff is pleasant; the sea breeze, which in fine weather usually sets in about seven o’clock in the morning, is very refreshing and prevents the solar heat from becoming oppressive.” Of “the relaxing and enervating effects” of a residence on the Coast of Devon, on the contrary, he repeats his former remarks, limiting a sojourn at Torquay to the winter and spring and stating, as a matter of notoriety, that “many invalids derive in two or three months, or even a shorter period, all the benefit which the climate affords. Others cannot remain above a few weeks without suffering” &c. ! Surely so decided an opinion, coming from what is justly considered one of the highest authorities, ought to be founded upon some data.—If a relaxing climate mean one that is warm and moist, we should expect to find the climates of Torquay and Undercliff strongly contrasted in these respects in the Meteorological Tables; but the contrary as we have seen is the fact.

As compared with Clifton, another spot which is recommended as having a *bracing* air, the contrast is still more favorable to Torquay both in regard to temperature, dew-point, and fall of rain. The annual amount of which at Clifton is 4.36 inches greater, and the number of wet days 37 more than at Torquay. Still Sir James decides that “the fall of rain at Clifton is absolutely less than in Devonshire,” and that “the vicinity of Bristol and Clifton is the mildest and driest climate in the West of England, and consequently the best winter residence for invalids in that part of the country” ! which is correct—the text or

the tables? The mortality of Clifton and the adjoining rural districts, is 1 in 46, that of the Newton Union 1 in 58, Torquay 1 in 61.

The fall of rain at Sidmouth is stated in the tables to be only 22.68 inches,—this appears to have arisen from an oversight in Dr. Cullen's figures—he states the fall of rain in the year 1845 to have been only 14.10 inches, whilst in the 9 months of 1843 there had been 30.36! (see note p. 407,.)—the amount at Sidmouth is unquestionably greater than at Torquay, which is 28.20.

It is very certain that *practically* neither heat nor moisture are found to be in excess in Torquay. A steaming apparatus is a very common appendage to the sick room, for the purpose of increasing the humidity; and no invalid, whom prejudice has allowed to remain during the summer, has found reason, in the airy parts of the town, to complain of heat, although this arises from no lack of sunshine. "Sunny Devon" is the epithet chosen by one to whom the *Quarterly* has given the palm amongst the Poetesses of England, and whose long residence here as an invalid gives value to her impressions.—The gardener would gladly accept double the average quantity of rain during the spring and summer months, with more of the muggy growing days with which he is tantalized, and a share of the sultry heat of the *bracing* counties. Spring planting and spring-sown annual and grass seeds are almost invariably failures from drought; and grapes, nectarines, figs, and other fruits very frequently fail from the want of sufficient heat to ripen them.

Dr. Shapter in his *Climate of Devon*, attributes this to "the peculiar prevalence of cloud" "for" he adds "as far as mere temperature is concerned there is no reason whatever for their not ripening sufficiently, but the absence of the direct rays of the sun, prevents the perfect developement of flavour." The erroneous opinion here expressed in regard to the high temperature of South Devon, arises from an oversight in his tables of the maximum temperature at page 8, where the *extreme* highest temperature in Exeter is compared with the *mean* highest temperature of London; the same error was committed in regard to the minimum temperature, which led to the apparently excessive variations upon which he comments, and which he now authorizes me to correct. Dr. Shapter's opinion of the *Climate of Exeter* is not so favourable in regard to the

prevalence of cloud, and the humidity of the atmosphere, as the comparison which has been given above with Clifton and other places would warrant, although in these respects Exeter is undoubtedly inferior to Torquay. The luxuriance of our vegetation, which is often adduced as an evidence of the humidity of the atmosphere, is really owing to a fertile soil, as is evident from the failure of crops on the hills, where the soil is thin.

Dr. Granville's unfavourable opinion of Torquay, is founded upon an error in his own figures. As this has been extensively circulated in the Spas of England, it will not be out of place to shew how it occurred. After referring to Dr. Barry's tables, in which he quotes the temperature of January, February and March, 40.3 43.4 and 45.6 respectively, he adds, "but we have already seen that the mean temperature at Clifton and Bath was higher during those months and years, having extended from 44 degrees even to 49 degrees, and therefore the contrast between Torquay and those places, with which in truth it ought to be compared, is not in favour of the latter." (p. 488.) On referring to his chapters on Bath and Clifton, the following appear to be the only passages at all bearing upon the temperature. "The absolute lowest temperature (of Clifton) had seldom been more than 11 degrees below the freezing point, and that only for one day, and the highest was 85 degrees." Of Bath he adds, "In several of what are called the cold months elsewhere, November, December, January, and February, the temperature of the external air at three o'clock in the afternoon has often been 44-5-6-7-8 and even 49 degrees, which bespeaks the mildness of the climate in winter." (p. 360.)

Now in the first place the comparison is not made between the same years, Dr. Barry's table was computed from observations taken between the years 1828 and 1838, that of Mr. Biggs at Bath, from the years 1839 and 1840.

Secondly "44-5-6-7-8" and even 49 degrees is not the *mean* temperature of Bath, but (as Dr. G. himself expressly states, p. 360,) the *highest extreme* at 3 o'clock in the afternoon.

In regard to the amount of rain which falls in Torquay, as compared with other places, Dr. Granville again hazards an opinion,—“everybody knows that it rains a *very great deal* in Devonshire, and certainly not less at Torquay than in other

parts of the coast of that county." If he had examined the table which had been published by Dr. Barry, in the Environs of Torquay, he would have found, that, in the year to which he referred, there had fallen at Torquay, 3.8 inches less rain than at Exeter, 5.5 less than at Plymouth, 8.6 less than at Plympton, and that in the month of September alone 3.5 inches less rain had fallen at Torquay than at Moreton; the excess was doubtless still greater in the higher parts of the moor.

With the same contempt for his own figures which he had exhibited in his Meteorological statements, Dr. Granville denies that the climate of Torquay is beneficial even in Consumptive cases for, says he, 31, of its 5600 inhabitants died of consumption in two years; if he had compared this proportion with that of England and Wales generally, he would have found that it was more than a quarter below the general average, and considerably lower than that of any other district in the kingdom. "The awful and thrilling effect of the frequent tolling of the funeral bell" is doubly a fiction, as it is not audible in the town.

From the preceding remarks, quoted from medical writers, which are unfavourable to Torquay, it must not be inferred, that their opinions are unfavourable upon those points, upon which they had the means of arriving at a just conclusion, either by personal observation, or accurate report;—on the contrary, Sir James Clark, who has occasionally visited Torquay, gives the most flattering description of its situation and general advantages, and, in spite of the erroneous tables in his first edition, gives a very high opinion of its climate, with some exceptions, which we have seen to be founded in error—"The general character of the climate of the South-west coast is soft and humid. Torquay is certainly drier than the other places, and almost entirely free from fogs. This drier state of the atmosphere probably arises, in part, from the limestone rocks which are confined to this neighbourhood, and partly from its position between two streams, the Dart and the Teign, by which the rain appears to be in some degree attracted. Torquay is well sheltered from the north-west, and is in a great measure protected from the north-east wind, the great evil of our spring climate. This protection from winds extends also over a very considerable tract of country, abounding in every variety of landscape, in which the invalid may find, at all times, a sheltered spot for exercise, either on foot or horseback. The

beauty of the country around Torquay, and the manner in which it is sheltered from all winds,—combining also as it does, in the highest degree, all the favourable qualities of the south-western climate—are advantages of great importance to the invalid, and which Torquay possesses to a greater extent than any other place on this coast.

Whenever Sir James Clark had the means of judging correctly his opinion is decidedly favourable to Torquay. Even Dr. Granville whose solitary visit of a few hours rendered it impossible that he should speak from personal experience upon any other point, describes our November climate, as “genial and pleasant as a clear, calm, and summer evening in the south of Spain!” Rather an exaggeration even its warmest advocates will admit, but far nearer to the truth than the opposite statements, referred to above, and the general impression of Torquay, which his sketch is calculated to convey, in its minor details, most of which are pure romance.

The Meteorological Journal for Torquay is regularly published in the *Torquay Directory*; to which will now be added a very valuable series of comparative observations, which has been commenced by the Registrar General in his Quarterly Reports. These statements will shew more forcibly than any tables of the *mean* temperature the actual superiority of Torquay, which is most felt in seasons of unusual severity, or periods of excessive heat. For instance, although but little difference is shewn between their mean temperature, in the preceding tables, the difference between the extremes at the following places during the severe winter of 1837-8 as given by Dr. Barry was as follows:—Torquay 21° , Exeter 17° , Chichester $9\frac{1}{2}^{\circ}$, Bristol 8° , Kensington 0° , and Sandhurst 8° below zero! The superiority of the climate of Torquay during the extreme heat of the past summer has been shewn at page 4, proving it to be the coolest place in England, with the exception of parts of Cornwall, which confirms the principle upon which the cool summers of Torquay have been accounted for.

ADDENDA.

The following summaries are deduced from the Quarterly Reports of the Registrar General, the details of which have appeared in the *Torquay Directory*. The series commences from the 1st of April, 1847, and affords the only statement of the comparative Meteorology of the several districts of this country upon which any reliance can be placed, having been founded upon observations taken at the same time, and with instruments regulated by the standards at the Greenwich Observatory :—

EXTERNAL TEMPERATURE, IN THE SHADE.

	Highest extreme.	Lowest extreme.	Mean Tempera.	Range of Temp.
To 30th June, 1847.				
Torquay	75	31	52·7	44
Average of England	78	27	50·9	51
Extreme of ditto	87	19	—	65
To 30th September, 1847.				
Torquay	80	44	60·5	36
Average of England	82	36	58·2	46
Extreme of ditto	98	20	—	68
To 31st December, 1847.				
Torquay	64	31	49·4	33
Average of England	67	26	45·8	41
Extreme of ditto	73	14	—	55
To 31st March, 1848.				
Torquay	57	26	43·1	31
Average of England	62	16	38·1	46
Extreme of ditto	71	4	—	56
To 30th June, 1848.				
Torquay	72	37	55·6	35
Average of England	79	28	53·4	51
Extreme of ditto	88	23	—	65
To 30th September, 1848.				
Torquay	75	46	58·0	29
Average of England	82	36	57·4	46
Extreme of ditto	95	29	—	60

HUMIDITY OF THE AIR AND FALL OF RAIN.

	Days of rain.	Inches of rain.	Vapour in cubic foot of air.	Additional vapour to saturate do.
To 30th June, 1847.				
Torquay	39	5.1	3.7gr.	0.7gr.
Average of England.....	42	6.3	3.7	0.7
Extreme of ditto.....	58	10.6	4.1	0.3

To 30th September, 1847.				
Torquay	21	3.5	4.7	1.2
Average of England.....	32	4.6	4.8	0.9
Extreme of ditto.....	46	9.3	5.0	0.2

To 31st December, 1847.				
Torquay	43	13.7	3.8	0.4
Average of England.....	43	9.1	3.4	0.3
Extreme of ditto	61	18.6	4.0	0.1

To 31st March, 1848.				
Torquay	52	9.3	3.0	0.4
Average of England.....	52	9.6	2.7	0.3
Extreme of ditto.....	67	16.1	3.1	0.1

To 30th June, 1848.				
Torquay	38	9.1	4.0	1.1
Average of England	43	8.1	3.8	1.1
Extreme of ditto.....	59	11.6	4.1	0.8

To 30th September, 1848.				
Torquay	49	10.4	4.7	1.2
Average of England	50	10.3	4.5	1.0
Extreme of ditto.....	61	15.2	5.0	0.7

The most important feature in the Climate of Torquay is its *equability*, both as regards the temperature, and the humidity of the atmosphere. The highest point registered during the year 1847, in Torquay, was 80°, and in 1848, 75°, whilst in some other parts of England it was as high as 98° and 95 at the same periods. The lowest temperature, on the other hand, was 31° and 26° in Torquay,—whilst the extreme in other parts was 14° and 4°, shewing six degrees of frost in Torquay, and twenty eight degrees in some other districts, and as much as ten degrees on the average of England.

In regard to the humidity of the atmosphere in Torquay the same equability is found to exist, the greatest amount of vapour in a cubic foot of air, shewing the *actual* humidity, being 4.7 grains, and the least 3.0 grains, whilst on the average of England the amount varied from 4.8 to 2.7 grains. The fluctuation in the *sensible* humidity, as shewn by the additional amount of

vapour required to produce complete saturation, was from 1·2 to 0·4 grains in Torquay, 1·1 to 0·3 on the average of England, the difference in either case being the same, but proving that there is less sensible dampness in Torquay than in other parts of England, many of which have hitherto enjoyed the repute of possessing a much more bracing air.

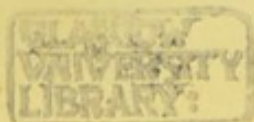
The causes of this superiority are to be found in the peculiar geographical position of Torquay. Its Southern latitude will in some measure account for the mild winter temperature, but the principal cause is the proximity of the sea, which not only encircles the great peninsular of the Western Counties, but also the smaller promontary upon which Torquay is situated, and thus, from its always retaining nearly the same temperature, the sea breeze moderates both the summer heat and the winter's cold. In addition to this, the coast from Exmouth to Start-point having nearly an Eastern aspect, the coldest winds in winter and the hottest in summer are from the sea which tempers, the extremes of each. The same cause also modifies the amount of vapour, the dry East wind being moistened in its passage down the Channel, and the superfluous moisture of the West being abstracted by the high range of Dartmoor.

The full influence of these causes is necessarily confined to the peninsula, of which a line drawn from Tor Abbey Sands to Babbicombe forms the base, within these limits it will be seen that the wind in every point to the Southward of North East and West is a sea breeze, and, as these prevail nearly throughout the year, Torquay is virtually an island, and its climate is as essentially different from that of the mainland, as the climate of Madeira is from that of the Continents of Europe or America in the same latitudes.

The climate of Tor is, for the same reasons, of a very different character; the influence of the sea is only felt when the wind is between the South and East, which is very rarely the case. Those who find the saline character of the sea breeze too stimulating may thus enjoy all the other advantages of the climate, in almost the same perfection, within a very short distance, and by selecting an elevated or a sheltered situation may suit the peculiarities of almost every constitution.

E. V.

Woodfield, Nov. 1848.



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