Remarks on the report of M. Chaptal, (late minister of the interiour) to the consuls or former government of France, with an examination of the claim of M. Guiton de Morveau to the discovery of the power of the mineral acid gazes, on contagion : in a letter addressed to William Wilberforce, Esq. M.P. / by James Carmichael Smyth.

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REMARKS

ON THE

REPORT OF M. CHAPTAL

&c. &c. &c.

BY

JAMES CARMICHAEL SMYTH, M.D. &c.

PRICE ONE SHILLING AND SIXPENCE.

3

REMARKS

ON THE

REPORT OF M. CHAPTAL

(LATE MINISTER OF THE INTERIOUR)

To the Consuls or former Government of France,

WITH AN EXAMINATION

OF THE

CLAIM OF M. GUITON DE MORVEAU

TO THE DISCOVERY OF THE

Power of the Mineral Acid Gazes,

On Contagion.

IN A LETTER ADDRESSED TO

WILLIAM WILBERFORCE, ESQ. M.P.

&c. &c. &c.

BY

JAMES CARMICHAEL SMYTH, M.D. &c.

Nihil est, Antipho,
Quin male narrando possit depravarier;
Tu, id quod boni est excerpis, dicis quod mali est,
Audi nune contra.

TERENT. PHORM.

London:

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NO. 10, CROWN COURT, PRINCES STREET, SOHO.
by W. Smith and Son, King Street, Seven Dials.

1805.

REMARKS,

&c. &c. &c.

East Acton,
1st March, 1805.

SIR,

I HAVE taken the liberty of addressing you, on the subject of M. Chaptal's Report; as it implies, in my humble opinion, an indirect censure, not on me only, but on the Committee of the House of Commons, of which you was chairman, and on the House of Commons itself: who, if the accuracy of his conclusions were admitted, was guilty of deciding a question of some importance, on slight and partial evidence; and of voting away the public money without proper enquiry.

To refute this calumny is fortunately no very arduous or difficult task; a full and candid exposition of facts being all that is necessary, which would have been laid before the public long ago, had I been sooner apprised of the circumstance. But it is only lately that it came to my knowledge, and I

might still have remained in ignorance, had not M. Morveau prefixed M. Chaptal's report to the second edition of his book, being (as he expresses it) *Le titre le plus honorable de ma proprietè.*

I have no occasion, Sir, to inform you, but it may be proper to acquaint the public, that my chief inducement for bringing the subject of the nitrous fumigation before Parliament, was not so much the hope of reward, as the desire of courting a fair and public investigation, of meeting the opposition made to it, in an open and manly way, and of giving such publicity and sanction to the discovery, as would render future neglect or ignorance criminal.

The Committee, to whom this business was referred, and at which you presided, did not, as you well know, form any rash or hasty opinion, nor deliver in a report to the House, until after four months of patient and careful investigation; during which, they examined with equal candor, the evidence in support of the claim, and every fact, real or pretended, against the merit of the discovery, or of its author. M. Morveau's publication, of the year 1801, with extracts from his memoir of the year 1773, were by myself laid

before the Committee; and in deciding on the relative pretensions or merit of the individuals of different countries, you displayed that liberality of sentiment so happily expressed by the first of Latin poets—

Tros, Tyriusque mihi, nullo discrimine, agetur.

Whether Messrs. Chaptal and Morveau have shewn equal liberality, or have acted with equal candor, I leave the public voice to determine.

REPORT OF M. CHAPTAL.

ORIGINAL.

Rapport présenté aux Consuls de la République, par le Ministre de l'Intérieur, en Messidor, An. X.

La Chambre des Communes, en Angleterre, vient de voter une récompense de 5000 liv. sterl. en faveur du Docteur Smyth, auteur d'une découverte importante, propre à désinfecter l'air vicié des prisons, hôpitaux, etc.

Comme une découverte dans les sciences, surtout lorsqu'elle intéresse

TRANSLATION.

Report presented to the Consuls of the Republic by the Minister of the Interior, An. 1802.

The House of Commons of England have lately voted a recompence of £5000. to Dr. Smyth, author of an important discovery for correcting the noxious air of prisons, hospitals, &c.

As a discovery in science, especially when it immediately interests the welfare

essentiellement le bien de l'humanité, me paroît liée à la gloire de la nation qui l'a produite, je crois devoir revendiquer celle-ci, en faveur de la France; et il me suffira, pour établir cette propriété d'une manière incontestable, de rapprocher quelques faits.

of society, appears to me connected with the glory of the nation which produced it, I feel it my duty to reclaim this, in favour of France; and, to establish this right in the most unequivocal manner, it will be sufficient for me to state certain facts.

Le C. Guyton-Morveau a fait connoître, en 1773, l'effet heureux des fumigations de l'acide muriatique pour désinfecter l'air corrompu.

The Citizen G. Morveau discovered, in the year 1773, the happy effect of fumigations with the muriatic acid, for correcting the noxious quality of corrupted air.

La première expérience a été faite, le 6 Mars, 1773, pour corriger l'air contagieux de la principale église de Dijon, à la suite de l'évacuation des caves sépulcrales de ladite église.

The first trial was made on the 6th of March, 1773, to correct the contagious air of the principal church of Dijon, occasioned, by emptying the burying vaults of that church.

Sur la fin de la même année, le C. Guyton, en employant le même procédé, arreta les progrès alarmans de la fièvre des prisons, qui s'etoit manifestée dans celle de Dijon.

Towards the end of the same year, the C^{n}. Guyton, employing the same means, stopt the alarming progress of a jail fever that broke out in the prison of Dijon.

En 1774, ces fumigations furent employées avec succès par Vicq-d'Azyr, pour combattre une *épizootie* qui désoloit le midi de la France.

In the year 1774, these fumigations were successfully employed by Vicq-d'Azyr, to extinguish *an epidemic distemper among horses and other animals*, which desolated the south of France.

En 1775, M. de Montigny publia deux Instructions sur les Maladies Putrides et Pestilentielles, et recommanda les fumigations acides dont il dit qu'on doit les premières applications au C. Guyton-Morveau.

In the year 1775, M. de Montigny published two Instructions upon Putrid and Pestilential Diseases, and recommended acid fumigations. For the first knowledge of which (he says) we are indebted to the Citizen Morveau.

En 1780, l'Académie des Sciences, consultée sur les moyens de corriger l'insalubrité des prisons, proposa les * fumigations acides, en donna la première idée au C. Guyton-Morveau.

In the year 1780, the Academy of Sciences, being consulted respecting the proper means of correcting the unhealthy state of prisons, proposed acid fumigations, and acknowledged their obligations to C. Morveau for the first idea on the subject.

En l'An. 2, (1794 vieux style), le Conseil de Santé rédigea une instruction sur les moyens de purifier l'air

In the year 2, (1794, old stile) the Council of Health drew up an instruction upon the means of purifying the

* Here, Mr. Chaptal is not perfectly correct, as there is no such expression as *fumigations acides* in the Memoire—vid. appendix.

des salles dans les hôpitaux militaires, en exécution du décret du 14 Pluviôse de la même année. On y conseille le procédé du C. Guyton-Morveau.

air of the wards of military hospitals, in compliance with a decree of the 24th Pluviose of that same year. Mr. Morveau's process was recommended.

En l'An. 7*, on a pratiqué avec succès, à l'armée d' Italie, la méthode proposée par le C. Guyton.

In the year 7, Morveau's method was practised with success in the army of Italy.

En l'An. 9†, on s'en est servi avec avantage contre la maladie contagieuse qui ravageoit une partie de l'Espagne; et en l'An. 10, on en a vu de très-heureux effets dans le traitement d'une *épizootie* qui a régné dans le département de l'Oise.

In the year 9 (1801) the same method was employed with success against the contagious fever that ravaged a part of Spain; and in the year 10 (1802), we have seen the happy effects of this method, in the suppression of *an epidemical distemper amongst animals*, that prevailed in the department of Oise.

Enfin, en l'An. 9, (1801,) le C. Guyton-Morveau a publié un Traité sur les Moyens de désinfecter l'Air, dans lequel il donne avec

Finally, in the year 9, (1801), the Citizen Guyton de Morveau published a Treatise on the Means of disinfecting Air, in

* The success could not be very great if we may judge by the mortality that prevailed. Vid. Odier sur le Fievre des Prisons, p. 3.

† Here M. Chaptal has made a mistake in the date, as it was the year 1800, or An. 8, and not the year 1801, or An. 9.

détail l'historique de sa découverte, fait connoître les résultats qu'on a obtenus de la pratique de ces procédés, et rend hommage à M. Smyth qui a fait les applications les plus heureuses des fumigations acides depuis 1780, dans les hôpitaux de Winchester, jusqu'à 1795, dans l'hôpital de Sheerness, et sur divers vaisseaux de l'escadre.

which he gives, in detail, an account of his discovery, and relates the results of the practice of this method, and does justice to Mr. Smyth, who had made the happiest application of acid fumigations, in the year 1780, in the hospital of Winchester, and, in the year 1795, in the hospital of Sheerness, and in different ships of war.

La seule différence qui existe entre le procédé employé par le chimiste Français et celui du médecin Anglais, c'est que le premier a fait usage des fumigations de l'acide muriatique, tandis que le second conseille celles de l'acide nitrique.

The only difference between the method employed by the French chemist, and that of the English physician, is, that the first made use of fumigations with the muriatic acid, whilst the other advises those with the nitrous acid.

Ainsi, tous deux emploient des fumigations d'acides minéraux; tous deux ont obtenu des résultats également heureux: il n'y a donc qu'une découverte, et cette découverte appartient essentiellement au chimiste Français.

Thus both employed fumigations with the mineral acids; both were equally successful. There is therefore but one discovery, and that discovery belongs essentially to the French chemist.

(Signed) CHAPTAL.

The facts, set forth in the preceding report, I do not mean to call in question; they are, I believe, tolerably correct. M. Chaptal has, *in general*, told the truth, but not the whole truth. It becomes then my duty to add what he has omitted or suppressed, and likewise, what he possibly was unacquainted with: as no just opinion of the pretensions of different individuals, or the claims of different countries, can be formed, unless from a complete and accurate knowledge of the whole circumstances. These I shall briefly endeavour to state.

In the years 1750, 51, and 52, some experiments were read by Sir J. Pringle at the Royal Society, which proved that the mineral acids of vitriol (*sulphuric acid*) and sea salt, were powerful antiseptics, and also that they had an effect in altering the smell or fœtor arising from putrid matter.*

In the year 1758, a professional tract, published in this country, shews the general opinion entertained by physicians, at the time, of the use of acid fumigations, as antidotes to contagion; and though nothing is affirmed in regard to the superiour power of

* Vid. Appendix A.

the mineral acids, those of sulphur and sea salt are particularly mentioned, and the manner of using them described; and the suspicion of the author, that some persons might probably choose to employ them in the apartments of the sick, notwithstanding the inconvenience and danger of the practice, proves that an opinion prevailed, even then, of their efficacy.*

The fate of the two acids, however, in this country has been extremely different; whilst that of sea salt was generally neglected, the acid of sulphur, either from theory or accident, came into general use: and many years before the date of M. Morveau's experiments, the effect of this, on contagions of different kinds, was fully established, by repeated trials in our navy, and in all the principal hospitals of the kingdom. In proof of this fact, I shall only refer to the writings of the late Dr. Lind†, which are universally known: having been translated into most of the modern languages of Europe. But if Dr. Lind, and the other English physicians, were taught by experience the effect of the sulphuric acid on contagion, they learnt, from the same high authority, that neither

* Appendix B. † Appendix C.

this acid, nor any means of effectually destroying contagion, could be employed where people were present; and consequently, they were always under the necessity of removing the people, before they could venture to attempt it.*

Here, then, a question naturally occurs; Did M. Morveau's discovery, in the year 1773, remedy this inconvenience, or supply this defect? Could the muriatic gas be employed in situations where the sulphuric could not? M. Morveau, altho', on this occasion perhaps an unwilling witness, shall answer the question himself—" Verba tua recognosce & aude negare."

In his Memoir published in the first volume of the Annales de Physiques, An. 1773, after describing two methods of disengaging the marine acid from common salt, he proceeds, page 442, " Il est evident que ni l'un " ni l'autre *ne peuvent se faire dans une* " *chambre, ou il se trouveroit actuellement* " *des malades,* mais combien d'autres occa- " sions, ou l'on peut avoir besoin de purifier " l'air du miasmes cadavareux; des vapeurs " alkalescentes dont il est infecté; c'est " pour celles la que j'ai proposé ce nouveau

* Appendix D.

" moyen, dont la theorie est generalement
" avancée, dout l'efficacité est prouvée par
" l'experience, dont la depense des ingredients
" et le procédé sont a la porté de tout le
" monde."

Again: " L'operation se feroit, du moins
" en grande partie, sans feu, si l'on employoit
" du sel decrepité, mais pour peu que les
" doses fussent considerables, il y auroit tout
" a craindre que celui qui en feroit le me-
" lange, n'eut pas le tems de se retirer, et ne
" fut suffoqué sur le champ, par l'activité des
" vapeurs acides."

Again: " L'un des Messrs. les Fabriciens
" m'a assurer, que s'etant presenté a l'un des
" portes de l'eglise, environ deux heurs après
" l'operation, il avoit été saisi par cette vapeur
" que s'echappoit par le trou de la serrure."

M. Chaptal undoubtedly had never read this Memoir; to suppose otherwise, would be to impeach both his candor and his judgment; for no one, having common sense and common honesty, with such a declaration before him, could possibly pronounce M. Morveau's discovery and mine, to be one and the same. Or, that a method of destroying contagion, which could not be used in the apartments of the sick, " *dans une chambre, ou il se*

"*trouveroit actuelment des malades,*" was the same, with a method which could be used without risk or inconvenience, in presence of the sick of every description, and in apartments of every size. The two discoveries, then, are only similar in so far as respects the power of the acids to destroy contagion. But, that the gas or vapour of the nitrous acid could be breathed without inconvenience, was a discovery totally different; which had no relation to its effect on contagion; was contrary to all former experience of the other two mineral acids, and, still more so, to the opinion generally entertained of the nitrous acid itself, supposed to be the most deleterious of the three. It was a circumstance equally unknown to Morveau as to the other chemists and physicians in Europe.

It is this quality, however, of the nitrous acid which has rendered its power on contagion of such general application, and has given it so decided a superiority over the other two:

Owing to this quality, the nitrous acid has proved the means of restoring health to the sick, and of giving security to their attendants:

It is to this quality, that those *heureux resultâts* mentioned by M. Chaptal, are chiefly to be ascribed ; which he affirms, not very accurately indeed, to have been equally the result of the muriatic and nitrous acids:

It was for the discovery of this quality of the nitrous acid, and the great advantage already derived from it, that the House of Commons of Great Britain voted a public recompence to the author.

From what has been said, it is evident, that M. Chaptal either did not understand the nature of the discoveries he was comparing, or intentionally misrepresented them: confounding together two circumstances totally distinct from each other.

Perhaps, as an apology for himself, he may allege, that from the trials made, by order of the *Conseil de Santé,* in the year 1794, it appeared that the muriatic, as well as the nitrous vapour, was, in a certain quantity, or to a certain degree, respirable. But admitting (what I by no means do) those trials to be conclusive evidence of the fact, M. Chaptal will not surely contend, that what was discovered by the *Conseil de Santé,* in the year 1794, was a discovery made by M. Morveau, in the year 1773, especially when

in direct opposition to his own express declaration at the time. Still less can he assert, that a discovery, made in the year 1794, is prior in date to one made in the year 1780.

But M. Morveau, not satisfied with the honor ascribed to him by M. Chaptal and the rest of his countrymen, of having been the first to discover, in the vapour of a mineral acid, the means of destroying contagion; claims all subsequent discoveries on this subject as his property: and assumes to himself the whole merit of suppressing the epidemical fevers that ravaged some parts of Spain and Italy in the year 1800, although it is well known that the success, on those occasions, was principally obtained by means of which he was entirely ignorant, and of which he had not even an idea. To support his pretensions, he mentions the occasional use that was made of the muriatic gas to purify some churches or empty wards of hospitals; and concludes by affirming, (what I am not disposed to deny) that the stop put to those calamities was entirely owing to the employment of *Les fumigations des acides mineraux*, a general title or expression; now adopted by him for the first time, and for an obvious purpose. But the disguise is too thin and flimsy

to conceal the truth, unless from those who choose to be deceived, or from those who do not think the question deserving their attention.

The ambition, however, of Morveau does not rest here.—He not only takes for granted, that he was the first person who discovered in the vapour of a mineral acid the means of destroying contagion, and that all subsequent discoveries on this subject are derived from, or originate in his. But he seems anxious likewise to impress the public with the belief of his having been the first to remark, that the power of destroying contagion was not peculiar to one of the mineral acids, but a property in common to the three.

From what has been already said, and from the evidence contained in the Appendix, you can form an opinion respecting his two first claims; to set aside completely the last, I have only to call your attention to certain facts and dates.

In the first place there is no notice taken by M. Morveau in his Memoir of the year 1773, of *Les acides mineraux*; neither is there any mention made of them in the *Memoire de l'Academie des Sciences* of the year 1780,

quoted by Morveau and Chaptal:* nor is there question of the use or advantage of any mineral acid, excepting the muriatic, in the *Instruction sur le Moyen, &c. redigée par le Conseil de Santè,* in the year 1794. I assert then, without fear of contradiction, that the expression of *Les acides mineraux,* as means of destroying contagion, is adopted by Morveau himself for the first time, in his *Traitè des Moyens de disenfecter l'Air,* &c. published in the year 1801. In this treatise we are told that it was only in the course of the preceding year (viz. in 1800) that he had turned his mind to this subject, that until then he had never heard a syllable of the effect or employment of the nitrous acid in England, and it is more than probable that he then learnt, for the first time, the established usage of the sulphuric acid in this country.

From the preceding facts the conclusion is obvious. If M. Morveau, previous to the year 1800, had a knowledge only of one of the mineral acids, and even that knowledge until the year 1794, confined to two experiments, how could he possibly affirm that the power of destroying contagion, which two trials had

* Vid. Appendix E.

scarcely ascertained in respect to one acid, was a quality common to the three? How could he establish a general rule without sufficient data to hazard even a conjecture on the subject? And certainly if his information and experience of the means of destroying contagion was inconsiderable, that of his countrymen was still more limited; but of this I leave you to judge, from the report he himself makes of it.

" J'ai publié, il y a plus de 25 ans, un " procédé pour purifier l'air chargé d'ema- " nations putrides et contagieuses : deux ex- " périences authentiques et décisives en avoient " constaté l'efficacité ; il fut jugé par l'Aca- " demie des Sciences le plus sûr de tous ceux " que l'on pouvoit employer; je n'ai pas " négligé, dans les circonstances malheu- " reusement trop fréquentes de contagion de- " clarée, de le recommander à la solicitude " du gouvernement; les étrangers, enfin, " ont publié des relations de l'usage avanta- " geux qu' ils en ont fait : cependant il est à " pein connu en France du plus grand nom- " bre de ceux qui devroient le pratiquer pour " leur propres sureté. Les feuilles périodiques " nous parlent tous les jours de mortalité " dans les Hôpitaux, qui les dépeuple d'en-

" firmiers et d'officiers de Santé ; et au nom-
" bre des moyens employés pour faire cesser
" se fleau, on ne nomme même pas les fumi-
" gations par les acides mineraux ; et malgré
" l'instruction publiée par le Conseil de
" Santé, l'on n'a pas encore un seul procés
" verbal des operations executées dans cette
" vue."—Again, page 23,

" Ainsi ; pas un procés verbal, pas une re-
" lation pas une publication officielle, ni
" même une simple notice de la pratique de
" la fumigation acide et de ses resultàts dans
" ces diverses circonstances ! Faut-il s'éton-
" ner que les uns n'en aient pas encore la
" première notion, que les autres la mettent
" au nombre de ces recettes qui n'ont pour
" elles qu' une théorie incertaine ?"—Again, page 29,

" Combien est differente la marche que nos
" voisins ont prise pour établir rapidement
" l'usage de ces fumigations, dès que les
" avantages en ont été constatés par des té-
" moignages digne de leur confiance."

Such is the account given by Morveau of the state of their knowledge, or rather of their ignorance, in France, respecting the effect of the mineral acids on contagion, at a time when the efficacy of those very acids in a

state of vapour was considered a discovery of such importance, as to constitute an epoch in the history of science, and to be claimed by the government of that country as a national honour of which they were jealous.

" Le gouvernement Français a jugè que la " pratique des fumigations d'acides mineraux " pour detruire la contagion, faisoit un " epoque assez importante dans l'histoire des " decouvertes utiles a l'humanitè, pour la " revendiquer en faveur de la France & de " son veritable auteur. Je n'ai rien a ajouter " au rapport fait a ce sujet par le Ministre de " l'Interieur, que J'ai cra devoir placer à la " tête de ce traite comme le titre le plus ho- " norable de ma proprietè." *Vid.* Morveau Traitè, &c. 2d edit.

After such a declaration, what must be the astonishment of the public when they are told, that M. Morveau, at the very moment he was making this claim in behalf of himself and of his country, had in his possession, and acknowledges his having read my treatise on the Winchester Fever, published in the year 1795, in which a detailed account is given of the employment of the three mineral acids by me, as antidotes to contagion in the year 1780,*

* Vid. Appendix D.

one and twenty years before his alleged epoch.—In this treatise the mineral acids are not only declared to be the most effectual means of destroying contagion, but their efficacy is established by the most undoubted evidence; whilst in France they certainly had no idea at the time of the power or peculiar advantages of the nitrous acid, and probably knew as little of the sulphuric.—This treatise contains a series of experiments made for the purpose of ascertaining and comparing the different degrees of respirability of the gazes of the different mineral acids, a comparison which M. Morveau seems always to have avoided, conscious possibly of the decided superiority of the nitrous acid in this respect, a superiority which the late report of M. Bertholet * to the *Institut Nationale* has fully confirmed.

This treatise contains likewise a critical examination of all the modes hitherto employed for subduing contagion, pointing out the utility of some, and the inefficacy of others, by far the greater number.

M. Morveau, in his 2d edition, has made some similar observations; but, with the book

* Appendix F.

in his hand, takes no notice of what had been written on the subject seven years before, although many of his remarks are merely a confirmation of mine, or lead to the same conclusion.

The above facts will, I think, justify my refusing to M. Morveau an exclusive property in the mineral acids, or the merit of having first established their general power on contagion.

Having endeavoured to shew what M. Morveau has not done, candor seems to require that I should likewise point out what he has. For although unwilling to allow unfounded pretensions, I am equally, I hope, incapable of detracting from real merit.

M. Morveau's merit as a chemist no one will call in question; and in many other respects he is also deserving of praise. His experiments made at Dijon in the year 1773 were ingeniously contrived, and neatly executed, and though not the first example, as they were supposed to be in France, of the application of the vapour of a mineral acid to destroy contagion, they were the first authentic evidence of the power of the muriatic vapour employed with this intention. We have to regret indeed that those experiments, although frequently published, were not, for two and

twenty years, again repeated on any occasion of human miasmata, or of a vapour noxious to man. There is no blame, however, that attaches to M. Morveau on this account. He did every thing that a good citizen, or a humane man could do, to make known his discovery, and to introduce it into general use. But there seems to be in every country a supineness, a *vis inertiæ*, that resists improvement; and man, perhaps from false pride, is unwilling to be taught even what is for his own advantage. If in France we have to remark inattention to the discovery of M. Morveau, what are we to think of the late calamity at Gibraltar? where, notwithstanding the legislature of the country had voted a public recompence for an effectual method of destroying contagion, only three years before, and which had been employed in Spain and Italy with the most complete success; this method was neither employed, nor so much as mentioned?—But I am unwilling to probe the wound any deeper, and wish to throw a veil over our errors, as well as our misfortunes.—But although I give M. Morveau all due praise for his experiments made in the church and prison of Dijon, it cannot be denied that they were founded on an erroneous chemistry,

and still more erroneous pathology.

M. Morveau imagined that volatile alkali, or ammonia, constituted a very considerable and important portion of the vapour produced by putrefaction. And that this gas, (which an acid would neutralize) was the immediate cause of all the baneful effects of putrid effluvia or contagion on the human body. " Cette theorie (says he) avoit pour base " deux faits bien constans; le premier que " toute decomposition putride produit une " *grande quantitè d'ammoniaque*, le second " que l'acide muriatique & l'ammoniaque " quand il se recontrent en etat de vapeur, " ou de gaz; forment presque instantanè- " ment un sel neutre." *Vid.* Moyen's de des Infecter l'Air, p. 8.

M. Morveau was evidently mistaken in both opinions. Preceding, as well as subsequent experiments, among which may be reckoned his own, prove that the quantity of ammonia produced by putrefaction is extremely inconsiderable; and medical experience has sufficiently ascertained that the gas or vapour of ammonia has no noxious quality on the human body, and never can produce the effect of contagion. I do not, however, censure M. Morveau for being mistaken on a

subject where he cannot be supposed to have any competent knowledge. Morveau is no Physician. He took up pathological opinions as he found them. He was in this case evidently the *sutor ultra crepidam.*

In the year 1794 our attention is again called to M. Morveau's public services.—Although not a professional man, he was appointed by the French Government a member of the *Conseil de Santè*, or *Board of Health*, and their choice of him was certainly highly proper, as the only new or important part of the *Instruction*, or general directions of that Board, was the ordering M. Morveau's process of fumigation with the muriatic acid gas, to be employed in the hospitals, &c. of France.

The members of the Board were, no doubt, sensible that there was something awkward, not to say absurd, in their issuing an order for the employment of a method of destroying contagion, of which they themselves had no experience; and to avoid probably this reproach, they directed trials to be made with M. Morveau's process in some of the hospitals in the neighbourhood of Paris; but of those trials we have no detailed account, no *procès verbal*, no accurate statement of facts to prove its efficacy. The Board

possibly considered the language they made use of on the occasion as sufficiently strong to supersede the necessity of any such evidence.

" Au nombre (say they) des moyens que la " chimie a employés avec un succés que *tient* " *du prodige* pour operer cette depuration nous " citerons le procedè que Guiton Represen- " tant de Peuple a mis en usage."—*Vid.* Instruction, &c.

After all, however, M. Morveau seems to have felt that his discovery was still imperfect, and would be of little service against contagion, unless it could be employed where persons were present; he therefore requested of his colleagues that some experiments should be made, to determine how far this was practicable.

Those experiments, it must be confessed, as directed by the Board, or rather I should suppose by Morveau himself, were extremely inconclusive; the only inference they admitted was, that the gas of the muriatic acid might be diffused in small quantity in an hospital ward without suffocating the people: but in what quantity it could be diffused with safety, or if the quantity so diffused was sufficient for the purpose of destroying or preventing the communication of contagion,

were points equally undecided as before.—And we cannot help remarking, that although the *Instruction* of the *Conseil de Santè* was sent by order of government, and under the reign of terror, to all the constituted authorities, the muriatic acid gas, in the manner ordered by them, was never employed (so far as I can learn) in any hospital of France.

In the year 1801, M. Morveau again comes forward as a public benefactor, by publishing his treatise, "*Sur les Moyen de Desinfecter "l'Air,*" &c.

This treatise contains a detailed account of thirty-two chemical experiments, made for the purpose of ascertaining,

1st, The nature of the vapour or gazes produced by putrifaction.

2d, The effects of different agents in decomposing this vapour, or rendering it inactive.

Of the first set of experiments I have to remark, that they contradict completely his opinion respecting the production of ammonia. "On a vu (says he, p. 100) que dans "le Experiences, vii. and viii. J'ai epuisè "sans succes les moyens de decouvrir la "moindre d'ammoniaque."—They also serve to confirm what was already known, viz. that

the carbonic acid, the fixed air of Drs. Black and M'Bride, was produced by putrefaction in greater quantity than any other gas but as this gas, though produced by putrefaction, is known to resist and correct it, it can never have the effect of putrid contagion on the body, and if it had such an effect, this could not be prevented by *Les fumigations acides.*

On his 2d set of experiments I shall likewise take the liberty of making a few observations. In the first place he employs smell as the test or criterion to judge of the malignant or noxious quality of putrid vapour; but as smell and contagion have nothing in common, he might as well have employed a thermometer to judge of moisture, or an hydrometer to judge of temperature. The vapour he employed for his experiments, viz. that produced by a few pounds of putrid beef, might be highly offensive to the smell, but never could occasion a contagious or noxious atmosphere. The putrifaction of a whale or an elephant has been known to cause a noxious atmosphere, which the dead body of a dog or a cat, however offensive, has never yet produced.

I have dissected, or been present during the dissection of many putrid bodies, and of the bodies of those who have died of putrid diseases,

but I never knew an instance, unless where the operator cut himself, of any one suffering by exposure to the smell or vapour on such occasions.

Another very obvious objection to any conclusion drawn from those experiments is, that they were made in close vessels, where the result is very different from what it would be were they made in the open air. (Ex. gr.) The muriatic acid has no opportunity in close vessels of attracting moisture, with which it has so strong an affinity, and by which it loses its gazeous state; nor has the nitrous gas an opportunity of attracting oxygen or vital air, which it does immediately when diffused in the open air, and is thereby changed into nitric gas. But M. Morveau's chief object in making those experiments was to shew the superiority and advantage of the muriatic over the nitrous or nitric gas. He therefore presses strongly on the reader the greater expansibility of the former, a circumstance which very probably may be true; but which is of little importance, if it appear that the nitrous or nitric vapour has proved sufficiently expansile for the destruction of contagion, in every situation where it has been as yet employed. But M. Morveau, whilst so anxious to

compare the expansibility of the two gazes, takes no notice of the difference of their respirability, or of the great and manifest difference of their effects on the organs of respiration,* and of the great difference in the smell and freshness of the air of a room where they have been employed.—Besides I must needs say, the many frivolous † objections he makes to the nitrous fumigation, by no means display that greatness and liberality of mind which we expect, or rather wish, to find in a man of his distinguished talents.

The 2d edition of M. Morveau's book, which came out in the year 1802, about a twelvemonth after the first, appears to have been published principally for the purpose of affording the author an opportunity of asserting his right to the property of *Les acides mineraux*, and with this view he judged well in placing M. Chaptal's *Rapport* in the front of it. This edition contains also the very interesting report, or relation, of the Spanish physicians respecting the epidemical fever of Andalusia, which with

* Appendix F.

† That it excited coughing—that it was necessary to repeat it twice a day on board the Union—his apprehension of the fatal effect of the nitrous gaz, which he confounds with the gaz, or vapour, of the nitrous acid, &c. &c. &c.

great justice may be called the *Currus Triumphalis* of the nitrous fumigation. This edition contains likewise some new chemical experiments, on which I shall offer no observation, as they lead to no new practical inference.

In respect to the very general application, which he and others have made of the doctrine of Oxygen, to Pathology and the practice of physic, I shall take the liberty of quoting the temporate and judicious observation of his countryman the celebrated Bucquet, an observation which I quoted on a former occasion, and which in my mind cannot be too often repeated, during the present rage for chemical theory.

" Comme il n'a certainment eu en vue que
" le bien de l'humanitè,* il me permettra
" quelques reflexions qui ont bien pu echap-
" per au savant Chimiste, mais que ne pou-
" voient manquer de frapper un medecin que
" quoique amateur zèlè de la Chimie & con-
" vaincu des avantages qu'elle peut procurer
" a l'art de guerir, a ête trop souvent temoin

* No one will doubt the truth of this remark, when he is told, that the person alluded to, was the benevolent Le Sage.

" des erreurs que cette science a portèes
" dans la medicine, pour n' être pas toujours
" en guarde contre elle, d' autant plus même,
" que ses raisonnemens sont plus seduisants
" & ses experiences en apparence plus con-
" cluantes." *Memoire par M. Bucquet, Professeur de Chimie, &c.*

But to conclude this subject, although it has been proved that M. Morveau was not the first person who discovered in the vapour of a mineral acid the means of destroying contagion; nor the first who discovered that this vapour might be employed with safety and effect in the apartments of the sick; nor the first who remarked that the power of destroying contagion was not a property peculiar to any one mineral acid, but a quality in common to the three: yet I am ready to allow that his ingenuity, talents, and zeal, justly entitle him to a considerable share of public respect and of public gratitude.

I have the honour to be,

with the most perfect regard and esteem,
SIR,

your most obedient servant, &c.

Ja^s. Carm^l.-Smyth.

William Wilberforce, Esq. M.P.

APPENDIX:

A.

Experiments upon Septic and Antiseptic Substances, &c. read at the Royal Society by Sir John Pringle, M. D. 1750, 1752, 1753.

a. I have also made some attempts towards the sweetening of corrupted flesh by means of mild substances; because distilled spirits, or strong acids, the only things hitherto known to answer this intention, are of too acrid and irritating a nature to be thoroughly useful when this correction is most wanted.—*Vid.* Paper 2d, Ex. 13.

b. Mineral acids being such powerful antiseptics, I was desirous to see their effects upon substances already putrid. For this purpose I dropped spirits of vitriol both upon a piece of corrupted beef and upon the crassamentum of human blood, also putrid, and observed that this acid, instead of allaying the fœtor, rather increased it: so that, by this means, it became stercoraceous; or was changed into

such a smell as arises during the precipitation of brimstone (by an acid) in a lixivial menstruum.—Having repeated the experiment both with the spirit of sea salt, and with vinegar, with the same result, we may from thence conclude, that the effluvia issuing from corrupted substances consist chiefly of the phlogiston or sulphur principle, since these effluvia so readily unite with and volatalize the acids; as appears by the increase and particular change of the smell.—*V.* Paper 7th, Ex. 43.

c. From these experiments it was natural to conclude, that since acids by themselves were among the most powerful antiseptics, and that the alkaline salts were likewise of that class, the mixtures of the two to saturation would resist putrefaction little less than the acid alone.—*V.* Paper 1. Ex. 5.

d. Dr. De Hæn, in the first part of his book, called Ratio Medendi, mentions some experiments which, in imitation of mine, he had made with antiseptics upon urine, when he found that acids always resisted its putrifaction more than any of the alkaline salts, the spirit of hartshorn excepted.—Appendix, S. 3.

B.

Historical Dissertation concerning the Malignant Epidemical Fever in 1756, *by Dr. J. Johnstone, published in* 1758.

a. Vinegar may be sprinkled about cold, if the weather is warm; and boiled with myrrh or camphor, an antiseptic steam will arise into the air, which the patient breathes greatly to his advantage; these steams will preserve the air free from putrifaction, and will insinuate themselves by the absorbent vessels of the lungs into the blood vessels, and will greatly assist in impeding the progress of putrifaction in the fluids. These are the most commodious, if not the most useful, methods of medicating the air the patient breathes; however, those who prefer the mineral acids may order brimstone to be burnt, or may raise the marine acid very easily, by putting a certain quantity of common salt into a vessel, kept heated on a chaffing-dish of coals; if to this a small quantity of oil of vitriol is from time to time added, the air will be filled with a thick white acid steam; but both the marine and sulphureous acid must be disengaged at a considerable distance from the

patient, otherwise their extreme pungency will be offensive to the lungs.

C.

Essay on the most effectual means of preserving the Health of Seamen, published in the year 1757, by James Lind, M. D.

a. The most effectual preservative against this infection, &c.——Such of their apparel as appears tolerably good ought to be cleaned, or, if necessary, fumigated with brimstone, and returned to them.—P. 6.

b. With regard to the sick, much will depend on their being kept as clean as possible; filthiness being a chief source of infection, and cleanliness an excellent preservative.—The less cleanly may have their hands and feet washed with a little warm water and soap, or with vinegar. When their linen becomes foul and stiff with sweating, they ought directly to be shifted, and after fumigating such foul linen with the steams of brimstone, they should be soaked in vinegar, and washed.

Dry fresh bedding is a great comfort to sick persons. Every bed, as soon as the patient is so far recovered as to be able to get out of it, should be carried upon deck, and there be

well fumigated, aired, dried, and beat by his mess-mates.

It is needful also that there be a recovery-place or berth, into which the convalescents are to be soon removed, taking care that the cloaths and bedding be sufficiently cleaned and fumigated before their admissin into it.—This regulation, enjoined by the commanding officer, ought to take place every day at noon, when the weather will permit, viz. That all empty beds in the hospital be carried upon deck, and well aired, and if needful, smoked and dried.—P. 140.

c. There are three methods commonly practised for purifying ships or vessels, after the men have been removed out of them.

The first is by burning tobacco, &c.

The second is by charcoal fires strewed with brimstone, &c.

The third method of purification is by the addition of arsenic to the materials of the second process.

Experience, the surest test of medical truth, has fully ascertained the efficacy of the processes which have been described. Whenever, therefore, persons die of a spotted fever, a malignant sore throat, the small-pox, or any distemper found to be communicable from the

sick to others, for the preservation of the rest of the family, and of the neighbourhood, the corpse ought quickly after death to be removed into another room; the room in which they died should be aired, by having the windows opened, till a charcoal fire be kindled with some rolls of sulphur upon it; after which both doors and windows should be kept shut for a considerable time, not less than eight or ten hours, till the room be thoroughly smoked.—I have known in several ships, where there are the fairest opportunities of trying and judging things of this nature, that the contagion of the small-pox has been entirely stopped by means of wood fires sprinkled with brimstone, kept burning and closely confined in the infected place. How useful then must this knowledge prove to the inland towns of England, where the dread and havoc of that distemper, among grown persons, exceed most calamities? Every patient as soon as received was directly stript, and all his cloaths, with their contagion, conveyed to the smoke-house, where the infection was effectually destroyed.—P. 256.

d. There should be a smoke-house adjoining each prison, built entirely of brick, without any window, or any other inlet of air but the door,

having iron hooks on the sides of the walls for suspending of cloaths—as during a vigorous infection an oven may not be sufficient to purify all the infected rags, or cloaths sent from the infirmary, they should be here spread upon the iron hooks, and fumigated for some hours with the smoke of brimstone sprinkled on charcoal fires, which must be previously well lighted in the open air. Strong fumigations with charcoal and sulphur, long and closely confined, will also destroy the infection wherever it is lodged, if the infected substance be well opened and exposed to them. —P. 339 and 340.

e. Every ward, immediately when emptied, is to be fumigated by means of brimstone and charcoal fires, together with all its bedding, furniture, and utensils, so that the infection may be totally destroyed.—§ xi.

f. A certain method, therefore, of destroying infection in places from whence persons cannot be removed, is a *desideratum* not yet obtained in physic. I have proposed, and tried, many things for this purpose, without success.—p. 321.

D.

A Description of the Jail Distemper, &c. published in the year 1795.

a. I was satisfied, after the most deliberate reflection on the nature of putrid contagion, that nothing could so certainly or efficaciously destroy it, as the mineral acids in a state of vapour; but to employ these with safety was the difficulty.—*Hic opus, hic labor.*

The fumes of sulphur, which are so successfully made use of to fumigate cloaths or furniture, could not be employed, either in hospitals or prison wards; as these fumes are well known, even in small quantity, to prove immediately destructive to animal life.—P. 54 and 55.

b. After removing all the hammocks, bedding, &c. from the wards, they were first thoroughly cleaned out; then the hammock posts were well washed with diluted marine acid, and the same thrown, by means of garden watering machines, to the upper parts of the posts, as high as the ceiling.—P. 58.

c. As we had not a sufficient supply of new beds, we were under the necessity of using some of the old ones; these, however, I took

care to have first fumigated, then washed with hot soap suds, and afterwards with diluted marine acid.

When any of the sick died, I ordered that the bed and bedding should always be removed, and not employed again, until it underwent a fresh fumigation and cleaning.—P. 62.

d. The hospital wards must be carefully swept every morning, and the places under the beds cleaned out with a wet mop; the floors of the wards (after being swept) must be watered, by means of a garden watering-pot, with diluted marine acid; the wards are then fumigated with censers of burning saltpetre, and *two or three gallipots, about two-thirds filled with fuming spirit of nitre, are to be placed in the middle of each ward. One or two gallipots were likewise placed between each bed, (*vid.* Commissioner Lulman's evidence before the House of Commons,) to remain constantly night and day, and to be renewed every morning.

* This circumstance had escaped the notice of M. Morveau, otherwise he could not have asserted that I did not employ the nitrous acid, in the year 1780, at Winchester.

The beds themselves are to be sprinkled with vinegar, and neither the bed, nor the bedding, of any patient who dies, or is discharged, is to be again used, until properly fumigated, washed, and aired.

The soil tubs must be washed out before they are again used, with diluted marine acid.—P. 69, 70.

e. The mineral acids, particularly when in a state of vapour, with the different gazes, or permanently elastic fluids produced by them, are probably, excepting fire, the most powerful agents in nature, and the source of an infinite number of the different forms of matter observable in the mineral kingdom, and which are constantly undergoing fresh changes, from their various combinations and decompositions.

But their power is not confined to the mineral kingdom; they are known to have great influence likewise over putrefaction, and those other spontaneous changes which vegetable and animal matter, deprived of life, undergoes; and therefore if the jail contagion, as I have endeavoured to prove, is a vapour produced by putrefaction, there cannot be a doubt that the mineral acids will prove effectual in destroying it.

So far we may reason *a priori;* but let us next consult experience, a less fallible guide. —From this it appears, that the volatile vitriolic or sulphureous acid, the only one hitherto made use of, proves effectual in destroying contagion; although, owing to its deliterious quality, it cannot be employed, except in situations from which people can be removed. But are the other mineral acids in a state of vapour equally dangerous with the sulphureous? and are they equally effectual in destroying contagion? To the first of these questions I can give a positive answer; to the second I can give one that at least is highly probable.—P. 181, 182.

f. From the preceding experiments the different acid vapours, in respect to the safety with which they may be breathed, may be arranged in the following order:—

1st, The vapour of nitrous acid, arising from nitre decomposed by vitriolic acid.

2d, Ditto of nitrous acid in its fuming state, or when the nitrous acid is mixed with nitrous gas.

3d, Ditto of marine acid, arising from common salt, decomposed by vitriolic acid.

4th, Ditto of nitrous and marine acids, ob-

tained from the decomposition of nitre and common salt, by vitriolic acid.

5th, Ditto of sulphur, burnt with an eighth part of nitre.

6th, Ditto of sulphur burnt with charcoal.

7th, Ditto of oxygenated marine acid, obtained by putting manganese to marine acid.

As the first vapour is perfectly harmless in any quantity in which it may be required, it is evidently the most proper to be employed in all situations where people are necessarily present; and if it should prove efficacious in destroying contagion, of which I have not the smallest doubt, it is the desideratum so much sought after by Dr. Lind; but which he confesses, with his usual candour, he never could find out.

The second, though more pungent than the first, may, I believe, be employed with the greatest safety; at least I have never observed any inconvenience from using it. But as it cannot so easily be procured in considerable quantity, and is attended with greater inconvenience and expence, I have of late years only made use of the first.

Our experiments likewise warrant us to affirm, that the third, or marine acid, though more stimulating, and more apt to excite

coughing than the nitrous, may be safely used, at least in a moderate quantity, where people are present; and where nitre cannot be had, I should have no hesitation in employing it.

Of the fourth I can say but little, only that, in breathing it, I perceived it more pungent than the pure marine acid; and therefore, unless it should be found to possess superior efficacy in destroying contagion, I would not employ it where there are people present.

As the fifth never can be used with safety where there are people present, its use must be solely confined to fumigating empty apartments, cloaths, furniture, &c.

The sixth should never be employed, as the carbonic acid may do harm, and never can have any effect on contagion.

Of the seventh I have no particular knowledge, only that it is extremely deleterious, and I believe extremely powerful; but whether it has more effect on contagion than the other mineral acids, experience only can determine.

Having now fully proved that the nitrous, and possibly also the marine acid, obtained in the manner already described, may be employed with perfect safety in hospitals and pri-

son wards, whilst the people remain in them, I shall, in the next place, relate how far my experience goes to ascertain the efficacy of those acids in destroying contagion.—P. 189, 190, 191, 192.

g. The effect of the marine acid, in a state of vapour on contagion, I have not yet had occasion to try, but have no doubt that it will be found of sufficient efficacy for destroying it; and, from the foregoing experiments, it is evident that, though not so mild or safe as the nitrous acid, it may be used in a moderate quantity, even where people are present.

The only purpose to which I have applied it has been, when properly diluted, to wash the hammocks, posts, bedsteads, and furniture; also the floors and walls of the apartments of the sick: and I am persuaded that, even in this way, it was extremely serviceable, certainly more powerful than the most concentrated vinegar.

I shall now conclude this subject with a few practical rules or observations, which may be looked upon as corollaries, or inductions from the preceding experiments.

The well known efficacy of the sulphureous acid, in destroying contagion, is a sufficient

reason for our continuing to use it as a fumigation for cloathes, furniture, &c.

The nitrous acid being attended with no risk or inconvenience to the respiration, and appearing, from our experience, of sufficient efficacy to prevent the farther spreading of contagion, seems the proper antidote to be applied in all situations where persons are necessarily present, and is, in short, the desideratum sought after by the benevolent Dr. Lind.

For purifying empty hospitals, or prison wards, and ships, I should also prefer the nitrous acid to the sulphureous, as I believe it to be equally efficacious; its vapour is more volatile and penetrating, and it does not leave the disagreeable smell which sulphur does. But for this particular object I think it would be advisable to make trial also of the marine acid, and of the mixture of nitrous and marine acids, as I am convinced of the efficacy of all the mineral acids for destroying contagion, and our experience is not yet sufficient to determine their relative advantages and disadvantages.

To obtain the nitrous or marine acid in a state of vapour, the method is extremely simple. It consists in decomposing nitre or

common salt by means of heated vitriolic acid. P. 195, 196, 197, 198.

h. The French physicians, instructed by that excellent chemist Le Citoyen Guiton, better known by the name of Mons. de Morveau of Dijon, have lately made trial of the marine acid in their hospitals, and have found it equally effectual in destroying contagion as the sulphureous, and as being more volatile, perhaps even preferable, for the purpose of purifying hospital wards.

They also remarked, that in a smaller proportion it may be safely used in hospital wards, even when people are present. The French physicians, however, have not employed the nitrous acid, nor made any trials of its effect on contagion; neither do they appear to have suspected that the power of destroying contagion was a quality inherent in all the mineral acids,* and probably, to a certain degree in all acids, under certain circumstances. Although their experience of the effect of the marine acid, together with my

* Is not the observation of M. Berthollet, in the year 1803, an acknowledgment of this? Le Docteur Smyth a employe les vapeurs de l'acide nitrique, ce que indique que la proprieté de desinfecter appartient a tous les acides. *Vid.* Annales de Chimie, vol. XLVIII.

observations on that of the nitrous, seem to establish the fact beyond the cavil of scepticism itself.—P. 202, 203.

E.

Rapport fait à l'Academie Royal des Sciences sur les Prisons, le 17 *Mars,* 1780, *par Messrs. Du Hamel, De Montigny, Le Roy, Tenon, Tillet, & La Voisier.*

Un autre precaution que nous croyons devoir recommander, et qui contribuera plus qu' aucune autre à la Salubrité des prisons, et de les désinfecter un fois par an, par la methode employée avec succès par M. de Morveau, elle consiste à degager dans les lieux que l'on se propose de purifier une grande quantite d'acide marin dans l'etat de vapeur, &c. &c.—Page 420.

F.

Rapport par M. Bertholet à l'Institut Nationale, 11 *Fructidor, An.* XV.—*Vid. Annales de Chimie, vol.* 48. *page* 321.

La vapeur Nitrique degagè à froid du nitrate de potasse par l'acide sulphurique à beau-

coup d'efficacité, mais elle est moins expansible : *comme la respiration en est moins affectee*, elle peut être preferable, dans le cas on le poumon demande des menagemens particuliers.

THE END.

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