

An essay on the nature and origin of the contagion of fevers ... / [John Alderson].

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A N

(P)

E S S A Y
ON THE
NATURE AND ORIGIN
OF THE
CONTAGION OF FEVERS.

By JOHN ALDERSON, M. D.
MEMBER OF THE ROYAL MEDICAL SOCIETY
OF EDINBURGH.

*Nunc Ratio quæ fit Morbis, aut unde repente
Mortiferam possit Cladem conflare coorta
Morbida vis Hominum Generi—
Expeditam.—*

*Suspensa manet aere in ipso
Et cum spiranteis mistas hinc ducimus auras
Illa quoque in Corpus pariter sorbere necesse est.
LUCRET. LIB. VI.*

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1788.

ESSAYS

NATURE AND ORIGIN

CONTENTS



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Printed and sold by G. P. ...
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TO THE RIGHT HONORABLE
LORD MULGRAVE,

JOINT PAYMASTER GENERAL

OF THE FORCES, &c. &c.

THIS ESSAY ON CONTAGION,

AS A TESTIMONY OF GRATITUDE AND ESTEEM,

IS,

WITH ALL DUE DEFERENCE,

HUMBLY INSCRIBED,

BY HIS LORDSHIP'S MOST OBEDIENT,

MUCH OBLIGED,

AND DEVOTED HUMBLE SERVANT,

THE AUTHOR,

HULL, APRIL, 1788.

“ It is not Air

That from a thousand Lungs reeks back to thine,
Sated with Exhalations ; rank and fell ;
The Spoil of Dunghills, and the putrid Thaw
Of Nature ; when from Shape and Texture she
Relapses into fighting Elements ;——
It is not Air, but floats a nauseous Mass
Of all obscene, corrupt, offensive Things.

ARMSTRONG,

E R R A T A.

Page 11. last Line but one, for *are* read *is*.

P. 24. last Line but three. The Quotation from
BARON DE TOTT runs thus ; When any Storm sent
the Workmen to shelter themselves under their Tents,
I continued in the *Rain*, and believe I may attribute
to this Precaution alone my having escaped the Dis-
temper.

P. 40. After *related*, insert a Period.

O N

C O N T A G I O

DAILY Experience affords such numerous and melancholy Instances fatal Effects of Contagion, as render attempt to mitigate its Violence ing to the Friends of Society scarce necessary to place before us *Facts*, in Order to excite his attention to the Subject: the Cal self is the constant Complaint of Neighbourhood, and almost every Newspaper presents us with an Example of the direful Consequences of Infection. From this malignant Source it is, that our Prisons become literally not only Places of Confinement, but Scenes of Execution; and what is still more alarming, Multitudes who have no Crime to expiate, no Debt to discharge to the Public, no unrelenting

A

Creditor

ditor to satisfy—the Industrious Manu-
 rier—the enterprizing Mariner—the
 y Soldier, (all entitled to the Care
 Gratitude of a Mercantile Nation)
 aily Victims to the unsuspected In-
 e of Contagion. But though the
 ance of the Subject be so obvious,
 ough it has engaged the Attention
 eral learned and ingenious Men,
 ave attempted to devise Means to
 the Evil, with a Penetration and
 ich must ever do them Honor;
 eir Attempts have hitherto, in a
 ree, been unsuccessful, it will
 ft, be deemed presumptuous in
 er to the Consideration of the
 ne following Sheets: in Confidence
 the Nature of the Enquiry, its Con-
 ection with the Health and Comfort of
 my Countrymen, and with the Utility of
 the Profession to which I am devoted, will
 entitle me to the candid Attention of those
 Readers who feel an Interest in whatever
 may contribute to the removal of Misery.

EVER since the Decisions of Bacon, our
 great Guide in all philosophical Researches,
 have

have acquired any Authority amongst us—Mankind have not contented themselves with the bare Consideration of Effects, singly considered ; but have endeavoured to trace them by the aid of Experiments to their true and proper Cause. Employment of this Kind, though destructive of many a fair Theory, is the Province of the Physician, since in various Cases, which call for his Aid, the most sagacious Skill will be baffled, so long as the *Fons et Origo Mali* is undiscovered. This has been particularly the Fate of the Subject of this Essay : the Cause has not been sufficiently investigated ; and, of Consequence, the Operation of the Means employed for its Prevention, has not been accounted for. As much as possible to obviate this Inconvenience in the ensuing Theory, I propose to conduct my Enquiries into the Nature and Cause of that Species of Contagion which gives Rise to the Jail or Hospital Fever, by

FIRST, shewing from indisputable Authority, that this Disease may be produced
in

in Consequence of a Number of Men being confined in a small Space;

SECONDLY, how Contagion is generated;

THIRDLY, how Fomites are formed and rendered active; and,

LASTLY, point out the Method by which the Air may be purified, infected Substances cleansed, and the Propagation of the Disease prevented. And,

FIRST, Sir John Pringle has remarked, * “ that the Hospitals of an Army, when crowded with Sick, at any Time, if the Air be confined, will produce a Fever of a particular Kind.” He observed the same Fever “ to arise in crowded Barracks and transport Ships when filled with too large a Proportion of Men, or when the Men had been long kept under close Hatches, as is often the Case in stormy Weather;” and seems fully convinced that

* See Observations on the Diseases of the Army.

that “ this Disease is incident to every Place ill-aired and kept dirty ; that is, filled with Animal Steams from foul or diseased Bodies.”

DR. Mead * when speaking of the pestilential Contagion, gives it as his Opinion, “ that nothing approaches so near to this Contagion as Air pent up, loaded with Damps, and corrupted with the Filthiness that proceeds from Animal Bodies.”— “ Our common Prisons, says he, afford us an Instance of this, where very few escape what is called the Jail Fever, which is always attended with a Degree of Malignity in Proportion to the Closeness and Stench of the Place ;” and again, “ in all Countries epidemic Diseases extraordinarily mortal, are frequently bred in Jails, Camps, &c.

DR. Cullen † is also of this Opinion, “ It is now well known that the Effluvia constantly arising from the human Body, if long retained in the same Place with-
out

* See Preface to his Works.

† See first Lines of the Practice of Physic, Vol. I.

out being diffused in the Atmosphere, acquire a singular Virulence; and in that State, applied to the Bodies of Men, become the Cause of a Fever which is very contagious.”

“THE late Observations on the Jail and Hospital Fever, have fully proved the Existence of such a Cause; and it is sufficiently obvious, that the same virulent Matter may be produced in many other Places, at the same Time: the Nature of the Fevers arising, renders it probable that the virulent State of human Effluvia is the common Cause of such Fevers, as they differ only in a State of their Symptoms, which may be imputed to the Circumstances of Season or Climate, &c. concurring and modifying its Force.”

MR. Howard * relates that seventeen Women being confined in a small Room, in the Cambridge Bridewell, without either Fire-place or Sewer, the Air soon became offensive and generated this Fever, which

* On Prisons.

which proved mortal to three or four of them.”

WE find a Clause to the same Purpose in an Act of Parliament for preserving the Health of Prisoners. “Whereas the Malignant, commonly called the Jail Fever, is owing to a want of Cleanliness and fresh Air, be it enacted.”—Not long ago the Mortality amongst the Cotton Manufacturers in the Mills near Manchester, drew the public Attention; *which after enquiry, was found to arise from the Air being so long confined as to bring on this Fever.

THESE Authorities, from amongst the many that might be adduced, will, I trust, be sufficient to warrant the Assertion, that the Jail or Hospital Fever may arise in consequence of a Number of Men being long confined in too small a Space. I shall now endeavour to account for the Manner in which this Confinement may be supposed to produce such an Effect. It has long been ascertained that Respiration
vitiates

vitiates a certain Quantity of Air in a very short Time ; and Experiments have proved how long an Animal can live in a given Measure of atmospheric Air ; but though Philosophers have agreed in the Fact, each has accounted for it conformably to his own Theory. Whilst one has supposed that something is thrown off from the Blood at each Expiration, and mixing with the Air renders it unfit for further Respiration ; another has endeavoured to prove that something is attracted from the Air by the Blood as it passes through the Lungs, and by depriving the Atmosphere of that Part which was alone proper for this Process, it becomes unfit for the further Purposes of Life—but as neither of these Theories is singly competent to account for all the Phenomena which Contagion exhibits, it is more than probable that a Junction of them approaches the nearest to the Truth ; and we may be allowed to conclude, that the Lungs attract from the Air a pure elastic Fluid found intimately combin'd with the Atmosphere, and that in return the Lungs give out to
the

the Atmosphere a Vapour impregnated with Effluvium, the natural excretion of that Organ *.

Hence then we find that Health consists in a reciprocal exchange between the Atmosphere and the Lungs—the Atmosphere giving a pure elastic Vapour, and in return receiving an excreted Effluvium.

Whenever, therefore, a Number of Men, as in an Hospital, or Prison, are confined in a close Place, where a sufficient Quantity of fresh Air is not supplied, this respirable Fluid will be exhausted; the animal Functions now no longer capable of receiving this

B

Pabulum

* That the Lungs attract Vapour may be demonstrated by a simple Experiment—let any one inspire thro' warm Water, in Muges Instrument for that Purpose, and by Means of a Valve expire into another, so contrived as to condense the returning Vapour, and compare the Quantity lost by the Quantity received; he will find that a large Quantity of Vapour has been absorbed, or at least such a Portion of some one of the constituent Parts of Water, as is sufficient to lessen the Bulk of the Whole materially; and the great Relief which those Patients find, by the Use of this Instrument, whose Lungs do their Office but imperfectly, is a Proof that pure Vapour has a principal Share in the respirable Part of the Atmosphere.

Pabulum Vitæ, cannot separate the noxious Particles, or make that Exchange which can alone keep up the Balance which constitutes Health, and in the System Disorder must necessarily take Place. In this State is an Hospital crowded with Men, already disposed by their other Complaints to be affected; and thus are Prisoners, labouring under the accumulated Distress of Body and Mind, attack'd with Fever.

At this Period we may properly mark the Distinction between Synochus † and Typhus—for under such Circumstances, I have frequently seen the former make its Appearance; and have no Doubt but by a timely Administration of those Remedies which Experience has suggested to Physicians, Synochus may be cured before the animal Functions are so compleatly disordered as to evolve a contagious Effluvium: but no sooner does it run to its second, or Typhus Stage, than under the Circumstances

ces

† Morbus contagiosus. Febris ex Synocha et Typho composita, initio synocha, progressu et versus finem typhus.

ces we have before described it becomes highly infectious.

In such Cases as have been evidently produced by Contagion, I never saw any of those Symptoms which constitute the Synocha Stage, but it was Typhus from the Beginning; and the recent Cases that have proved so fatal from absorption of putrid Matter at Dissections, evidently shew a Distinction in their first Action. But that Fever in an Hospital may take Place without generating any Contagion, if timely checked; I have the Authority of the Clinical Professor* of Edinburgh to support my Opinion; who observes, “that the Hospital Fever is prevented by an Attention to the first Symptoms of Disorder, which are a Suppression of the excretion of the Skin, and disorder in the Functions of the Stomach; and that by restoring the one and removing the Contents of the other, with proper ventilation and the application of warm Water to the Feet, the further Interruption of the Functions ^{is} ~~are~~ by these Means prevented, and Contagion obviated.

From

* Dr. Gregory.

From what has been said, I think I may be allowed to define Contagion to be an Excretion from the Lungs, † in Consequence of Fever induced by Air already surcharged with animal Effluvium, which in passing thro' the Lungs becomes active by being dissolved in that phlogisticated Fluid; much in the same Manner as the saline earthy Matter is in the Urine, when it first passes out of the Bladder.

Having thus ascertained (as far as good Authority will warrant) that Contagion is generated, and found the different Steps which lead to its production; I proceed to consider the Means by which it is imparted. Contagious Diseases differ much in the Mode by which they are communicated—one requires insertion into a wounded Part—another produces its deleterious Effects when applied to the Surface by simple contact,

† That the Lungs by a morbid Action should throw of a contagious Effluvium is as easy to be conceived as the general received Opinion of mucous Membranes when inflamed discharging Pus—not that I apprehend the Evolution of Contagion is confined to the Lungs, other Emunctories have no Doubt their Share; hence Privies have frequently communicated Contagion.

fact; and a third may be conveyed to the Blood thro' the Medium of Air as it passes thro' the Lungs. That which is the Object of our present Enquiry has been always supposed, by the best Authors, to be conveyed to the Blood in the last mentioned Way—and this may again be divided, First, by Effluvium immediately from the Sick; and Secondly, by the Action of Fomites, that is, Substances imbued in a particular Manner with this Effluvium, and by which the Seeds of the Disease have been preserved for a great length of Time.

Authors do not agree in accounting for the Mode by which the Air becomes so impregnated as to be able to communicate Infection. It has in general been considered as floating or suspended in common air, requiring a near Approach to produce any Effect. An ingenious Author, * in a late Publication on the Contagion of the Small-pox, alledges that the infectious Matter is *dissolved* in atmospheric Air; and that thereby it is enabled to produce the Effect, thro' this Medium, to all within a certain Distance,

* D. Haygarth.

tance: but that being further diffused, it becomes diluted and dissipated.

If the Infection had never been communicated but by Effluvium immediately from the infected Person, either of these Ways would be sufficient; but they give us no satisfactory Way of accounting for the Phenomena of Fomites, the Action of which has been considered by all Observers, as more virulent than the newly emitted Effluvium from the Sick.

Dr. Cullen observes “ that Substances
 “ having been near the Bodies of Men are
 “ imbued with Effluvia, in which Substances
 “ these Effluvia are sometimes retained
 “ in an active State for a very long Time;
 “ and it appears probable that Contagions
 “ as they arise from these Fomites, are more
 “ powerful than as they arise from the human
 “ man Body.”

On the melancholy Event at the Old Bailey it was remarked that those who received the Infection immediately from the Cloaths of the Prisoners, suffered more
 from

from this Disease, than those to whom it was afterwards communicated by these unfortunate Gentlemen.

Dr. Lind gives several Cases where a single Person, who, though not ill himself, communicated the Infection by his Cloaths to a whole Ship's Crew—and that a Nation of Indians was almost extirpated by some infected Blankets *—In short, says he, “ they (Fomites) contain a more certain, a more concentrated and contagious Poison than

* In the Year 1746, while the French Squadron under the Duc D' Anville passed the Summer at Chebucto, now Halifax, an infectious Fever prevailed among them, and cut off a great Number of Men; on the Return of the Squadron to Europe, several Blankets and old Cloaths, which had been used in their Tents and Hospitals, were unfortunately left behind—These fatal Receptacles of Disease were soon after eagerly picked up by a Party of Mimack Indians, who accidentally came to visit the Place, and who cloathed themselves with some of them; others they carried home and distributed them among the rest of the Tribe. The unhappy Consequence of which was the almost total Extinction of the Mimack Nation; scarce any of them survived. The English upon traversing the Country the next Summer from Annapolis Royal, were surpris'd with finding the dead Bodies and Skeletons of whole Families of that Nation lying unburied in their Huts, until the Neutrals, who also inhabited that Country and the neighbouring Nations informed them, that the Mimacks had been cut off by the French Blankets.

LIND.

than the newly emitted Effluvium from the Sick."

Nothing satisfactory has ever yet been offered to account for the Manner by which these Substances become impregnated with the contagious Matter; or how they are afterwards capable of propagating the Disease.

Dr. Cullen only speaks of them as Substances imbued with Effluvium. He does not attempt to account for their being thus impregnated, nor explain to us how they are rendered active after being once imbued.

Dr. Lind thinks the best Way to account for the Communication of Infection, is by supposing that there is, in all infected Places, a certain Nidus or Source of Effluvia adhering to particular Substances; but he does not tell us how these Substances become thus impregnated. His Observation, however, led him to conclude that these Effluvia did not long reside in Air, but were occasionally sent into it from those Substances—He accounts for the great Degree

gree of Violence which Infection thus communicated produces, by supposing that Retention in certain Substances, such as Cloaths, &c. increases their Virulency, and he has contrasted the Mortality which frequently happened from the transportation of Felons, with the Condition of the poor naked Negroes, who are carried in Crouds to the West Indies. Great Numbers of the former, by the retention of Effluvium upon their filthy Cloaths, fall Victims to the fatal Effects of a contagious Disease; whilst the other, being naked, feel no other Inconvenience than what arises from the great Heat and close Confinement; many of them dying of Suffocation, but no Infection being produced.

Dr. Haygarth * denies the Possibility of Substances becoming imbued with any contagious Effluvium; because, according to his Theory, being soluble in Air it necessarily dissolves as soon as evolv'd, and vanishes. And he accounts for the Action of Fomites, by supposing that a certain

C Portion

* A Treatise on the Prevention of the Propagation of the Small-pox.

Portion of Pus, or Scab, of the suppurated Pustules of the Small-pox adhering to such Substances as are known to convey the Infection, have been concealed from the Action of the Air—which, upon being exposed, dissolve and impregnate the Atmosphere with the contagious Matter.

This is much what Dr. Mead † has said on the same Subject, except that he supposes Fomites to act by contact—“ The purulent Matter being caught in the Bed Cloaths and wearing Apparel of the Sick, and there drying and remaining invisible, becomes a Nursery of the Disease, which soon breaks forth upon those who happen to come in Contact with it.”

Dr. Haygarth's Hypothesis of the solubility of Infection in Atmospheric Air may certainly be applied to the Small-pox, but will not at all apply to the contagious Matter of Fever; for it has been observed that exposure to the Air * has been found inadequate

† Mead's Works, p. 232.

* Wherever this Infection lurks, and in whatever Materials it is harboured, the Admission of the purest Air,

quate to destroy the activity of this Poison, which would not be the Case if the Matter was soluble; nor have we any visible Matter which is thrown off from the Body in Fever, so as to account for Infection.

I shall now endeavour to account for these Phenomena.—I have already shewn that a certain phlogisticated State of the Air is conducive to the Production of this Disease; and that the contagious Matter of Fever, when thrown off from the Body, is dissolved in this Air as it passes out of the Lungs; and being thereby rendered active, is capable, whilst thus dissolved, of communicating its direful Effects to all within its Influence. But as this phlogisticated State of the Air depends upon a detraction of one of its constituent Parts by Respiration, in Consequence of which Loss, the Nature of the Remainder is such that it is enabled to keep dissolved that foreign Matter call'd Contagion; it will surely appear very reasonable that if this State of the Air be changed or reduced

or the most perfect Ventilation will often not avail, either in removing or abating its activity.

duced to its former Purity, by adding to it that Portion of which the Lungs had bereaved it, its Powers and Properties for elective Attraction will be altered, and that which was before held dissolved and suspended will thereby be precipitated. Accordingly we see this Operation take Place; for the Air in its Passage out of the Lungs being highly phlogisticated, brings with it the contagious Effluvium; but no sooner is the Air restored to its pristine Purity, than it lets fall the mephitic Matter, which being deposited upon certain Substances capable of receiving it, forms what Authors have agreed to call a Fomes, more or less potent probably in Proportion to the Quantity precipitated. So ready is the Atmosphere to part with the mephitic Matter which it contains, that Mr. Howard assures us, upon visiting the Cells where some Men were confined with contagious Diseases, his Cloaths became so impregnated with the Effluvia, that he could not bear to ride in his Chaise, but was obliged to get on Horseback, and (as an Illustration of what I have just advanced) the Vinegar, to which he was always accustomed to smell, became

became so impregnated as to be intolerably offensive *.

Sir John Pringle seems to have been aware of the Disposition there is in a contagious Atmosphere to hover round the Bed of a Patient; for he gives particular Directions for the constant Removal of the Air near the Bed of a Sick Man: being of Opinion there can be little Hopes of recovery

* This Disposition of the Air to precipitate any foreign Matter, may be illustrated by the Phenomena that take Place in a somewhat similar Impregnation.

The Air of a newly painted Room is highly impregnated with Particles of Paint suspended and floating in it. If a Tub full of Water be placed in the middle of the Room the Surface of it will be found in a few Hours covered with Particles of the Paint, and the Smell will be entirely removed, which, without this Expedient, would have remained some time, however carefully the Room might have been ventilated, at least in the common Way—which may be thus accounted for. The Air having a greater Attraction for the Vapour of the Water which is constantly arising, than for the Particles of the Paint, attracts the Vapour and precipitates the Paint; and not only that which comes in immediate contact with the Water, but every Particle of the Paint will be decomposed: for the Air thus depurated being now lighter than the surrounding Parts containing the Paint rises up; and thus the heavier pressing in to supply its Place, the Operation goes on so long as there is a Particle of Paint left suspended in the Air.

very if the Patient be suffered to breathe in the Atmosphere which will be formed around him.

To what can we attribute the Retention of this Matter within the Walls of a besieged City, or the Lines of an encampment, but to that Precipitation of it which takes Place, when the Air thus saturated mixes with the general Atmosphere. * The same Thing has been observed by Authors who have written on the Plague; they tell us that it will rage with Violence on one Side of an eight Foot Wall, and not be communicated to the Air of the other Side, and
it

* That Currents of Air are found to convey Contagions will make nothing against this Theory, we find by the Hygrometer, that the Air is at different Times very differently disposed to give out Moisture; if then a Current sets in upon a Quantity of Air impregnated with Contagion as in a Camp, and not being disposed to part with any pure Air, or Moisture, as a Precipitant the Wind may carry along with it this Matter to a very great Distance, which will not produce the Disease until that Change of the Atmosphere takes place, which disposes it to precipitate the noxious Effluvium. Thus Fogs and Mists have often rendered Contagions active,

Seeds of Plants have been carried from Sweden to Paris by the Wind. Why not the Seeds of Disease?

it may be worth while to remark, that this Disease when it breaks out in Constantino-ple, only Attacks those who by their religious Tenets are forbid to take any Precautions to avoid it—Those of other Countries who reside there and live in Houses of more than one Story (which the lower Class of Natives do not) by avoiding any Communication that might introduce it by a *Fomes*, remain totally free from the infectious Atmosphere, by retiring to their upper Apartments, where they reside during the Continuance of the Disease, and where they would be equally liable to Infection were the Air affected to any Height. *

Dr.

* Dr. Turnbull, who was Physician at Smyrna, assured Sir John Pringle, that he visited many Patients every day during the raging of the Plague without any Inconvenience, for being fully convinced that a near Approach alone could communicate the Disease, he was wont to go to the Windows of the infected Houses, ask the necessary Questions and give Directions without dismounting.

In Egypt, to prevent Contagion, they shut themselves up in their Dwellings, their Provisions are deposited at the gate and received there by the Porter, who takes them up by means of a Pair of Iron Tongs, and plunges them immediately into a Barrel of Water.

VOLNEY.

“ The Works at Barber’s-point went forward, tho’ the

Dr. Haygarth relates a Case, which seems to make for my Opinion rather than his—

A young Lady, with her three Brothers, met a Child with the Eruption of the Small-pox full upon it—he describes the tallest of them as being of the same Height with the Child in the Nurse's Arms, but out of the four, the youngest and lowest only received the Infection, as they were all at equal Distances, Dr. H. feels a Difficulty in accounting for this Fact, for had the infectious Matter been capable of being dissolved in atmospheric Air, it would have been alike applied to all—but on the other Hand, if so soon as it passes from the Mouth it begins to be precipitated, then will the Chance of Infection be in Proportion

Plague daily carried off many of the Labourers, several of whom did not live three Hours after the first Symptoms of the Disease—obliged to be constantly with them, this Malady was not the least Inconvenience of my Stuation, but I could not avoid the Communication that was necessary, and when any Storm sent the Workmen to shelter themselves under their Tents. I continued in the ~~rear~~ ^{rain}, and believe I may attribute to this Precaution my having escaped the Distemper.

tion to the Height of the Person—the Result of this particular Case proves the Truth of the Hypothesis I have advanced.

With a View to ascertain the State of the Air in Wards in which the Hospital Fever was prevalent, Monf. Maret, * of Dijon, made several Experiments which convinced him, that the upper Stratum of the Room, or as much Air as was near the Level of the opened Windows, was so pure that Birds which he had placed there enjoyed perfect Health, yet the lower Parts of the same Room continued vitiated and infected; for when he removed them to the Level of the Beds of the Patients, they sickened and died, though the Windows were kept open, and it was what is generally called a well ventilated Ward.

In this Predicament is every Hospital and every Jail where Air is alone let in at the Top. The Matter of Contagion instead of being conveyed away by the Air, is precipitated, and thus do Blankets,
 D Cloaths,

* Memoires de Dijon, 1783.

Cloaths, &c. become imbued with a more concentrated Poison than when it issued from the human Body—Hence the most common Mode by which this Disease is communicated; for as a Thread dipped in the variolous Ichor will communicate the Small-pox to Hundreds; so has a Blanket imbued with this precipitated concentrated Effluvium been found sufficient to depopulate a whole Indian Nation.

And I apprehend the mildness of the Symptoms which have been remarked to follow on Infection from the Effluvium as it passes immediately from the Patient, does not so much depend on a less virulent State of this Matter itself, as on its being applied to the Body in a more diluted Form—A Fomes formed by repeated Precipitation, soon becomes a *Collection* of mephitic Matter, which being dissolved by the Breath in a greater Proportion than when diffused thro' the Air of a Ward, proves more destructive in Proportion to the Quantity*.

From

* Dr. Lind mentions one Bed that gave a violent Fever to three Nurses successively.

From what has been said it will be understood why ventilation is not of itself sufficient for the Purpose of removing Contagion from infected Substances; for so long as it remains undissolved upon Cloaths, &c. it will remain inert and capable of communicating the Infection only upon meeting with its proper Menstrum, phlogisticated Air.

Nothing can better illustrate what I have advanced on the Precipitation of contagious Matter, than the Fact mentioned by Mr. Howard—that his Cloaths, and even his Vinegar became highly impregnated; for independent of the fresh Air he carried with him upon his Cloaths, the Vapour from the Vinegar would be a powerful Precipitant—and thus throw down a large Quantity of the mephitic Matter, which (as in the Case of the Paint and Water) would rush into the Vial to supply its Place,

* Mr. Day has mentioned a Case which strengthens the Hypothesis of a chemical
Process

* Considerations on the Contagion in Maidstone Jail,

Process—The Mason who repair'd the Hole thro' which one of the Prisoners escaped caught the Jail Fever—which is thus accounted for; the Operation of Precipitation taking Place so soon as the Man approached the open Air, a Fomes was deposited in the Hole, which being re-dissolved by the Breath of the Workman again became active.

In the Experiments of *Monf. Maret* it is evident, that by the Admission of fresh Air at the Top of the Room, that Stratum alone becomes compleatly depurated to which the fresh Air has Access; and in Proportion to the Distance from the Window will the purification of the Air be found—The Means which *Dr. Lind* found most effectual in removing Contagion, would seem at first sight to militate against this Doctrine; for what he recommends we know to be Processes which phlogistificate the Air to a very great Degree; and that instead of destroying the Infection, they would only tend to make it more active: but I think it may be thus explained, and its beneficial Effects accounted for—The first Action of the phlogisticated Air (produced by the Combustion of
the

the Substances recommended) would be to dissolve the contagious Matter, and thereby to diffuse it thro' a large Quantity of Air. The great Heat he orders to be employed would so rarify the whole Mass, that upon giving proper Ventilation, the whole would escape together; nor any decomposition take Place till it became more generally diffused thro the Atmosphere, and consequently might not again be precipitated where it could produce Disorder.

In all Probability the Disease amongst the Felons, * owed its Rise to Fomites conveyed by their Cloaths, &c. containing a Portion of the contagious Matter some Time or other precipitated during their Confinement in Jail, which in the confined Hold of the Ship meeting with its proper Menstruum, phlogisticated Air, would be dissolved and rendered active.

That Combustion also renders Contagion active may be seen by what Dr. Mead has mentioned, who says that “ burning the
Cloaths

* See Lind.

Cloaths of those who died of the Plague diffused certain Particles of the infectious Matter into the Atmosphere," and he quotes the Facts mentioned by Mercurialis—that "the Plague in Venice was augmented by burning a large Quantity of infected Goods in the City." All this is readily accounted for on the Theory I have endeavoured to establish. Combustion rendering Air equally phlogisticated as does animal Respiration, a large Collection of mephitic Matter precipitated upon the Cloaths, &c. would be rendered active by its Solution in the Air; and all who came within its Influence would doubtless receive the Infection. Dr. Mead also furnishes us with another Fact; which will bear the same Explanation—"at Shipston, a poor Vagabond was seen walking in the Streets with the Small-pox upon him—the People, frightened, took Care to have him carried to a little House seated upon a Hill at some Distance from the Town, providing him with proper Necessaries. In a few Days the Man died, they ordered him to be buried deep in the Ground, and the House and his Cloaths to be burnt.—the Wind being pretty high blew the

Smoke

Smoke upon the Houses on one Side of the Town. In *that Part* a few Days after eight Persons were seized with the Small-pox; “So dangerous” says Mead, “is Heat in all Kinds of pestilential Disorders and so diffusive of Contagion.

Hodges * also relates that Fires being ordered to be made in the Streets for three or four Days during the Plague, in one Night following there died no less than Four Thousand people; whereas in any one single Week before, or after, never twice that number was carried off.—Thus Contagion owes its activity as much to its solution in phlogisticated Air, as Antimony in the Tartar Emetic, to the Acid of Tartar, to which it may be properly compared; for by adding to either Solvend that for which it has a greater Attraction than for that with which it is compounded, the Antimony and Contagion will alike be precipitated in an inert Form; yet, however still capable of being rendered active by being again dissolved.

Whenever,

* Hodges de Peste.

Whenever, therefore, any one by his Breath applies a certain Portion of this Air to a Blanket, or other Substance on which this Matter has before been precipitated, it will be dissolved—the sleeping Serpent will be roused, and the next Inspiration will convey a direful Poison to his Blood.

Having found that the Air by Respiration becomes unfit for the further Purpose of Life, and there being no just Reason to believe that the general Atmosphere is one Jot less respirable than it was 4000 Years ago—tho' Myriads of animated Beings have every Moment been carrying on this Process—Philosophers were naturally led to infer that some Process is instituted by the all-wise Author of our Being, to answer this important Purpose: Struck with this Idea, Dr. Priestley, by a number of well imagined Experiments, first led the Way to the Discovery of this very important Part of Nature's Operations. And Dr. Ingenhouz, with a Zeal no less earnest, added many more tending to ascertain what this peculiar Process is.

It is not my Intention here to relate the Particulars of these Experiments, but to take such a View of them as may lead us, by an Imitation of the natural Process, to find out a Means to depurate the Air of a Sick Ward.

The first Thing that presented itself was that Plants, in certain situations, purified the Air and rendered it again respirable after an Animal had died in it.

But further Experiments proved that Plants themselves, under certain Circumstances, were not long able to be supported by remaining in the same Air; for it was found that they also vitiated Air after a certain Period.—Water and Light were then found to be absolutely necessary to the compleat Performance of this Process, which Dr. J. clearly shews by Experiment; for having placed an aquatic Plant in a Jar full of Water in the Light of the Sun, the most perfect Air was produced.

Sir Benjamin Thompson's Experiments seem to prove that the simple decomposition

of certain Rays of the Sun in Water alone, is capable of producing this pure Air.

If such be the Means which Nature herself provides against those Calamities produced by vitiated Air, why is her Bounty defeated? Why are mankind destined still to suffer under those aggravated Evils for which she has presented them with an adequate Remedy? the Answer must be sought, not in the genuine Propensities which the Author of our being hath implanted in us, but in the artificial Refinements of Society.

In the earliest Ages of the World, when Men had not yet formed themselves into large Communities, and when they led a wandering Life, removing from Place to Place, determined in their Choice of Settlement alone by the Convenience of Pasturage, the Operations of Nature underwent no Constraint, and the Means intended by the all-wise Creator, produced their full Effect.—For no sooner was the *Liquidum Vitale* absorbed, and human Effluvia evolved, than the pure Vapour from the running
Stream

Sream, or fertile Plain, supplied the Waste, and decomposed the noxious Matter.

But when the human Race, relinquishing the Comforts of Independence, began to place their Happiness in large Communities, and Individuals formed themselves into Societies for the Improvement of those Arts which could alone be brought to Perfection by the Conjunction and Assistance of many, they crowded into Cities, and breathed their own Destruction. Crimes increased, and Confinement became necessary. Taste and Luxury devote Myriads to Destruction for their Gratification, by the Accumulation of sedentary Arts, or of Machines to shorten Labour; nor is it the least of the Horrors of War (the necessary Consequence of an Encrease of Wealth and Power) that it shortens the Period of our Existence, by other Methods than the Sword. An invested * Camp, or a garrisoned Town, have proved an inglorious

* In the Year 1717, when the Army entered the Camp of Belgrade, in May, they were 55,000 effective Men; but on the 18th of August, they could muster only 22,000 under Arms: the rest being either Dead or incapable of acting.

rious Grave to many a brave Man, who had long resisted the Sword of the Enemy; and even in the projects of Humanity to abate these Miseries how often are we compelled to lament, that its Generosity is defeated by an ill-constructed Hospital, or the Negligence of those who are appointed to superintend it?

The following Suggestions refer immediately to what has been here said; for since the remote exciting Cause of Fever depends upon a peculiar State of the Air, namely the Effect of Respiration; and the actual Production of the Jail or Hospital Fever, with a Power of communicating Infection, depend upon a morbid Excretion of Effluvium from the Body, in consequence of this State of the Air, in which, whilst it is dissolved, it is rendered active; it follows, that to prevent this exciting Cause, we have only to keep the Air in that State in which it would be found, were it exposed to those Processes we have already mentioned; and, whilst Contagion is forming, to endeavour to procure its Expulsion, by preventing its Precipitation upon any
 Thing,

Thing, which by retaining it, might prove a *Fomes*.

To effect the First of these Ends has long been the Object of Attention to those who have had the Care of Hospitals, Ships, &c.—and many useful Inventions by Dr. Hales, Mr. Sutton, and others, have been employed with Advantage—for, as heated Air was found to be lighter than the external Air, it was readily enough supposed, that by opening the Windows at the Top of the Room, the Air would be freely admitted, and thus a complete Ventilation be procured, the Pressure of the heavier expelling the lighter Fluid; but alas! Experience teaches us, that an Hospital, however well ventilated in this Manner, is but too often the Nest of Disease; and why it should be so, will be easily explained on the Principle I have before maintained. For instance, if an Effluvium be mixed with the Atmosphere, to which it will no longer be united than till the Air meets with what it has a greater Attraction for; then will this noxious Fluid subside upon the Admission of fresh Air, instead of being expelled; and
thus

thus accumulating produce those Circumstances, which we have supposed favourable to the generation of Fever.

To procure compleat Ventilation, the Air should, in a Stream, sweep the Floor of the Ward, Hospital, &c. It has been proposed, in order to answer this Purpose, that the Wards of Hospitals should be built of an elliptic Form, with the Door at each End, and Fires on the Middle of each Side; or with the Fire-place at one End, and the Door at the other—so that the Air, rushing in with a Current, might not leave a Corner unaffected—which Dr. Lind had before observed, was sufficient to engender Disease. Or I conceive the Windows might be constructed as in the Hospital of San Juan Baptista, at Toledo,—which open on a Level with the Floor, or in the improved buildings of the Adelphi, London.

But as perfect Ventilation is not always practicable, nor the free Admission of cold Air always adviseable, an Accumulation of human Effluvium may be prevented by the Evaporation of pure Water, which
 may

may be conveniently obtained, by placing a certain Quantity of Water in the Middle of the Room ; the Vapour of the Water being more strongly attracted by the Air * than the Effluvium is, the latter will be precipitated, and, as in the Case of the Paint, will fall into the Water †.

But as the spontaneous Evaporation of Water is very slow, and the Quantity of Vapour not sufficient in all Cases to supply as much Fluid as will precipitate the whole of the Effluvium, particularly where Contagion is generating (as in Cases of Typhus Fever, or mortifying Limbs, which Sir John Pringle asserts to have been the Cause of

* As compleat Ventilation of any Room depends on the rarefaction of the Air, the Want of a Fire can never be dispensed with ; its great Use was clearly proved in the Circumstances mentioned by Lind, Page 234. The Mortality attending those who were lodged in the Mill without a Fire-place, being far greater than those who were in some “ old Houses, though not nearly so well accommodated, but where they kept a constant Fire of Spruce Wood.”

† As pure Air may be manufactured from Water, by Means of a few green Leaves, or a Skain of raw Silk, in the Sun, surely no Opportunity should be omitted, of supplying a crowded Room (that has a proper Aspect) with this necessary Fluid. See Philos. Transact. Vol. 77, Pt. 1st.

of this Fever) I would recommend the Use of Steam, by which a larger Portion of Water being converted into Vapour, a more compleat Exchange will take Place, and all the noxious Particles be decomposed.— The good Effects of this Method I have repeatedly experienced, not only in Cases of Fever, but also where, from the separation of a large Slough or Eschar (as in sphacelus) the Air has been rendered intolerably offensive ; for by the Use of Steam or Vapour of warm Water, I have been able in a very short Time to restore the Air to its former Purity, and thereby remove the Factor,

A few Years ago in this Town I had an Opportunity of shewing my Friend Dr. Holland,* who attended with me for that Purpose, the good Effects of the Method I have here proposed, to remove the Stench : It was a Case in Surgery where the closeness of the Room, the largeness of the

* I cannot omit the Opportunity which the mention of this Case affords me, of paying a Tribute of Respect to the Memory of that most ingenious Friend, who was present during the Circumstances I have related ; the early Part of his Education was conducted by his Father the Rev. P. H. who unites a very extensive Knowledge in the learn-

the Family, the poverty and consequent dirtiness of the House all conspired to render the Air already furcharged with Effluvium from the Slough of a large Wound,

F almost

ed Languages, and (what is a rare Accomplishment with such Acquisitions) a humble and exemplary Piety—After he quitted his Father's House, the medical Instruction of Dr. Aikin (*a*) laid the Foundation for that clearness and distinctness which he discovered in judging of Symptoms; a Faculty which greatly recommended him to the most discerning of the Professors under whom he afterwards studied at Edinburgh. During his Residence in that University, he became one of the first Ornaments of the medical Society; as he joined to a vigorous and lively Conception, a free and manly Communication of the Ideas he entertained. Thus qualified he entered on the Business of his Profession in this Town, where I flatter myself he will long live in the Recollection of many who were Witnesses to his indefatigable and impartial Attention to the Welfare of his Patients, to the Sincerity with which he always expressed himself, and to that due Sense of Obligation which he constantly felt to those who first cherished and encouraged the exercise of his Abilities. Unfortunately for himself, in conjunction with such singular Endowments, he was diffident of his own Powers; and the anxious Feelings which he endured, whilst the Fate of a fellow Creature depended on his Care, preyed upon his susceptible Mind. By a Paradox not unfrequent in the human Constitution, to have been more extensively serviceable, his Desire of becoming useful should have been less ardent; insomuch that all who knew him will justify me in applying to his Character

(*a*) Late of Warrington, now of Yarmouth, so well known in the World for his refined Taste in the politer Parts of Literature, and his extensive Abilities in the Profession to which he is devoted.

almost intolerable. My Friend, that he might be the more able to judge of the Effect, withdrew. In the mean Time I ordered a large Quantity of boiling Water to be brought to the Bedside of the Patient, where it was poured from one Vessel into another, to promote Evaporation. By this Means the Air was supplied with a proper Quantity of Moisture (for which upon the Principle † already laid down it would have

Seneca's animated Encomium of a Physician, whose Mind he describes as cast in a similar Mould to that of my valuable Friend, *Magis pependit, quam Medico necesse fuit. Pro Hominibus, non pro Famâ artis extimuit. Non fuit contentus Remedia monstrare, sed admovit. Inter sollicitos assedit, ad suspecta Tempora occurrit: nullum Ministerium oneri illi, nullum Fastidio fuit. Gemitus Hominum nunquam securus audivit.*

† Sir John Pringle observes that frequent Showers during the hot seasons cool the Air, check the Vapours, dilute and refresh corrupted Water “and precipitate the the noxious effluvia.”

Observations on the Diseases of the Army.

A great Fall of Rain evidently checked the Ravages of the last Plague in London.

History of Jamaica.

“It is well known that the penetrating Dews which fall in Egypt, about Mid-summer, destroy, even in Alexandria, all remains of the Plague.”

Baron de Tott, Vol. 2.

have a greater Attraction than for the putrid Particles) the Atmosphere of the Patient was soon depurated, and the Man immediately felt the good Effects of this Operation. My Friend returning, declared the Room to be without Stench or Fætor; he was convinced that the Patient was much relieved, his Tongue before dry, being now moist and every other Symptom of Fever alleviated. †

The good Effects of a similar Process have also been proved in a remarkable Manner by some Experiments made at Maidstone Jail, where the Fever was actually stopped by causing Showers of boiling Lime Water to fall thro' the Air of the infected Room by Means of a Machine contrived for that Purpose. So instantaneous was the Benefit derived from this Operation, that Mr. Day tells us the Prisoners strove to be employed

† It is not more pleasant than salutary that Vessels of boiling Water are brought into crowded Assembly Rooms late in an Evening, for the Purpose of supplying that grateful Fluid, Tea; which if there be any Harm in drinking at that late Hour, it is effectually counterbalanced by the Use of the Vapour in depurating the Air, necessarily become phlogisticated by the respiration of such a Number of People.

ployed in the producing it:—The Alteration of the Air giving them a Sensation of Pleasure and Relief to which they had been long unaccustomed.

The Method which Mr. D. recommends, differs from that which I have always employed, by using Lime Water instead of pure Water. How far Lime * is necessary to the perfect destruction of Contagion I have not yet ascertained; it is however very useful when applied to the Walls of infected Houses, &c. Whether it acts as a Specific in destroying the Matter, or only covers it, White Washing is an Operation that ought never to be omitted in the Purification of such Places.

The Power which Water has in removing mephitic Matter, and thereby preventing Disease, is known to every Sportsman, whom Experience has taught that a
Stream

* “ In Jamaica it is usual to throw a Quantity of quick Lime into Privies that are grown offensive, in order to sweeten them; which Purpose it very speedily and most effectually answers, by absorbing probably the mephitic Particles.”

Stream of Water running thro' his Kennel, will effectually prevent that Fever which frequently terminates in the Generation of a Species of Hydrophobia * when the Hounds are kept within a small Space ; tho' the
Court

* I account myself extremely fortunate in having an Opportunity before this Sheet is printed off, to add a Note which will Corroborate this Assertion by the Evidence of one of the best modern practical Writers : “ The common Notion (says he) that this Disease amongst Dogs can only proceed from the Poison of an external Bite ; or that it originates in some particular Dog from internal Disease, and from thence is disseminated, has excluded the Idea of spontaneous Madness, arising from some peculiar State of the Air—But this Influence of the Air generated the canine Madness in the Year 1783 in the West Indies ; for it was general, and many Dogs were seized with it that had no communication with others ; and some Dogs that were brought from Europe and North America, and that were not on Shore, went mad on their Arrival in the Harbours in the Islands.”

Moseley on Tropical Diseases, &c.

There are also Diseases amongst the brute Creation which are generated by Contagion from a Fomes, in the same Manner as the Jail Fever. How often has a Manger, or a Rack, not thoroughly cleansed or renewed, infected a fresh Horse with that fatal Distemper the Glanders ? the Difficulty of removing which is equally great as a Fomes from the Contagion of Fever—but as the same Methods of Purification ought to be employed, and will prove effectual, I trust, the publication of this Essay will tend to lessen if not to eradicate this Evil.

Court in which they are kept be not covered in; those who have not the Convenience of a running Stream, find it necessary to throw cold Water upon the Ground of the Kennel in dry Weather.

Monf. Volney asserts that the Water Carriers at Cairo, who are continually wet with the fresh Water which they carry on their Backs in Skins, are never subject to the Plague. This striking Fact, whether we account for it with M. Volney as the simple Effect of Lotion, or on the preceding Theory from the Atmosphere which surrounds them, proves in a most forcible Manner the Power Water possesses in rendering Contagion inoffensive--I think we can hardly attribute this Power to Lotion; for these Men can never be so thoroughly wet as to wash away every Particle of Matter that falls upon them. But without straining a Fact to meet a Theory, we may venture to attribute their Escape to the constant Evaporation from the Water they carry (which in such a Country as Egypt must be excessive) precipitating every noxious Particle before it reaches them, and thus supplying

supplying them with a purer Atmosphere than the rest of the Inhabitants enjoy. *

Now as it is not Water impregnated with the Filth and Nastiness of a damp and
dirty

* It has been rendered probable by the Experiments of Mr. Cavendish, that Water is a Compound of dephlogisticated and inflammable Air. Mr. Watt asks, “are we not authorised to conclude that Water is a Compound of dephlogisticated Air and Phlogiston, deprived of Part of their latent or elementary Heat? that dephlogisticated Air is composed of Water deprived of its Phlogiston, and united to elementary Heat and Light? and that the latter are contained in it, in a latent State, so as not to be sensible to the Thermometer, or the Eye? And if Light be only a Modification of Heat; or a Circumstance attending it; or a component Part of inflammable Air; then pure or dephlogisticated Air is composed of Water deprived of its Phlogiston and united to elementary Heat”. Now as Steam is Water united to latent or elementary Heat; and as the Lungs deprive the Atmosphere of its dephlogisticated Part, may there not be more than simple elective Attraction in the Action of Steam in depurating the Air of a Place phlogisticated by animal Effluvia?—Altho’ I have some Years before the publication of Mr. Cavendish’s Experiments on the Composition of Water, been in possession of the Facts here adduced in Support of the Action of Steam, and am firmly perswaded that Steam is, somehow or other, converted into a respirable Fluid, yet I shall forbear any further reasoning, nor venture Conjectures on a Subject which the greatest Philosophers have not been able precisely to determine.

See Philos. Transact. Vol. 75.

dirty Room that is here recommended, (the very Effluvium from which is of itself capable of generating one Section * of Fever) but the Evaporation of a *pure Fluid*, so Fires and Cleanliness are absolutely necessary: for without Cleanliness every Invention whether for ventilating or depurating will be ineffectual; and without Fires a constant Dampness may remain, that to those who are confined without Exercise, may prove injurious.

The better to promote this End, great Attention ought to be paid to the Furniture of all Places, intended as Receptacles for a number of Men; whether Hospitals, Jails, or Workhouses. Dr. Lind's Experience taught him that Wood, and more especially Woollen Substances were particularly liable to retain Infection. The Bedsteads therefore ought to be made of
Iron,

* Febres, *miasmate paludum ortæ*, paroxyfmis pluribus, a pyrexia, saltem remissione evidente interposita, cum exacerbatione notabili, et plerumque cum horrore, reduntibus, constantes: Paroxyfmo quovis die unico tantum.

Iron, * the Legs, or that Part of the Posts below the Bed should be much higher than they are made in general, in order to admit a free Current of Air underneath; the Curtains, if Curtains be allowed, ought to be Linen as well as the Coverings of the Bed; and the Stuffing of the Bed itself ought to be of Straw. These are all Substances easily kept clean, or renewed §. Mr. Howard recommends the Floors of such Places to be made of Brick or Terras, which certainly admit of more complete washing than Boards, and when great Occasions require, may be either strewed
 G with

* If the ingenious workers of Cast Iron would turn their Thoughts to this Article, Iron Bedsteads might be supplied on Terms sufficiently moderate, to be an Object worthy of Attention to all Governors of Hospitals, Magistrates, &c.

§ I cannot sufficiently reprobate the Practice of suffering Patients, &c. to put their dirty Linen, Cloaths, &c. in Boxes under their Beds, by which free Ventilation is obstructed, and Substances every Way calculated for the Retention of infectious Matter placed in the Way of receiving it;—on which should any infectious Matter be lodged, little will it boot the poor Man to have well recovered from the dangerous Operation of the Stone, or for whatever else he may have been sent to an Hospital, if upon returning Home he communicates to his Family a pestilential Disease.

with Quick Lime, or white washed with boiling Lime water.

The Method of purifying Air by Means of Perfumes † can only be accounted for by supposing that the Air will attract *these* rather than the mephitic Matter ; but their frequent Failure proves, they are by no Means to be depended on.

The Method which Dr. Lind recommends for the Removal of the contagious Matter, is not only proper but absolutely necessary, where it can be applied to such Substances as may have been exposed to the Deposition of this Matter ; and upon the Theory already proposed it will be readily understood how this Effect is produced.

Whenever therefore this Disease has been
prevalent,

† The Fumigation Powder used by the Russians at Moscow in 1771 to prevent and destroy the Infection of the the Plague, was composed of Sulphur, Nitre, and certain resinous and aromatic Substances.

De Mertens.

How far the Deflagration of Nitre with Sulphur may influence the elective Attraction of such an Atmosphere I am not at present prepared to determine, nor shall I offer my Conjectures at a Time when the ablest Heads are employed on the Subject.

prevalent, such Substances as have been in the Way of receiving Infection and are capable of retaining this Matter, should be exposed to the Fumes of Sulphur and Charcoal; but in such a Manner as that a Current of Air may immediately displace the phlogisticated Air which will be formed by the Process, and which now holds in Solution the contagious Matter: taking Care that the Wind do not blow it, thus dissolved and active, upon a Town, as the Cases already mentioned by Mead are sufficient to alarm us for the Consequences*.

The best Contrivance that I know of for this Purpose is a common Lime Kiln, in the upper Part of which the Cloaths being suspended, and a Charcoal Fire with some Sulphur lighted in the Fire Place below, the Current produced by the rarefaction will dissipate the whole together when thus dissolved,

As this is easily procured, not only the Cloaths, Bedding, &c. of those who have
been

* It was remarked that those only caught the Infection at the Old Bailey who sat within the Influence of a Current of Air which carried the dissolved Miasma along with it.

been in infected Places, but the Cloaths of all Prisoners, when new Cloaths are not provided, should undergo Fumigation in this Way, previous to their being brought into a Court of Justice; where the crowded State of the Place, and the consequent Vitiating of the Air, renders every Particle of Contagion active, and subjects all present to the dangerous Consequences of Fever.

When a House has been infected, a similar Method must be pursued; taking Care, that the Rooms be first of all completely filled with phlogisticated Air, in order that the contagious Matter may be thoroughly dissolved, and by an opening in or near the Ceiling, and another upon a Level with the Floor, such a Current of fresh Air be produced as will effectually and at once displace the whole of that corrupted; for if the Air be suffered to enter *gradually*, a Precipitation of the noxious Matter will take Place, and a Nidus, or Fomes for the Disease by this Means be preserved. Hence we can readily account for the Failure of such Processes, when not carefully conducted; of which several Instances may be seen

seen in Lind ; and hence we see plainly why great Heat becomes necessary to ensure Success. *

With regard to personal Preservatives, for those whom a Sense of Duty leads to the Abodes of the wretched, where this Poison is active, I know of none so powerful as a fearless Mind. What has conducted the benevolent Howard thro' those dismal Scenes where Disease fate brooding, but that consciousness of Duty which rendered him intrepid? His Escape from so many fiery Trials may convince those, who have invidiously attributed his Motives to Ostentation and Vanity, that he must first have been incited, and still continues to be stimulated by the best of Motives, a most ardent Wish to alleviate the Sufferings of his fellow Creatures.

For those however who feel an Inclination to relieve, the Miserable, and are nevertheless subject to an Apprehension of Danger, the

Four

* I would also recommend that all Sessions Houses, &c. that are for several Days filled with animal Effluvia should be well purified with Steam, properly ventilated and aired by good Fires after the Sittings are ended each Day.

Four Theives Vinegar * has been found the most useful Preventative. Cotton made into small Doffils and dipped in it, may be put up the Nostrils, or a Phial containing this Vinegar may be carried open before the Mouth, or under the Nose. Of the Utility of which there can be no Doubt, for its Mode of acting has been explained by what has been said before, and its good Effects were demonstrated by Mr. Howard, who found an actual Precipitation of the mercurial Matter in his Phial after once or twice using it. † Before any one voluntarily puts himself in the Way of Infection, he ought to

* The Four Thieves Vinegar took its Name from four Men, who during the raging of the Plague at Marseilles, under Colour of assisting the Distressed, robbed great Numbers. Being all condemned to suffer Death, one of them was pardoned on discovering the Preparation of their Preventative, of which the following is a Translation.—Take of Lavender Flowers, Rosemary, Rue, Wormwood, Sage and Mint, of each a Handful, of White Wine Vinegar, a Gallon, let them stand in a Sand Bath for eight Days to digest—when wanted add three Drams of Camphor to every Pint.

† I would recommend it to Physicians to have the Heads of their Canes hollow, within which might be inclosed a small Phial of perfumed Vinegar, by smelling at which, *if they did not get Knowledge as formerly*, they might at least prevent Infection.

to brace himself up. If he is a Man who enjoys Health, and drinks a certain Quantity of Wine every Day, let him not venture without it, but let him abstain from more than is necessary for this Purpose : or should his Habit be debilitated, a Glafs of Huxham's Tincture of Bark may enable his Body to resist the sedative Powers of Contagion for the Time he may be exposed to it ; and upon returning Home, he ought carefully to wash his Hands, Face, and Mouth, making free and liberal Use of Water. *.

In all Cases of Fever, even where the most judicious Means have been successfully employed to prevent an accumulation of human Effluvia (the proper Menstruum of Contagion) every one ought to be careful neither to receive the Breath of the Patient, nor to apply his own Breath to the Bed Cloaths of the Sick ; as it is impossible to say how small a Portion of Contagion, when dissolved, may be sufficient to infect

* Mr. Howard relates a Case of a Prisoner brought out as dead ; on being washed under the Pump, shewed Signs of Life, and soon after recovered.

infect a Person already disposed by fear or real Disease to receive it.

Of this we are told the Egyptians are remarkably careful ; they never speak, when they meet during the Plague, without turning away the Head to avoid breathing upon one another. *

Not only to prevent the Action of Contagion on themselves, but to prevent the Precipitation of it upon their Cloaths, Physicians would do well to order the Room where any one is confined with a contagious Disorder, to be well steamed and properly ventilated before they enter.

It is well known that many infectious Diseases, and particularly the Small-pox, have been conveyed upon the Cloaths of those who have visited Patients labouring under such Complaints, and have thence been communicated to a distant Place. From what has been already advanced, it will be readily understood how this may have taken
Place,

* Volney.

Place, for tho' it has hitherto been presumed that the open Air was of itself sufficient to carry off all Infection; yet from what I have said, I trust, it will be evident that this can by no means be the Case. In several Instances, where nauseous Stenches have been perceived, the Stomach has been very much affected, as if primarily attacked by the action of the contagious Matter, conveyed thither by the Saliva. As it is as easy to conceive this Matter capable of acting in the Stomach, as when applied to the Surface of a Wound, it will be well to avoid swallowing the Saliva during the Time any one is obliged to remain in an infected Place: and I would recommend to those who may be in this Manner affected, to lose no Time in getting the Contents of the Stomach compleatly removed, * for I know of no Step that is so likely to obviate those fatal Consequences, which but too often follow Infection, when no Attention has been paid to its Commencement.

But as it was no Part of my Plan in the present Publication to point out a new Mode of treating the Jail or Hospital Fever, nor

H

my

* See Page 11.

my Wish to enlarge this Essay by copying all those useful Directions for purifying infected Places, which are to be met with in Lind, Howard, and others : I shall content myself with having noted the Causes that render Contagion active, and with furnishing a few Instances, as Illustrations of the best Method of preventing and removing its Effects ; and I flatter myself the good Sense of those to whom I write will be able, upon the general Principles I have laid down, so to employ the Means here recommended, as to render this Essay beneficial to Society.

F I N I S.