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PART I.  
ORIGINAL COMMUNICATIONS.

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I.

*An Essay towards an Inquiry how far the Effluvia from dead Animal Bodies, passing through the natural process of Putrefaction, are efficient in the production of Malignant Pestilential Fevers; and how far such Effluvia are capable "of exciting a Putrefactive Emotion in all other" living "Animal Substances exposed to their action?"* By  
C. CHISHOLM, M. D. F. R. S. &c. &c.

I AM going to hazard an opinion which may experience a more formidable resistance from prejudice, than that which I have formerly attempted to support, (See Edin. Med. Journal, No. XXI. p. 32-50.) as it seems, indeed, on a general view, less tenable—I mean, that the effluvia from dead animal bodies, passing through the natural process of putrefaction, and unrestrainedly diffused through the atmosphere, are injurious to living animal bodies exposed to their action, no more than inasmuch as their fœtor is offensive to the olfactory nerves\*; and that, when confined to a very limited space, and their principles, instead of entering into new combinations, are concentrated, and in that state applied to, or received into, the bodies of living animals, these effluvia may act as a poison, producing, in the living animal frame, fever, perhaps,

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\* Nasorum sunt pestes.—Ramazzini.

perhaps, but incommunicable, or incapable of propagation by contagion;—or instant death, by a sudden exhaustion of the living principle. The want of decision of the ablest chemists respecting the precise nature of these effluvia, is very remarkable; and, under every circumstance of the case, should create doubt. To draw conclusions from the analysis they have given us of the gaseous products of putrefying animal substances; and to apply these conclusions to the investigation of the causes of diseases supposed to be their peculiar offspring, would be, I imagine, as unphilosophical as they would be fruitless. The clearest results would be only conjectural. It seems to me, therefore, a more rational course of inquiry to state facts—facts obvious to the senses, evident to every understanding, presenting a clear and sensible line of discrimination,—separating them from all the pretensions of chemical or theoretical speculation\*.

Medical system writers, unhappily, in most instances, take facts  
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\* One of the most enlightened of the French chemists, M. Fourcroy, says of these effluvia: "As to the nature of this fugitive odorous substance, it is particularly on this point that our researches have made but small progress, and should be further prosecuted," &c.—*Elements*, Vol. III. 301. M. Chaptal says, "the last degree of decomposition has its peculiar characters. The smell becomes faint, nauseous, and exceedingly active. This more especially is contagious, and transmits the seeds of infection to a great distance." He then enters into a detail of pestilential epidemics, which can have no reference to this product of putrefying animal substances.—*Elements*, Vol. III. 402. Dr Mitchell of New York, in a letter to Dr Percival of Manchester, observes, that, "the discordant opinions of physiologists and physicians, two of whom can scarcely be found to agree, shew, that the rays of science have hardly begun to illuminate or organize this mass of rudeness, after the experience of two thousand years. I question much whether those venomous or pestilential complaints are better understood, or more successfully treated, than in the days of the Sage of Cos!" To dispel this obscurity, he invented a most ingenious chemical speculation, which at once seemed to lighten the whole horizon of infection and contagion. The detail of facts, the argument in support of its application to pathological investigation, seemed incontestible. Subsequent inquiry, perhaps deeper chemical research, has proved, however, that the gaseous oxyd of azote (nitrous oxide) has been totally inadequate to the production of the effects attributed to it.—See *Med. Rep.* Vol. I. 266.; *Annals of Philosophy*, Vol. I. 156. M. Guyton de Morgeau used the steams of muriatic acid; Dr C. Smyth, those of nitric acid, to purify infected and pestilential air. Dr Mitchell, on the other hand, asserts, that the dispersion of the powder of tobacco would have destroyed as much contagion. Notwithstanding the confidence with which this ingenious gentleman proposes the use of alkaline salts in the correction of putrid vapours, and maugre the dispersion of potash in the city of New York, amounts, by his calculation, to more than fifty-four tons annually, yet unhappily it affords no counteraction to the cause of the malignant pestilential fever, which has so frequently desolated that city.—See *Moyens d'entretenir la Salubrité*; Smyth's *Account of Experiment*, &c. *Med. Rep.* Vol. II. 232; and *Mitchell's Case of the Manufactures of Soap*, &c. p. 60.



on trust; they copy from their predecessors; and an opinion is thus promulgated from age to age, which originally had probably no better foundation than superstition or conjecture:—The substance which offends the sense of smell must be injurious to the whole economy of the body, and must necessarily excite in it that tumult which goes under the name of putrid, malignant, or pestilential fever. Thus have the original propagators of this opinion reasoned without examination; thus have subsequent compilers given credence without investigation. Mankind have a propensity to judge of things by exterior appearance:—and an offensive factor, an harsh and unseemly aspect, a bitter and nauseating taste, convey to the mind a sensation of malignity, which the fancy readily fabricates into a morbid cause of desolating action. It is thus that putrid animal effluvia, or effluvia proceeding from dead animal bodies passing through the natural process of putrefaction, even in a widely diffused state, are, at once, by a very common operation of the mind, converted into agents of pestilence and death. Medical writers, until of late, have given very much into this belief; and it has therefore become a kind of axiom in medical physics, that such effluvia, whether in a state of diffusion or concentration it matters not, are the most certain and frequent cause of malignant and pestilential fevers. But to be more particular:

As it perhaps never happens that butchers, scaffengers, tallow-chandlers, soap-boilers, and others, who, by their trade, are more immediately engaged in converting putrid animal substances, that is, the flesh, offals, bones of animals decaying by the natural process of putrefaction, to useful purposes, and exposed to the inhalation of the effluvia proceeding from them, are afflicted with the diseases that are supposed to be the offspring of this process; it follows, that if such diseases, malignant and putrid fevers for instance, are ever found to be the produce of this process, we can only account for their being so, by supposing the exhalations proceeding from it to be confined to a very limited space, and there concentrated, that is, having their principles chemically united into a compound of a most pernicious nature, and deprived of all chance of escaping such union by the intervention of substances, or fluids, whose affinities to it would generate new combinations with the bases of these principles. The effect, however, is local, and terminates in the individual exposed to the action of the cause\*. Such an arrangement of morbid cause may, indeed, account

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\* The cause, in fact, of typhus, is, I believe, an undefined change in the atmospheric air, brought about by its confinement in a very limited space, and incapacity



count for malignant fevers proceeding from the miasms of putrid animal substances in stationary camps; for there we sometimes meet with all the conditions I have stated †. A soldier's tent is a very limited space, seldom subjected, in stationary encampments, to the perfusion of pure atmospheric air;—and within it such miasms often are generated, often are concentrated, and generally during night, and frequently in the day, envelope the body of the soldier. The same may happen in barracks, and in transports. But these fevers are not contagious or pestilential, unless there should be the concurrence of a cause which, under proper management and distribution of the soldiers, cannot exist. A proof of this proposition is, that the officers, more careful to prevent

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capacity, in a great degree, of renewal, and the respiration of an effluvia emanating from the persons inhabiting the wretched close dwellings in which the fever is generally found; it has nothing to do, I apprehend, with the effluvia of putrid animal substances, in whatever state they may exist. We are imperfectly acquainted with, indeed almost ignorant of, the nature and composition of contagion. One thing, however, we do know, that there is a most important distinction between the effluvia of putrid animal matter, and the gaseous matter constituting contagion\*; a distinction more readily perceived in the effect, than in the constitution of the agents. I am aware of the inconsistency which may be attributed to me in stating a proposition so opposite to that which may be found in my Essay, Vol. I. 281., and my letter to Dr Haygarth, p. 142. But herein I trust I manifest that disposition which should be paramount in the minds of those whose object, in all discussion, is truth. Subsequent inquiry and reflection have convinced me that I stood not on solid ground when I stated, that among the causes of pestilence is the product of animal substances of every description, deprived of life, and in a state of putrefaction, &c. And I cordially agree with the critic on my letter to Dr Haygarth, when he says, “we are more inclined to think that there is a specific contagion, distinct from mere putrefaction, and which, perhaps, is not cognizable by any of the senses.”—Crit. Review, July 1809. The question of M. L. B. Guyton Morveau is unhappily still unanswered; and I fear I may add ever will remain unanswered—“What then is the nature of those invisible corpuscles which, like organic beings, possess the power of reproduction, and of assimilating to their own essence, every thing with which they come into contact, and which seem to assume *life* but for the purpose of propagating *death*.”—Treatise, &c. translated by Dr Hall, p. 2.

† This fact has not escaped the observation of Dr Rush of Philadelphia. “The army (says he), when it lay in tents, was always more sickly than when it lay in the open air; it was always more healthy when kept in motion, than when it lay in an encampment.”—See Mem. of Literary and Philosophical Society of Manchester, Vol. II. 508. My own experience, in the course of a very extensive military range, gives most ample confirmation to the Doctor's observation.

\* Quem qui seire velit, Lybici velit æquoris idem  
Discere quam multæ Zephyro turbentur arenæ.—Virg. G. ii.



prevent or avoid this concentration of putrid animal miasms, are healthy; a further proof is, that a change of encampment, terminating the action of the cause, the effect instantly ceases, nor does it again appear, unless there should be a renewal of the circumstances which gave rise to it. Another, and still more cogent proof is, that when a regiment has the good fortune to be commanded by an enlightened, active, and humane officer, whose care and diligence are directed as much to the purification of the air, and consequent preservation of the health of his men, as to their military discipline,—no such fevers, often no disease, are generated:—or if sickness has prevailed, it is displaced by health. One of the most remarkable examples of this I ever met with was exhibited by two commanding-officers of the 45th regiment, when stationed at Grenada in the year 1788. One, by the most criminal neglect, permitted the accumulation of every description of filth, but more especially of putrid fragments of animal substances; used no means to prevent the universal and excessive use of the worst kinds of spiritous liquors; instituted no regularity in exercise and parade duties. He saw the necessary consequence, (a fever of a malignant and fatal nature, but not contagious; arise in the barracks of the soldiers), with a stupor, a perversity, a malignity which cannot be reconciled with duty or humanity. During the greatest prevalence of this fever, a superior officer, of a description, in all respects, opposite, arrived from Europe, and superseded the former. The utmost attention was paid to cleanliness, ventilation, exercise, and more especially to regulation of diet, and the removal or destruction of fragments of putrid animal matter, the refuse of their rations. A new and most gratifying scene took place:—the fever ceased, and health and comfort assumed its place. The officer whose humane and active exertions effected this sudden and salutary change, was Lieut.-Colonel Oliver Nicolls, now a lieutenant-general.

It is, I imagine, doubtless owing principally to this concentration of the principles of the effluvia proceeding from putrefying animal substances, into a virulent poison, that armies were so often destroyed by malignant fevers, generated on, and limited to, the spot. Unacquainted with economy, prodigal when in plenty, prodigious accumulations of putrid animal matter surrounded the irregular soldiers of the darker ages, in their stationary encampments: famine often resulted, and lent its desolating aid. The histories of the campaigns during the darker and more barbarous ages, often record such fatal catastrophes, and even the 15th, 16th, and 17th centuries, were not sufficiently enlightened to prevent them. Ramazzini, who took his information from the most



most celebrated and best informed physicians of his time, does not hesitate to acknowledge and lament this\*.

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\* *Profecto nostrâ hac ætate, nullum calamitosius vitæ genus excogitare licet quam illud, quod milites, gregarii saltem, ducunt tum in acie, ac arcium oppugnationibus, tum in hybernis quoque, sive ob neglectam militarem disciplinam, cum non eâ diligentia, ut olim, bonæ militum valetudini consulatur, — nihil tamen æque morborum phalanges in castra invehere posse crediderim, quam castrorum sordes, et neglectam munditiam. — Ab iis medicis qui magnos exercitus comitati sunt, accepi, tam gravem mephitim in castris interdum per ætatem persentiri, ut nullum antrum charondum gravius fœteat, &c. (De Morbis Castrensibus).* The frequency of what is called, in the records of the ancient and middle ages, plague and pestilence, arose evidently from three causes:—The imperfect state of agriculture giving rise to famine; the prodigious extent of marshes, which were not drained until the 17th century in general; and the almost constant warfare the unsettled and barbarous state of society gave occasion to. The last, indeed, may be considered as the agent which called forth the two first, and presented subjects to be acted on by them. Another circumstance may be considered as contributing to this general effect; the great heats experienced during summer, and the excessive cold in winter, before clearing the surface of forests and draining the marshes, had produced a more equable temperature.

The words of Holinshed are curious:—"For while their minds changeth from obedience to unrulinesse, and turneth itself from honeste to wildnesse, from small fare to spoile of vittels, and from beds in the night to cabins, and from sweet houses to *stinking camps*, it must needs be by changing of affections which alter the bodie, and by using of rest that filleth the bodie; and by glutting of meals which weakeneth the bodie, and with cold in the night which accraseth the bodie, and with corrupt air which infecteth the bodie, that there follow some grievous tempest, not onlie of contagious sicknesse, but of present death in the bodie."—Chronicle, p. 1049. See Mr Grose's *Military Antiquities*, Vol. I. 266, 268, where quotations from Sir James Turner's *Pallas Armata*, and Sir John Smythe's *Discourses*, throw much light on the economy and management of the English armies of the 15th and 16th centuries, more especially on the provisioning (proviand or provand) of the soldiers. It was often the false economy of our princes of those periods to give the soldiers provisions instead of money as pay, the consequence of which was frequently fatal; for "they must be contented to march sometimes one whole week and scarce get two pounds of bread all the while, and their officers as little as they. I have known," continues Sir James Turner, "captains give a very great demonstration of their patience and their affection to their master's service, by satisfying their appetites with water and very coarse bread, one whole summer and part of the next winter." The payment in provand furnished ample room for the exercise of a peculatory and avaricious disposition, the bane, alas! of our armies in all periods of our history. Sir J. Smythe says: "But such covetous men of warre, under the pretence, (as though their souldiours had beene either naturele fooles or children) did, contrarie to all militarie order, put the greatest part of their souldiours pay into their own purses, allowing them great scarcity of provand. By which means it came to passe, that diverse thousands of their souldiours, partly by hunger and partly by evil lodging, and altogether by the small care and misuse of our such men of warre, did perish." Of the expedition under the Earl of Leicester, in Queen Elizabeth's reign, he says: "Scarce the fortieth man escaped with life



But we are frequently told by medical writers, more especially system writers, that the fevers which often desolate armies, have their cause in the effluvia proceeding from the putrefaction of the unburied bodies of men and horses slain in battle. This I am very much inclined to believe is a mere theoretical idea; and I believe so principally for two reasons: 1. We have innumerable instances of prodigious slaughter in battle, without this effect being the consequence to the living. 2. In all instances adduced in support of this opinion, we find most powerful, acknowledged, and indisputably ascertained, morbid causes existing, fully sufficient to this effect, without resorting to, at most, a doubtful cause. If any direct unequivocal proofs had been given of the efficacy of these effluvia in producing the typhus gravior, or the various species of tritæophya, I should be ready to submit to an opinion founded on such premises: but I believe there are no such direct unequivocal proofs on record. On the other hand, there is always an heterogeneous assemblage of causes presented to our notice:—the simplicity, the homogeneity, if I may thus apply the word, of nature, is not attended to; the precise cause of a precise effect is not given: but several causes are employed to produce

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life from this cause.” What a lesson to the government of a country!—It is a most singular fact, that the military codes for the government of the English armies, called “the constitutions, the charters, statutes, ordonnances, and customs for the warre” of the 12th and 13th centuries, exhibit an infinitely greater degree of attention to the religious and moral conduct and health of the soldier than those of any subsequent period. There is a sense of duty to God and to society, we should not expect in ages perhaps falsely called barbarous. Mr Grose has given some excellent specimens of these regulations, which do honour to the prince or the minister who enacted them, Vol. II. 57-107. These very regulations, however, bear on the face of them abundant proof of the extreme irregularity of our armies of those times, whose constitution and duration were loose and short, and whose services were feudal. They likewise give ample confirmation to the representation of Holinshed, and the excessive anxiety concerning the supply and application of provisions, and more especially the waste which constantly accompanies an uncertain and irregular issue of them, and manifest the filthy state of their camps and quarters. Even in the reign of Henry VIII. when the encampments were extremely magnificent, (Ibid, p. 205) there is a clause in the military code of that king, which proves that “Carryn (carrion), filthe, and other unwholesome or infective stinkinge thinges,” were continually present in the camps and quarters, (Ibid. 97). The astonishing wretched state of the army medical department of the earlier periods of our history, must have also largely contributed to the distresses and mortality of their armies, notwithstanding the custom which generally prevailed of discharging a soldier as soon as he became sick. In the reign of Henry V. military surgeons were classed with shoemakers, taylors, barbers, and washerwomen. The pay of a military surgeon in Edward II.’s reign, was 6d per day; in Henry V.’s 1s.; in Edward IV.’s physician 2s. surgeon. 1s. and assistant 6d.; in James I.’s physicians 6s. 8d., staff-surgeons the same, regimental surgeons, 4s. 8d. (Ibid. Vol. I. 272-277).



duce one effect, or several effects are made to proceed from one cause. Seeing no obvious causes in nature for those diseases which spread their baneful influence epidemically, more especially the pestilential, besides the undefined, and, perhaps, undefinable constitution of the atmosphere, constantly referred to, Hippocrates insinuates, that they must be attributed to the wrath of heaven—*simul vero et si quid divini in morbis inest*\*;—an easy mode of removing a difficulty; and indeed such is their obscurity, that we must acknowledge it to be the most obvious—for what elucidation has our boasted knowledge of nature and her operations furnished us, in the investigation of the origin and precise nature of contagion? Galen, however, less scrupulous, or more speculative, imagined, and I have no doubt, believed, he saw these causes in the changes of the seasons of the year (*μεταβολη των αερων*), in the state or constitution of the atmosphere (*εκ της περι τον αερα καταστασεως*), in situations subject to great heat and moisture; and in the inspiration of the putrid miasms, arising either from a multitude of dead bodies left to pass through the natural process of putrefaction, as after battles, or from stagnant lakes and marshes †. Physicians, since the time of Galen, have founded their opinions of the causes of pestilential fevers, on premises as uncertain as those just stated—on premises which their succes-

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\* ἄμα δε και ειτι θειον ενστιν εν τει νεσοισι. Prænot. 1. Edit. Vanderlinden.

† συντελει δετι προς την των ἐρρημενων σπηδωνων νοσηματων γενεσιν ἡχαρα, μαλιστα μεν ει κατ' αμφο δυσκρατος ἐιν θερμωτερα και υγρωτερα καταστωσα— at regio ad dictorum putridorum morborum generationem confert, maxime quidem, si in utroque intemperata fuerit calidior et humidior constituta.—1. Epidem. Comment. 1.

ως τα πολλα δε εκ της αναπνοης αρχεται τε περι ξ αερος υπο σπηδωνωδοις αναθυμιασεως μιανθεντος. ἡ δε αρχη της σπηδονος ἡτοι πληθος τι νεκρων ἐστι μη καυθεντων, ως εν πολεμοις εἰωθε συμπιπτειν. ἡ εκ τεληματων τιναν, ἡ λιμνων αναθυμιασεις ἀρα θερος· ἐστι δ' οτε καταρχει μετ' αμειρος θερμασια τε περιχοντος. Sed magna ex parte (februm pestilentium) incipit ex aëris circumfluentis respiratione putrida exhalatione infecti. Principium autem putredinis, aut multitudo cadaverum est minimè crematorum, quemadmodum in bello contingere solet, aut exhalatio quarundam paludum aut stagnorum æstivo tempore, atque interdum immoderatus calor circumstantis aëris est principium. De Febribus, Lib. i. c. 6. Ed. Lutet. Parisior. 1679. In support of this proposition, Galen makes a most singular misapplication, I apprehend, of a fact recorded by Thucydides in his account of the plague of Athens. The fact is that which relates to the miserable temporary huts, (*καλυβαις πνιγυραις*) or summer-cabins, erected by the peasants for their accommodation, after they had been driven into the city by the Peloponnesians, which became, like the grog-shops in Grenada, a principal means of diffusing the contagion, and not, as Galen represents them, the principal cause of the plague (*αιτια πυρετου γενησομενα*):—for the pestilence had already been introduced, had already prevailed over the city, and these peasants becoming infected, by intercourse with the diseased, rendered the disease still more virulent and general.



sors have proved to be insufficient or incompetent; whilst these, in their turn, have yielded to others equally unsatisfactory. The records, and more especially the systems of medicine, furnish lamentable proofs of this; and the experience of liberal and enlightened physicians warrants the clear, pointed, and comprehensive remarks of the Honourable Mr Boyle, whilst it perceives little room for the admission of that philosopher's own conjecture on the subject. He wishes to take a middle course between supernatural and natural causes, but leaves us as much in the dark as ever, by assigning pestilence to "subterranean expirations." "Those," says he, "that fetch it from the malevolent aspects and influence of the celestial lights, besides that they suppose some things very difficult to be proved, have recourse to agents too remote, too general, and too indeterminate, to be acquiesced in as the causes of such particular symptoms and phenomena, as oftentimes accompany pestilences. And as for those other sects of physicians, that confidently derive the plague, some from internal putrefaction, and others from excessive heats, noisome stinks, corrupt aliments, and such other celebrated causes; though each party alleges plausible reasons for its own opinion, yet their objections against their adversaries are much stronger than their arguments are for themselves. And the learned Diemerbroeck, though his own hypothesis seems to be more theological than philosophical, has much enervated the arguments brought for the several opinions lately named, and by him dissented from." Mr Boyle's sources of information were from "consulting uncommon authors, and asking questions of great travellers and navigators." "By this means I came to learn, that divers great countries are usually free from the plague, that, according to the vulgar hypothesis, ought to be as much subject to it, if not more, than England, France, Italy, and those other parts of Europe and Asia, where that fatal disease rages, from time to time, in the parched regions of Afric, to which the excessive heats would make one expect that the plagues should make far more frequent visits than to our temperate European countries." After enumerating many countries,—Guinea, Nubia, New England, China, E. Indies, &c. which are almost totally exempt from pestilence, he proceeds: "Now, when I consider how vast tracks of land are comprised in those countries, some of which the plague does not at all, and others but exceeding unfrequently, invade; this immunity seems to me very unfavourable to most, if not all, the opinions received among physicians, as also that of Diemerbroeck himself, who derives the plague from a supernatural cause,—the wrath of God against the sins of men. For, in regions of such extent, and divers of them



them very populous, which are seated under very differing climates, and which are some of them inhabited by nations that make war with numerous armies, *fight bloody battles*, leave *heaps of unburied bodies exposed to the putrefying heat of the sun*, are sometimes forced, as well as others, to live upon very unwonted and unwholesome foods;—in these regions, I say, it is not imaginable but that great intemperatures of the air, especially in point of heat, stench of dead bodies killed in battle, unwholesomeness of aliments, in short all the causes, to one or other of which the several parties of physicians are wont to refer the plague, should be wanting any more than in our Europe; and yet the plague, which is presumed to be the effects of one or other of these causes, is not here observed to be produced.”—See Hon. R. Boyle’s Works, 4to. Lond. 1772, Vol. V. p. 56. This long extract precludes the necessity of further quotation in support of my proposition\*.

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\* The celebrated Stahl accounts for this diversity and instability of opinion: *Dolendum est quod nullus auctor febrium species distinxit, nisi ex præconcepta putredinis et malignitatis opinione, ita ut individuas observatione compertas ad suam speciem, imo, ad genus referre difficillimum est: hoc exinde factum est, quod nullus auctor historiam morbi seponat ab ejus theoria philosophicâ, et semper causam supponat cognitam, atque exinde signa characteristicâ derivare contendat; quo errore nihil pejor in re medicâ.*—Sauvages, Nosol. Meth. Tom i. 301. This is certainly a principal cause of the retardation of pathological knowledge; and yet it is sometimes wonderful to what lengths it may be carried. Nay such has been the prejudices relative to the supposed exclusive agency of animal putrefaction in the production of putrid or pestilential fevers, that some physicians have made dead stranded whales the cause of widely extended pestilence and death. A fact of this kind is stated by Forestus, (*Opera, Lib. vi. ob. i. Sch. fol. ed. Tom. I. 202*). He lays down, as a general principle, that fish dying and becoming putrid in water, “*præcipue in lacubus et stagnis minusque mobilibus,*” first infect the air, and afterwards bring on plague. And this, he says, may happen even in the ocean, if it should throw up on its shores, fish, more especially large fish, “*vivos vel mortuos;*” a singular enough event. He then proceeds to detail the deadly effect of a fish of the whale kind, *ingentis magnitudinis atque portentuosæ molis*, stranded on the coast near Egmont, in N. Holland. We are, however, to take along with us, that Forestus was one of the observers of the “*disciplina astrorum,*” and a believer in the occult causation of diseases; and that he also, like some of the American physicians of the present day, confounds those fevers which are the genuine offspring of marshes with those which proceed more immediately from contagion, and designates them by the general name “*pestis,*” and “*febris pestilentialis.*” This is more particularly remarkable in his account of the endemic fever the city of Delft was annually subject to during the hotter months. This, as usual, he calls “*Pestis,*” but the cause is evidently local, and productive of bilious remittent fever:—“*in loco profundiore sita est (Delft), et aquas non currentes aut fluentes habet: ita ut halitum quemdam putridam, maleque olentem emittant.*” What more is necessary for the production of bilious remittents? and yet this author is often quoted



There are grounds of belief, that even the concentration of the miasms of putrid animal substances, does not give rise to fever, and seldom, if ever, to disease of any description. The following facts certainly militate against a contrary conclusion.

1. In the neighbourhood of Bitton, in Gloucestershire, about a mile from Willsbridge, which was my residence for nearly four years, there is what is called, "a bone manufactory," in which animal bones, after the extraction of their medullary oil by boiling, are distilled, and yield the usual products, muriate of ammonia, and sulphate of soda. From this manufactory, a fætor of the most offensive nauseating nature proceeds, and fills the atmosphere for nearly a mile around, diminishing in strength as it recedes from its source, and in proportion to its dilution or decomposition. The country is thickly inhabited, and near the manufacture itself is the village of Oldland, the population of which is very considerable; yet, in not one instance has this manufacture proved, in the smallest degree, injurious to health. I have frequently visited it with the most complete impunity. For several years the superintendant, Mr Henderson, his wife, and family, lived in a house, having on one side, connected with it, that in which the retorts are placed, and on the other, that in which the bones are boiled:—yet they had every appearance of health, and they assured me they enjoyed it. A more convenient house, on a neighbouring hill, becoming vacant, Mr Henderson rented it for the accommodation of his family. Soon after they began to reside in it, they lost their health, and were, when I last saw them, much inclined to return to their old and stinking habitation. This exemption from disease in the manufactory of sal ammoniac, &c. has been noticed by Morveau and Chaptal. (*Edin. Med. Journ.* Vol. II. p. 295).

2. Between Bristol and Hanham, on the banks of the Avon, is Conham, remarkable for nothing but its having been chosen for the site of an extensive manufactory for the conversion of the flesh of dead animals into a substance resembling spermaceti—a project which has been relinquished several years ago. This being also not very distant from Willsbridge, I made a good deal of inquiry into the result, as far as it affected the health of those immediately engaged in the process, and of the inhabitants of its

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quoted as an evidence of the cause of pestilential fever, (*typhus et typhus gravior*); although there is not a better established fact in pathology, than that pestilence cannot proceed from such a cause. With respect to the putrid whale of Forestus, it is fair to oppose one fact by another; and the authority of Dr Gordon is as good as that of Forestus in the present instance. See my Letter to Dr Haygarth, p. 251-253.



its thickly peopled neighbourhood. The foreman or superintendent, Richard Bolston, residing now at Jeffries-hill near Hanham, has been my principal informant: and his account was confirmed by that of Mr Thomas Pearsall of Willsbridge, and other respectable persons. Bolston was two years employed constantly in this business; and during that time resided in the midst of dead animal bodies, horses, asses and dogs, many of which were left to pass through the natural process of putrefaction. He had three labourers under him, and he declares that neither himself nor any of these men suffered from a moment's sickness, or indeed experienced the smallest inconvenience. Their business was to cut up the carcasses, to strip the muscular flesh from the bones, and to dispose of it first in boxes, perforated for the admission of water, which were afterwards laid in pits filled with water. The entrails and every part not useful to them, were left to putrefy on the surface. The pits prepared for the animal matter thus disposed were seven feet deep, and four broad and long, and each calculated to contain the flesh of fifty horses, besides asses and dogs. An idea may therefore be formed of the immense volume of putrid animal effluvia, enveloping continually the persons of Bolston and the labourers, by being informed that there were six of these pits, and consequently 300 carcasses of horses, and as many of asses and dogs, exhaling in greater or less abundance their offensive miasms. Notwithstanding this, Bolston declares, that although the stench was offensive in the highest degree, yet he and those with him sustained no injury—and to this the inhabitants of the country around bear ample and angry testimony both in relation to Bolston and themselves.

3. Another remarkable fact, well known where the manufactory of refined sugar is extensively carried on—butchers preserve the blood of the slaughtered animals in open tubs, kept in close small shut up houses, sometimes for several weeks, until the quantity required is completed, or until there is a demand from the sugar-bakers for it. It is then, in a putrid state, conveyed through the public streets in carts or drays to the sugar-houses, emitting the most offensive effluvia, and extremely annoying to all those who pass it. It is seldom immediately used by the sugar-bakers, but kept by them in casks in a putrid state, filling the air of the manufactory, and frequently of the vicinity, with its putrid miasms, or what Galen and his followers would call *σπέρματα λοιμικὰ γενησομένα*, the seeds of pestilence. But what is the result to the workmen, or to the inhabitants of the surrounding houses?—nothing inimical to health. This fact exists constantly in the city of Bristol, where in general the streets are extremely narrow, and the houses excessively crowded and ill ventilated—and yet the harmless nature of



of these exhalations may be daily verified—I speak from my own observation, and the experience of the most respectable sugar-bakers. In summer it is more remarkable than in winter\*.

4. Mr Newman, surgeon in Stokes Croft, Bristol, a gentleman of great worth and professional skill, procured for me from his friend Mr Bevington and his brother Mr Newman of Bermondsey in Southwark, the following interesting particulars respecting the leather-dressing business.

“I have just received your letter of the 20th inst. (January 1810), making inquiry respecting putrid, contagious, and low fevers, as affecting the workmen employed by leather-dressers, to which I can give you a pretty clear reply. Our men are generally healthy, and the most so of the labouring poor—many have been in our service and knowledge fifteen and twenty years, and I do not recollect one case of the kind occurring (in our establishment) in London. The first process in dressing is to put the skins

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\* We cannot, in most of the foregoing cases, have recourse to such ingenious calculations as that given by Dr Mitchill of New York, in his defence of the tallow-chandlers and soap-boilers of that city. He estimates the yearly consumption of soap in New York at 364,000 lb.—one third of this quantity is alkaline salt; consequently the potash expended or thrown away is 121,333 lb. or more than 54 tons. See Case of the Manufact. of Soap, &c. p. 60. We must seek for other causes of the exemption which the inhabitants experience from deleterious effect, or at once admit the harmless nature of the prodigious volumes of putrid animal exhalations, which exist in them. In one case, perhaps the most remarkable, the attempt at manufacturing adipocere, it is evident that no alkaline salt of any description could lend its corrective power; therefore, if we suppose any pestilential fumes to arise from these vapours, there was nothing on the spot to prevent the extrication of it. These facts, compared with each other, are very important ones, in whatever way we view them; for if this immense accumulation of alkaline salt cannot be supposed to have any agency in the correction of putrid animal vapours, then all the manufactories from which they exhale, must be admitted as harmless:—if its agency is admitted, then we perceive that the poison possesses within itself its own antidote. Perhaps our safest reasoning on the present occasion might be this. There is a compensation in nature for all necessary evils—and the effluvia, perhaps “*cunctarum exordia rerum*,” of the philosophic poet, proceeding from the process of animal putrefaction, considered so destructive of life, by the unthinking or the speculative, when diffused in the atmosphere, are immediately absorbed by the inhalents of vegetables, or have their nature changed by the attraction of chemical affinity, and the new combinations which thence result.

Haud igitur penitus pereunt quæcunque videntur;  
 Quando aliud ex alio reficit natura, nec ullam  
 Rem gigni patitur, nisi morte ajuta aliena. LUC. i. 263.

So nought can perish, that the sight surveys,  
 With utter death; but nature still renews,  
 Each from the other, nor can form afresh  
 One substance, till another be destroyed. GOOD.



skins into a pit of water to soften them, which is often used two or three times, that is, for two or three parcels, before it is changed, until the stench is intolerable. After this process the skins are struck out over a beam, and hung up, side by side, as close as possible, in a small room excluded from external air, which we term a stove: in this state they remain until they heat and slime, so that we can pull off the wool. The process of putrefaction is here so rapid as to disengage large quantities of volatile ammoniac, affecting the eyes of strangers with tears, and their noses with the most offensive smell. Our men always pull the skins in the stove in cold weather from preference, and are occupied in it a whole day at a time without injury." Another gentleman, a brother of Mr Newman's, concerned in the leather-dressing trade, but not in the same house, in Bermondsey, informs him "that so far from our workmen being unhealthy or particularly subject to fevers, the reverse is the fact—the men employed look generally robust and healthy. In a concern in this line of business of fifty years standing, in which fifty men are constantly employed, the men have been uniformly healthy; and in this a circumstance is deserving of notice, viz. the men who work upon the raw skins, from which there is a constant and profuse exhalation of putrid steams, and those employed at the lime and tan-pits, are equally healthy." Mr Newman the writer of the above, says there are about sixty leather-dressers and tanners yards in Bermondsey, and in them about 700 men are constantly employed.

It may perhaps be objected to this account that the business of leather-dressers in other countries had been represented as extremely unhealthy. Hippocrates is supposed to have meant something of this kind as the cause, when he mentions the case of a person, Philiscus, *residing near the wall*, who died on the 6th day of a malignant fever (Epidemic. Lib. i. s. 3.); for anciently, and now indeed, offensive trades of this kind were carried on in the suburbs, *παρα το τευχος* of cities. This was the case at Rome, beyond the Tiber, and some of the Latin poets have exercised their wit in allusions to it. It is highly probable, however, that the real cause naturally existed in the spot itself set apart for the "sordidiores artes," and that what was attributed to them proceeded from the marshy nature of the soil. Certain it is, without recurring to this explanation, we cannot reconcile Mr Bevington's and Mr Newman's, two respectable living witnesses, with the testimony of Ramazzini and Mercurialis, Martial and Juvenal, as quoted by him; and there is sufficient evidence that the Transiberina Regio of Rome, and the Paduano (once, 17th century, *male sanus, bestiis quam hominibus aptior*) were proverbially unhealthy



healthy from their marshes, and that Bermondsey is not.—See Ramazzini, *De Morb. Artific.* cap. 15.—and Annotat. in Lib. Lud. Cornelii, *Veneti de Vit. Sobr. Commodis*—and de *Virg. Vestal. Valetud.* tuend. *Dissertat* \*.

5. I borrow the following singular fact from the ingenuous and experienced Ramazzini. “In hac civitate (Modena), quæ pro suo ambitu satis populosa est, ideoque domos confertas habet ac præaltas, mos est ut tertio quoque anno in singulis domibus cloacæ expurgentur, quæ per vicos discurrunt. Cùm ergo domi meæ id opus fieret, contemplatus unum ex operariis istis in antro illo Charonæo magnâ anxietate ac sollicitudine opus suum peragentem, miseratus tam improbi laboris, ipsum interrogavi, cur tam sollicitè laboraret, et non pacatius id ageret, ne ex nimio labore in multam lassitudinem incideret, tunc miser ex antro illo oculos attollens, meque intuitus: nemo, inquit, nisi expertus, imaginari potest, quanti constet, plus quàm quatuor horis in hoc loco morari, idem enim est cæcus fieri.—Rursus ab eodem quæsivi, num in faucibus ardorem ullum persentiant, difficultatem aliquam respirandi patiantur, capitis dolore tententur, num odor ille nares percellat; nauseam pariat; nihil horum respondit ille, neque pars ulla in hoc opere mulctatur, præter oculos.”—This account was afterwards confirmed by his observing a number of these people reduced to blindness and beggary. “Oculis tamen solummodo, bellum tam atrox indicunt fœtidæ exhalationes istæ, ac illos acutissimis spiculis sic feriunt, ut illis vitam, id est lumen, eripiant.” Thus, as certain acrid substances seem exclusively to affect different and distinct parts of the body, as cantharides the bladder, the torpedo the nerves—“sic halitus illi ex humanis fœcibus per varios corruptiones gradus trium annorum spatio, talem adsciscant naturam, ut oculos tantùm lacessant, cæteris vero partibus ignoscant.”—(*De Morb. Artific.* cap. 13). This fact is no less important than curious, as it tends to shew the inconsiderate conclusions of some eminent writers respecting the influence of the exhalations of privies on the health of men. Sir John Pringle often attributes the epidemics of camps to this as a cause; but it is fair to believe that he did so, without allowing himself sufficiently to investigate the subject. The tendency of this fact, too, goes to the overthrow of some of the bold, and I am inclined to think, hasty assertions of Dr Miller, relative to the locality of the cause of the pestilential fever of New York in 1805; for what is “the blast of putrid exhalations from the sewer of Burling-slip”  
to

\* My Essay on the Malignant Pestilential Fever may also be consulted with illustrative effect, under the article Martinico, Vol. II. p. 120—123; under St Lucia, *Ibid.* p. 133; under Demeraray, *Ibid.* p. 200.



to the halitus ex humanis fœcibus per varios corruptionis gradus trium annorum spatio" of Modena? (See Ed. Med. Journal, Vol. III. 252.). Now, whether the effect of these exhalations is asphyxia at Paris, according to Sauvages (Nos. Meth. i. 820), or amaurosis at Modena, according to Ramazzini, in either case there is ample proof that they cannot be productive of putrid or pestilential fevers.

6. The spontaneous extrication of putrid vapours from the sepulchral vaults of the cathedral church of Dijon, celebrated for having given occasion to the first experimental essays of oxygenants in the decomposition of putrid and contagious effluvia, may seem an exception. But this, in truth, can be considered only as a mephitic acting on those within its influence, in a greater or less degree, according to its concentration, and producing the usual effect of such effluvia, asphyxia.—What M. de Morveau says of the appearance of a contagious fever in the neighbourhood, as connected with this mephitic vapour, is extremely vague and indeterminate—By sprinkling with a considerable quantity of the vinegar of the four thieves, "the odour of the putrid effluvia was merely masked for a moment, and soon reappeared with its former activity, spreading to the neighbourhood, where the symptoms of a contagious fever began to appear." When the fumigation had been completed, he does not say that this contagious fever had been stopped or prevented—in fact he says nothing about it—he adverts only to the purification of a mass of air contaminated by these mephitic vapours. (See his Treatise on the means of purifying Infected Air, translated by Dr Hall, p. 25-29.—See also Sauvages, Nos. Meth. tom. i. 819.) Ramazzini is by no means satisfactory on the subject, indulging in declamation, and exhibiting no proofs that "post magna prælia commissa, per insepulta cadavera, seu per antiqua sepulchra incautè aperta, diras pestilentias enatas, quæ ingentem populorum stragem ediderint." De Vespillonum Morbis.

7. I shall offer another argument, arising indeed out of established facts, but which may perhaps be considered more curious than essential, more philological than philosophical, more amusing than instructive. It nevertheless possesses great weight as a part of the general argument.

One reason why the Romans made use of the word *lues* to express their conception of a pestilential disease, may have been the opinion they entertained of the infectious nature of the effluvia proceeding from those places where their sacrifices and expiatory offerings of slaughtered animals were made; the word *lues* being evidently a derivative from *luo*, to expiate; and the catena-



tion of ideas was simple and easily formed \*. It is probable, also, that the Greek word for pestilence, λοιμὸς, was formed under the same catenation of ideas, and had its origin from λυω, which bears the same signification as the Latin luo. I am aware that the learned Parkhurst derived λοιμὸς from λελειμμαί (perf. pass.) of λειπω, to fail—(Lexicon, Vol. v. 35.)—but there is not a catenation of idea between the supposed effect and cause—the same affinity does not exist but in a very remote degree. In contradistinction to this supposed source of pestilence, a morbid constitution of the atmosphere, so constantly referred to in Hippocrates and Galen, was called φθορα—an expression as indefinite as the state of the atmosphere it was employed to signify. Other nations, among whom expiatory sacrifices of animals were as frequent and as extensive as among the Greeks and Romans, attached no such idea to the effluvia arising from the putrid remains of the victims. This was especially the case among the ancient Jews. But among them pestilence was denominated by a word which conveyed an idea of the exterminating effect, rather than of the cause or source of the disease, and was evidently connected with the theocracy, and a catenation of idea with the wrath of God. The word *Deber*, in various parts of the Old Testament is applied to pestilence; and indeed I believe is the only word used to signify that malady. In the Polyglotte, the Latin word answering to it in every instance is pestis or pestilentia; the Greek is either λοιμὸς or θανατος †. But that the catenation of ideas which gave

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\* See Gesneri, Thesaur. Ling. Latin.—Lues ab ea vi verbi luo—Lues est diluens usque ad nihil.

† Exod. c. ix. v. 3—Levitic. xxvi. 25—2 Sam. xxiv. 14.—1 Chron. xxi. 14.—2 Chron. vii. 13, &c. Parkhurst translates *Deber*, “the plague or pestilence, which eminently carries off men, or drives them to their graves.” The radix is דבר, to drive or carry off.—See Parkhurst’s Lexicon, Vol. iv. 55.—Calmet, Vol. ii. 370, fol.—See also the Polyglotte Bible for the above, and many other instances. I may here take occasion to remark, that the appropriate meaning of the word “pestilent,” as applied to St Paul by the lawyer or pleader, Tertullus, before the Procurator of Judæa, Felix, appears hence evident. In the original (λοιμὸν) it bears precisely the signification of the Hebrew word; and τὸν ἄνδρα τούτον λοιμὸν, is literally a man who carries off or drives away the Jews from the religion founded on the law of Moses, or a converter. Dr Hammond paraphrases λοιμὸν, dangerous; a very loose version at best.—Acts, xxiv. 5. I find Dr Parr of Exeter, in his excellent Medical Dictionary, and Dr Turton in his Medical Glossary, derive pestis from the Hebrew word פסא, Pasat; a very remote affinity in the meaning, although an analogy in the formation of the words. Parkhurst, Vol. iv. 287, translates פסא, Pasat, to spoil, divest, or ship off, as in Job xix. 9, and xxii. 6, and many other places—also to strip off the skin, to flay, as in Leviticus, i. 6, &c.—also to spoil, pillage, or plunder, as in 1 Sam. xxx. 14. vastavimus—2 Sam. xxxii. 10. spoliandum, &c.—In the Polyglotte, the word is pointed with



rise to the Greek and Latin appellations of pestilence was the act of a lively imagination, and not the offspring of established premises, is evident, not only from the difference of result among the Jews, but among infinitely less refined, and, if possible, infinitely more cruel nations. Among the Jews, I believe, there is no instance of pestilence proceeding from any other cause but the wrath of God, as a punishment for disobedience; nevertheless, there has never been a people, since the creation of the world, who have been engaged in more bloody, and literally exterminating wars; and who have, from their uniform practice of leaving the dead of their enemies to be devoured by wild beasts, been more exposed to the supposed pestilential influence of the exhalations from animal bodies passing through the natural process of putrefaction. From the cause to which pestilence was often attributed by the Greeks and Romans, the emanations from putrid animal substances, it could not proceed among the Jews, at least as far as these emanations were connected with their sacrifices;—for it was a law in the Mosaic code, that no part of the victims should remain unconsumed by the evening of the day on which they were offered. This is evinced by the detail of the sacrificial ceremony in Leviticus. The victim was burnt (chapters i. iii. and iv.), or ate by the priests (c. vi. 10. c. vii. c. x. xii. &c.) Hence the appellation *Deber* had peculiar propriety and force of signification.

Clavigero, on the authority of Torquemado, says, that at the dedication of the great temple of Mexico, anno 1486, 72,344 human beings, prisoners taken in war for the purpose, were sacrificed to the Mexican gods; and that a petty king or lord, about the same time, in imitation of his master the emperor, sacrificed many thousands on a similar occasion. On the erection of the great altar at Mexico, more than 12,000 were offered up:—and the annual average of human creatures thus disposed of

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with the vowel points; and in no instance, I believe, is it used to signify pestilence. I apprehend that, if the word has ever been used in that sense, it must be figuratively—indeed, in the authorities I have consulted, there is not the most distant allusion to this word being applied to pestilence. See Avenarius's Lexicon, Heb. ed. Wittenburgæ, 1589, p. 646. It is probable, therefore, that *Pasat*, being considered the radix of *Pestis*, is only an ingenious etymon, without authority to support it. I say this, however, with all possible deference; and after consulting various respectable authorities, both written and living, which incline me to believe that the true, and perhaps only Hebrew word for *Pestis*, is *Deber*. Calmet, indeed, expressly says, "Pestilence answers to the Hebrew word *Deber*, which properly signifies the plague, and which is extended to all other epidemical and pestilential diseases, as murrain, Exod. xi. 3. &c." Vol. ii. 370. folio.



of, amounted to 20,000, besides a prodigious number of quadrupeds and birds. Notwithstanding this dreadful waste of human blood—and notwithstanding the horrible stench always present in this quarter of Mexico, the diseases, among an immense population, some say six millions in the city alone, were trifling, and proceeded almost altogether from marsh miasmata. The bodies of the victims were precipitated to the bottom of the steps of the altar, there to putrefy; or were sometimes ate by the Mexicans—and a pond of water, situated close to the great temple, was continually tinged with the blood of the sacrifices. (See History of Mexico, vol. 1st, p. 201, 232, 281, 426. See also Herrera, decade iii., c. 16.; Prevost's Voyages, &c.) The prodigious sacrifice of peace-offerings, made by Solomon at the dedication of the temple of Jerusalem, may be compared, 1 Kings, viii. 63.

The annals of Dahomy furnish numerous illustrations of the foregoing remark,—a nation whose kings delighted in blood, who wanted heads, not slaves to garnish their palaces continually stained with human gore, and whose “annual customs” presented, to the terrified European many thousand human beings, sacrificed to the manes of their ancestors—a barbarous oblation, founded on the wildest and most savage superstition, denominated by them, “the watering the graves of the deceased royal family.” There are some remarkable instances of the savage cruelty of these natives of Guinea, given by Governor Dalzel, in his History of Dahomy—in which, if pestilence could be the produce of the putrefaction of animal bodies, we should expect to hear of the most direful pestilential epidemics—but in which no such result is even noticed.—“It being now noon, they sat down to dinner on the ham and fowls they had brought with them; but were so annoyed by flies, they could scarce put a morsel into their mouths, without taking in some of these vermin with it. They little thought whence this nuisance proceeded, else they would have made a much shorter dinner; nor was it till about 3 o'clock, when, being desired by a messenger from the great captain, to come to the king's gate, that on their way they perceived, with no small degree of disgust and horror, two heaps of dead mens heads, piled up on two large stages, and covered with swarms of their late visitors, the flies. The interpreter told them, “they were the heads of four thousand of the Whydahs, who had been sacrificed by the Dahomans to their god, about three weeks before, as an acknowledgment of the great conquest they had obtained.” The king of Abomey, Ahadec, lived in a kind of charnel-house, yet was healthy, and 70 years old when he died. Dalzel thus describes this singular palace: “The author had once an occasion  
to



to pass the limits of the courts already described, when king Ahadee was sick, and would see him in his bed-chamber. This was a detached circular room, of about eighteen-feet diameter. It had a thatched conical roof; the walls were of clay, and white-washed within. There was a small area before it, formed of a wall about three feet high, the top of which was stuck full of *human jawbones*; and the path leading to the door was paved with *human skulls*,—the area within was also paved with skulls, which I understood were those of neighbouring kings, and other persons of eminence and distinction, whom having taken prisoners in the course of his wars, he had placed there, that he might literally enjoy the savage gratification of trampling on the heads of his enemies\*.”

8. The Greeks and Romans were remarkable for the order and cleanliness of their camps, for their selection of the articles of the soldier's diet, for the salutary distribution of their exercise and rest, and for the energy of their military discipline; and we accordingly find, that their armies enjoyed a proportional degree of health†. When, therefore, we read of any remarkable epidemic in their armies, we shall always, I imagine, find that they were more attributable to local causes than to the neglect of proper management;—still less to the adventitious one, supposed to arise from the effluvia of animal bodies passing through the natural process of putrefaction. This was remarkably exemplified in the army of Marcellus at Syracuse; for although Livy assigns their comparatively superior health to their being more accustomed to the  
attributed

\* See A. Dalzel's Hist. of Dahomy, 4to, 1793, Introd. 14. 2. Hist. 21, 31, 32, 40, 148, 220, &c. Adahoonzu's apology for the annual customs is curious. How close is the affinity between the manners and customs of all barbarous nations! The watering the graves of their ancestors of the natives of Guinea, is, with the exception of the funeral pile, precisely

————— inferias quos immolet umbris,  
Captivoque rogi perfundat sanguine flammæ. Virg. Æn. 10. 519.

The Dahomans act on the same principle which influenced Achilles, when he sacrificed twelve Trojans at the funeral of Patroclus (Il. 23.), and Æneas, when he offered up eight youths to the manes of Pallas. Nor indeed was the principle changed in after times, when the Romans substituted the gladiatorian contests, (*munera gladiatoria*) around the funeral piles of those they were inclined to honour, for these inhuman sacrifices—it was only a refinement of the Dahoman customs. See Livy, Valer. Max. &c. as quoted by Kennet in his Rom. Antiq. 271. Ruæus's ed. of Virgil, in Æn. x. 519. See also Justin for the human sacrifices of the Carthaginians; Dionysius for those of the Gauls; Tacitus of the Germans; and Potter's Antiq. of Greece, Vol. i. 218.

† See Vegetius de re Militari, passim. Kennet's Rom. Antiq. p. 212-219.—Livy, Lib. i., &c.) Potter's Antiq. of Greece, Vol. ii. p. 72.



attributed morbid causes than the Carthaginians, yet it is much more probable that this proceeded from the care and attention of the commander, and the existing rules of discipline and management. For 1st, It was a calamity felt by both armies;—2d, the season was autumn;—3d, the ground on which they lay was, in its nature, marshy and unwholesome, but much more so on the outside of the city than within;—4th, the heat was intolerable;—5th, although Livy seems inclined to attribute the mortal nature of the distemper, latterly, to the putrefaction of the dead bodies, which they would not at last be at the trouble of interring, and which consequently lay scattered over the ground in the view of the survivors, who were in constant expectation of a like fate; yet he removes the impression of this opinion, by informing us, that the distemper raged with much greater violence and fury in the Carthaginian than in the Roman camp; because, as he before observed, the nature of the ground there was infinitely more unwholesome, and because the Romans, by lying so long before Syracuse, were become more hardened against the air and water—*diu circumsedendo Syracusas cœlo aquisque adsuerant magis*—by which we are doubtless to understand the exhalations from, and the water of, the marshes;—6th, the contagion which took place might be clearly enough accounted for in two ways—the prodigious accumulation of sick in their hospitals, and their consequently crowded situation, of which, contagion is the invariable attendant in such circumstances—*curatio ipsa et contactus ægrorum*—or by the previous existence of pestilential infection in the Carthaginian army, from whom it might be readily conveyed to the Roman\*.—And finally, habit, seconded

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\* The frequency of plague at Carthage, furnishes us with room for probable conjecture, at least, that their armies frequently or generally carried fomites imbued with contagion with them in their invasions of Sicily—a conjecture supported by the authority of Dionysius, Diodorus, and Justin. Hence the Romans, under the Consul Marcellus, not having suffered by disease to any extent, before the arrival of the Carthaginians, is easily accounted for. The melancholy, but very interesting history of this epidemic, which proved so fatal to both armies, is contained in Lib. xxv. c. 26. of Livy. “*Postremo ita adsuetudine mali efferaverunt animos, ut non modo non lacrymis justoque comploratu prosequerentur morbos; sed ne efferrent quidem aut sepelirent—jacerentque strata exanima corpora in conspectu similem mortem expectantium; mortuique ægros, ægri validos, cum metu, tum tabe ac pestifero odore corporum conficerent,—multo major tamen vis pestis Pœnorum castra, quam Romana, (diu circumsedendo Syracusas, cœlo aquisque adsuerunt magis) adfecerat,*” &c.—I may here observe, that the “*jacerent strata exanima corpora*” here mentioned, could not be more productive of pestilence, than the “*four thousand heads of Whydahs piled on stages,*” related by Dalzel—or the 8000 dead bodies of soldiers, and



seconded by temperance, an antiseptic diet, which the Romans constantly used, regular exercise and strict discipline, might counteract the effects of marsh miasmata, as we frequently see they do; but certainly could not oppose any effectual barrier against the morbid action of the effluvia of putrefying dead animal bodies, if morbid action could take place in such circumstances as the historian represents them. These remarks derive much support from what happened to another Carthaginian army before Syracuse, 185 years before the capture of it by Marcellus. The causes of the epidemic on this occasion, as described by Diodorus Siculus, are similar, as far as these could proceed from local circumstances—there is a difference, inasmuch as the malady, described by Diodorus, was attributed to imported pestilential infection. The prevailing opinion at the time (B. C. 397) was, that it was a punishment, inflicted by Ceres and Proserpine, on the Carthaginians, for their having plundered the temple of these deities; but the historian immediately adds—*tum ad numinis divini pœnam, hoc etiam, quod multa hominum millia unum in locum convenerant, ipsumque anni tempus ad morborum incrementa efficacissimumque erat, et quod ætas illa ardores insolitus habebat. Locus etiam ipse causam ad hoc præbuisse videtur ut calamitas superaret. Nam etiam Athenienses in iisdem antea castris (B. C. 415.), fœda strage morbus absumerat, propterea quod locus ille palustris et concavus exstitit. Principio enim ante solis exortum, quod frigida ex aquis aura extraharet, horror corporis percellere mox per meridiem æstus suffocare—(Diodori Siculi, lib. xiv. Wesseling's ed. Amst. 1746, tom. i. 697.)* The historian, in the subsequent paragraph, informs us, that the disease originated in Africa—*ἡψατο μὲν ἐν ἡνόςθ' πρῶτον τῶν Λιβυῶν*—but that it was augmented after its introduction,—*ex insepulorum fœtore et paludum putrefactione (δία γὰρ τὴν τῶν ἀδαπτῶν δυσωδίαν, κ' τὴν ἀπὸ τῶν ἐλαῶν σπηδεῶνα)*—The principal symptoms are those of marsh fever. At the commencement, a catarrhal affection, presently succeeded by swellings of the neck, pains in

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a greater number of servants, peasants, waggoners, women and children, and horses, which Diemerbroëk mentions as having lain in a putrid state for a considerable length of time after battle—anno 1642, in agro Juliacensi maxima strages facta est, et ad minimum 8000 militum occisa fuerunt, præter majorem adhuc famulorum, &c. numerum—corpora inhumata sub diu computruerunt, nulla tamen pestis insecuta est.—Diemerbroëk de Peste. I feel particularly gratified in perceiving my sentiments on this interesting subject are, in all respects, correspondent with those of the ingenious translator of M. de Morveau's treatise on the means of purifying infected air, from whose note, p. 93, I have borrowed the foregoing extract from Diemerbroëk.



the lumbar region, dysentery, and a pustular eruption all over the body, (φλυκταίνας περὶ τὴν ἐπιφανείαν ὅλην τε σώματι). The disease, however, seems to have been contagious—adde quod omnes, qui ægrotis assidebant, eodem modo corripiebantur, (ὡς γὰρ οἱ τοῖς καμύσι παρέδρευόντες ἐνεπιπτον εἰς τὴν νόσον ἀπαντες). But if we fall into the belief of the historian, that the disease originated in an imported infection—a belief sanctioned, indeed, by the frequency of the plague at Carthage (see last note),—we shall have a further proof of the existence of an hybrid-fever, (see my Letter to Dr Haygarth, p. 136); for we cannot suppose, that the effluvia of the putrefying dead animal bodies possessed any efficacy in giving it this mixed character, because the disease existed, and prevailed extensively, before any such supposed cause could have existed, far less operated; and because precisely the same circumstances, imported infection and marsh miasmata, most fatally prevailed only 17 or 18 years before, (B. C. 415.) among the Athenians, under Alcibiades and Nicias. I may here observe, that this very curious fact presents a most forcible argument in support of the opinion, that a plague or a pestilential malignant fever actually prevailed in Athens, and originated in imported infection:—for the expedition under Alcibiades and Nicias took place not long (only eleven years) after the last record we have of that epidemic at Athens, (B. C. 426)\*. And we know from very recent experience, that the lapse of several years, and even the most assiduous employment of every means of eradication, are not sufficient to extirpate wholly the seeds of pestilence, once they have been permitted to take firm root in a city, (see my Letter to Dr Haygarth, p. 192).—But whether this application of this fact is admitted or not, yet the fact itself, supported as it is by the joint authority of Diodorus and Thucydides, establishes at least the foreign origin, probably African, of the pestilence of Athens, and seems to preclude all further doubt on that hitherto disputed point. The co-existence of the same calamity in Persia further strengthens this conclusion; at all events, however doubtful this last fact may be considered †, it proves to us, that a disease,

ease,

\* “In the beginning of winter (B. C. 427), the plague broke out a second time at Athens, not that during this whole interval of time it had wholly ceased, though its rage had very much abated. But now the mortality began again, and continued not less than a year.” Smith’s Transl. of Thucydides, B. iii. M. de Rollin makes it still later, B. C. 424.

† Whatever opinion may be generally entertained of the Epistles of Hippocrates, in which this fact is mentioned, and which are the chief authority for it, it is certain that many eminent men have not hesitated to admit their genuineness.



ease, marked by precisely the same distinguishing symptoms, was almost universal at the same period of time, a circumstance which could not be attached to a disorder whose causes were local. The application of this to the pestilence which has lately ravaged the West Indies, the North American States, and occasionally some cities and fortresses of Europe, is obvious. Mr Swinburne and Mr Brydone bear testimony to the unhealthiness of Syracuse. The former observes, that “in summer, the marshes at the head of the port exhale vapours that infect the air, and endanger the lives of the inhabitants. The case must have always been the same. In these fens, the whole Carthaginian army, that came to rescue Syracuse from the Romans, perished of malignant fevers, not one single man escaping.”—*Travels into the Two Sicilies*, Vol. ii. p. 342.

9. In modern times, the epidemics of armies may be almost uniformly referred to the same causes—marsh miasmata, inclement seasons, privation of necessary food, relaxed discipline, and excessive heats in camps, the latter predisposing to the action of the former; and to the crowded situation of the sick in hospitals, and of the healthy in transports and barracks. I say *almost* uniformly, for there are undoubtedly very remarkable and most fatal instances of epidemics arising from an imported infection, as was unhappily manifested in the armies of Sir Charles Grey and Sir Ralph Abercromby, in the windward West India islands; in the army

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ness. Thus Suidas says, *εὐτὸς ἐγράφε πολλὰ, καὶ πασὶν ἐγένετο διαδηλὸς ὄστρο καὶ ποικίλῃ Περσῶν βασιλείᾳ, τοὶ καλλυμένοι Ἀρταξερξῆσι, γραφαὶ Ἰσταγῶν. τῆς τε ἀνδρῶν σοφίας δεοίμενοι.* He then quotes the letter. Suidas in Hippocrate. It has been said, that the existence of Suidas himself is somewhat uncertain. I satisfy myself, however, with the reasons which his editor has considered as sufficient for the establishment of the fact, that he did exist, and flourished in the 10th century—See Preface to Kusterus's ed. Bartholemy admits both the authenticity of the Epistles and the existence of Suidas.—*Trav. of Anacharsis*, Vol. i. 164. In the epistle of Artaxerxes to Pætus, he says, *morbus pestilens appellatus, invasit exercitus nostros*—and, from the earnestness with which he calls on him for assistance, it is evident the necessity must have been urgent, and the disease till then unknown in Persia. The expressions are strong—*ἐπὶ πολέμῳ ἡμεῖς, πικρῶν ἡμῶν, non belligerentes debellamur—ἐπιβουλήν ἡμῶν consilii inops sum.*—The answer of Hippocrates to the Præfect Hystanes, although illiberal in one respect, is truly national and patriotic—*Persarum autem divitiis uti, fas mihi non est; neque barbaros homines a morbis liberare, qui hostes sunt Græcorum.* In the decree of the Athenians, respecting the services of Hippocrates, they mention the fact—*quando etiam peste, a Barbaris in Græciam proficiscente.* It is also mentioned in the speech of Thessalus, the son of Hippocrates, to the Athenians, *ἡμῶν πρὸς τὴν οὐκ ἐκ τῆς βαρβαρίας.* (*pestis ex Barbaria adflueret*). Hipp. Oper. omnia, ed. Vanderlinden, Tom. ii. The fact is stated by Thucydides—*et in magnam partem regionis regis Persarum.*



army of St Domingo, and in the garrison of Gibraltar—(see my Essay on the Malignant Pestilential Fever, vol. i. 203-238, and 450.; vol. ii. 116, &c.; and Letter to Dr Haygarth, appendix). Sir John Pringle's excellent treatise on this subject, furnishes ample proof of my general proposition, and precludes any necessity for adducing facts in support of it here. I shall, therefore, only notice the epidemic of Warsaw, because it was expressly assigned to the influence of the effluvia of putrefying dead bodies, and to the employment of carrion or putrid flesh as food. Sauvages thus describes, from Dr de Hahn, (*Journal de Medicine*, December 1757) the causes of this fatal epidemic—"Morbus epidemicus inceptit Februario, post famem quâ pauperes morticina putrida vorabant, post cædes belli, aëre cadaveribus insepultis infecto, post animi pathemata ex frustrata messe, aliisque ærumnis, adde quod nullo vento expurgata fuerat dudum atmosphaera." (*Nosolog. Method. tom. i. 334. Tritæophya Vratislaviensis*). That famine is often the precursor of pestilence, is an observation justified and sanctioned by the experience of all ages\*; but whether it is so by the nature or quality of the food used in such deplorable circumstances, or by the extreme debility consequent upon the privation of the necessary quantity for the support of life, seems to admit of little discussion, although it has been subjected to much. For we know with certainty, that epidemics, most fatal epidemics, have proceeded from privation, not deterioration of food. Bengal has furnished one of the most remarkable instances of this, in the year 1770;—the natives perished by thousands from the dearth of their accustomed food, rice; their religion prohibited the use of animal food in any state or shape; and we therefore can assign the mortality, not to the nature or quality of their food, but to privation of the necessary quantity of it. On the other hand, we know, with equal certainty, that some carnivorous animals, nay, that some savage or half-civilized nations, select for food, carrion (*morticina putrida*), or the putrid flesh of animals, which have been slaughtered or killed in a healthy state, not destroyed by disease, with impunity— with nutritive effect. Spallanzani furnishes a remarkable proof of this. "I brought a pigeon," says he, "to eat not only fresh flesh, but such as was foetid, and even completely putrefied. The bird at first absolutely refused it, and I was obliged to force it into the stomach: for some days, it suffered from this treatment, and became evidently leaner. But by degrees, nature became inured

\* αὐτῆκα γὰρ λιμὸς ἐστὶν—quare statim ubi fames molestat morbus sit.—Hipp. de Flatibus.



inured to the food, and the pigeon, stimulated by hunger, took it spontaneously, till at last it recovered its plumpness; and now its appetite for tainted, was as keen as it had been before for sweet meat. We may learn from this instance," continues he, "that custom is capable of changing disagreeable, and even noxious food, into good nourishment." He farther observes, that besides many loathsome insects which delight in corrupted animal substances, there are many birds, the crow, the kite, the vulture, &c. and quadrupeds, the chacal, the hyæna, &c. that seek tainted flesh, "while other animals fly the miasmata that arise from bodies in such state, these seek and are guided by them to their abominable repasts." (On Digestion, Dissert. vi. Eng. Transl. vol. i. p. 283-288). Mr Paterson's account of a new tribe of Hottentots is very much in point. He says their living is in the highest degree wretched, and they are the dirtiest of all the Hottentots. They feed upon a whale or grampus, accidentally cast on shore, as long as it lasts, and even when it is reduced to so putrid a state as to become in the highest degree offensive. They besmear their skin with the oil, by which means they smell so exceedingly rank, that their approach may be thus perceived before they come in sight, (Encycl. Britan. Hottentot). Mr Forster, describing the Kalmuck Tartars, says, "there is not perhaps on the face of the earth, a human creature who lives on coarser fare, or to a civilized people, more disgusting, than a Kalmuck Tartar. ---Raw putrid fish, or the flesh of carrion, horses, oxen, and camels, is the ordinary food of the Kalmucks; and they are more active and less susceptible of the inclemency of the weather, than any race of men I have ever seen." (Journey from Bengal to England, p. 258)\*. Hence then, as Spallanzani justly concludes, it

\* So just is the observation of Lucretius:

Nec refert quidquam, quo victu corpus alatur  
 Dum modo, quod capias, concoctum didere possis  
 Artubus, et stomachi humectum servare tenorem. Lib. iv. 634.

For nought imports it, what the food employ'd,  
 If but the stomach into genial tides  
 Concoct it sole, and pour through every limb.—Good.

Cook (3d Voy. Vol. ii.) Dixon (Voy. p. 173.) and La Perouse, (Voy. Vol. ii. 134.) all agree in their description of the astonishing filth of the native Indians of Port St Francis, on the north-west coast of America. La Perouse says, their cabins possess a nastiness and stench, to which the den of no known animal in the world can possibly be compared. They never remove more than two steps for the performance of any necessary occasion; and during a meal, they retire for this purpose only four or six feet, and take their places again. Cook is still more explicit: "They dry their fish within doors, gut them there, and these,

with



it appears that the various classes of animals, and man among the rest, in an healthy state, are endowed with the power, not only of checking the putrefaction of substances lodged in their stomachs, but also of correcting them when already putrid. The inference which, I apprehend, may be drawn from these remarks and facts, is, that the flesh of slaughtered animals, or animals which are not killed by disease, rendered putrid by the usual natural process in contact with atmospheric air, does not morbidly affect the system of living, healthy animals, which from choice, accident, or necessity, make it their food; and that consequently, the *morticinia putrida* of Dr de Hahn, does not seem to have been the cause of the pestilential fever of Warsaw, described by him. What then were the probable causes of it? Modern travellers have happily, but undesignedly, explained the mystery.---The explanation is found in the crowded and wretched population, in hovels where external air in winter has no access, and where respiration consumes the vital energies of the air, thus confined within narrow and close limits. This, joined to privation of the necessary quantity of food for the support of life, and the distress of mind consequential upon the disappointed hope of an abundant harvest, and the horrors of a cruel warfare, was abundantly sufficient for the production of a fatal epidemic pestilential fever, even without resorting to the local circumstances of the city, from which we should expect an annual destructive marsh fever\*.

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with the fragments of their meals, and the addition of all other sorts of filth, lie every where in heaps, and are never carried away. In a word, their houses are as dirty as hog-sties." And yet these people seem to be acquainted with some of the more necessary arts of civilized nations, and enjoy uninterrupted health. To what mischief, to what pestilential calamities would this

———— semperque recenti  
Cæde tepibat humus————

give rise to in the United States of America!—But if man is the child of habit, then the den of Cacus, to the Indians of Port St Francis, is the Temple of Hygeia, and to the inhabitants of the N. American States, cleanliness and decency the source of pestilence!

\* Mr Wraxal gives a most deplorable account of this city. It unites the extremes of civilization and barbarism, of magnificence and wretchedness, of splendour and misery. Prince Radzivil, one of the greatest Polish noblemen, when coming to court in his coach, drawn by the finest set of horses in the kingdom, so completely stuck fast in the mire, at a hundred yards from the royal palace, as to make it necessary to take him out and carry him thither in the arms of his servants." Warsaw was unpaved before 1763,—and "in front of Stanislaus's Palace, so indecently neglected are the sewers, that the smell is pestilential." The people accord too well in their appearance with the aspect of every thing



10. Another argument arises out of a very curious and well known, but imperfectly understood fact, in the history of pestilential fevers. Did these fevers proceed from any but one certain undeviating cause, of the true nature of which we know almost nothing, we should find them deviating in their character, according to the diversity of cause. We see indeed, an hybrid pestilence, i. e. a pestilence whose type is remittent, from a concurrence, in the same person, of its peculiar cause and marsh miasmata;—but where that peculiar cause exists not, although the effluvia of putrid animal matter may be present concurrent with the miasmata of marshes, these miasmata never fail to produce those fevers which are their pure and defined offspring— but here contagion has no place.

In those instances of plague or other pestilential fever, in which the contagion is resisted by the constitution of the person exposed to it, this effect is produced by something in the system of that person which is capable of decomposing the virus, and of entering into new combinations with the constituent principles of its basis. This is supported by experience and observation; and is illustrated by what we almost always see happen to such persons under a new arrangement of circumstances. Let persons thus exposed to pestilential contagion with impunity, receive into their systems a new substance, which may disturb the process of decomposition and combination, either by suddenly stimulating the nerves, or by manifesting a stronger affinity to the *antidotal* principle

thing around them. I never beheld so many objects of horror or compassion, as present themselves in the streets; many of these are a disgrace to humanity, as well as a reproach to the national police." *Memoirs of the Court of Berlin*, Vol. ii. Let. 18. Mr Coxe speaks in the same unfavourable terms.—He states the population of Warsaw at from sixty to seventy thousand. "The whole town has a melancholy appearance, exhibiting that strong contrast of wealth and poverty, luxury, and distress, which pervades every part of this unhappy country. The greatest part of the houses are mean and ill-constructed wooden hovels." *Travels*, Vol. i. 170. Dr Vicat, in his account of the Plica Polonica, assigns it to causes which illustrate the present subject—The bad air, arising from woods and marshes, bad water, and want of cleanliness.—*Ibid.* p. 232. Sauvages, on the authority of Erndiel, in his *Varsovia Physicè Illustrata*, assigns the Plica to a cause which must act generally—*principia hujus morbi sunt abusus aquæ vitæ, alimenta acria et viciosa, et incredibilis horum popularum sordities.*—*Nosol. Meth.* tom. ii. 606. It may very justly be asked, if this was the cause of the pestilential fever of Warsaw in 1757, why did not similar events take place on former occasions, when carnage was still more horrible?—for the history of Poland is in truth little more than a series of wars, of a most dreadful and exterminating nature—and yet we hear of no remarkable fevers proceeding from them, or rather arising out of them in the mode described, until De Hahn discovered it.



principle possessed by the constitution, and thereby leaving the pestilential virus undecomposed:—in such a case, the pestilential virus will have full and uncontrouled play, and will produce its usual effects. Such a substance as that I have mentioned, is the poison of fish for instance:—other causes are hyperoxygenation, by entering into the tropical climate whilst the system has received the contagion, violent exercise, evacuating medicines acting violently, sudden emotions of the mind. Of the efficacy of the three last causes, an infinite number of instances were furnished in the year 1795, at St George's, Grenada, where the *incolæ vel climati assueti* were as much afflicted, and suffered as much by the pestilential virus, as the *“nuper advenæ.”* (See my Essay on the Malignant Pestilential Fever, Vol. ii. p. 231-234). M. Morveau, therefore, justly observes, “it is always some diminution of the vital force that renders the resistance unequal, and the action of the poison efficacious—and this may take its rise from a moral affection as well as a physical impression.” (Treatise on Purifying Putrid Air, &c. p. 184). The nature of the contagious miasmata continues always the same\*.

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\* Before I close this paper, already, perhaps, too long, I must take leave to express my regret, that modern writers too frequently take on trust what has been supposed to be the sentiments of preceding writers on the subject of pestilential fever. I am sorry to remark a prominent instance of this, in a late work of considerable merit and value.—The following passage of Dr H. Robertson's book on the N. H. of the Atmosphere, (Part iii. c. 3. § 2.) is certainly not sanctioned by Du Tertre—“It is to be observed,” says he, “in the history of the typhus flava of the W. Indies, that *Pere Tertre, an apostolic missionary, who lived in the islands of St Christopher's, Guadaloupe, and Martinique, from 1640 to 1648, gives a very minute account of the history of these climates, but makes no mention of a contagious fever existing in them, though he is otherwise very particular in the description of a fever which, he says, was ordinarily met with in that country, but which does not appear to have proved uncommonly mortal, or to have been accompanied with a yellowness of the skin.*” Dr Robertson will find, I think, on a reference to Du Tertre's *Histoire Generale des Antilles habitées par les François*, tom. i. p. 422, that his quotation is not correct.—“*Durant cette même année 1648, la peste, jusqu' alors inconnue dans les îles, depuis qu'elles étoient habitées par les François, y (Guadaloupe) fut apportée par quelques navires; elle commença par Saint Christophe, et en dix huit mois qu'elle y dura, elle emporta près du tiers des habitans,*” &c. He treats fully of the endemic diseases of that early period in Tom. ii. p. 477. An attentive perusal of my account of Martinico and Barbadoes, (Essay, 2d. ed. Vol. ii. p. 99, 110, and 170, 180.) will probably throw further light on the subject. I imagine Dr Robertson will also find, on a reference to my Essay, Vol. i. p. 203-207, and to my letter to Dr Haygarth, p. 46, that the cause of the fever which proved so destructive to the St Domingo army which sailed from Cork in 1796, had a different origin from that to which he assigns it, inasmuch as direct proof differs from probable inference. The reader will derive much instruction from a comparison of Mr Tytler's and Mr Royston's



The conclusions which seem to result from the consideration of these premises collectively, and thus imperfectly stated, are, I apprehend—

1. That the theory of ingenious chemists, founded on experiments or speculations, to prove the pestilential influence of putrid animal effluvia, receives no support from practical knowledge, or the known economy of nature.

2. That in no known and well ascertained instance, are putrid animal exhalations productive of pestilential fevers.

3. That in a concentrated state, they either become a mephitic poison, producing asphyxia and instantaneous death, or seem to produce fevers of a malignant, indeed, but not pestilential nature.

4. That in every instance which seems hitherto to have been investigated, wherein putrid animal effluvia have been supposed to be the cause of epidemic malignant fever, other agents of a less dubious, better-known and well-ascertained nature, exist, such particularly as marsh miasmata, and the exhalations from stagnant water and damp unventilated places; and the types or forms of such epidemics thus attributed to putrid animal exhalations, are such as are known to be the peculiar product of marsh miasmata, being uniformly marked with exacerbations and remissions, or paroxysms and intermissions. Contagion and marsh miasmata, (10.), may act conjointly in the same person, but the character of each respective action is manifested; but when marsh miasmata and putrid animal effluvia are present at the same time, no action but that of the former is manifested---the latter exhibits none of a morbid character.

5. That all, or almost all those manufactures, in which putrid animal exhalations are evolved, are no further injurious than by being nuisances by the fœtor which they emit.

6. That as nuisances, but not as causes of disease, they should be as much as possible removed from the habitations of men.

7. That putrid animal exhalations, which cannot be supposed to possess within themselves, or which have not, from the circumstances of the situation or manufacture in which they are evolved, a principle of decomposition, and a capacity of entering into new combinations; and are consequently the true uncombined product of animal putrefaction; are not injurious farther than by their offensive fœtor.

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Royston's summary of the opinions respecting the endemic and foreign origin of the malignant pestilential ("yellow") fever, with the very short history given by Dr Robertson--N. Hist. of Atmosphere, Vol. ii. p. 390-393.



8. That very little probability exists that putrid flesh, rendered so by the natural process, which from selection, accident, or necessity, becomes the food, is injurious to the health of men; a provision being made in the gastric juice of the stomach, by which such food is rendered not only harmless but nutritious.

9. Viewing the whole of the subject, (see Edin. Med. Journal, January 1810, p. 44-48) both in relation to the pestilential epidemics of brute animals, and of the human race, and inquiring into their reciprocal capacity of being communicable from the one class of animals to the other, I imagine there is sufficient evidence in our possession, that such capability does not exist;—that the aura, or emanating gas from the diseased brute animal, does not produce disease of any description in a healthy human being exposed to it;—that a human being feeding on, or receiving into his system, the flesh of a pestilentially diseased brute animal, may certainly have disease excited thereby in his system, but a disease of a nature altogether new, and terminating with him, either in cessation of disease or extinction of life;—that the same series of cause and effect may take place, when brute animals feed on, or take into their system, the flesh of a pestilentially diseased human being:—but that there is solid ground of belief, that such series of cause and effect is provided against by the instinct of the former, directing them to what is beneficial to, guarding them against what may be destructive of, life.

10. That as there is a necessity for the dissolution and reduction to their primary elements of animals, in order that the series of succession of animated nature may be maintained; so would it evince an unaccountable deviation from the compensative economy of God, should the process of that dissolution and reduction be productive of injurious effect, when the ultimate purpose of it is beneficial and compensative.

11. That the dissolution and reduction to their primary elements of animals, may be considered as the physical link connecting the dead and the living, inanimate and animated nature—the one and the other mutually depending on each other, reciprocally contributing to each other's support.

*Finally*, That the result of the whole is—-that in this, as in all things else, the wisdom, the mercy and goodness of God are manifested; that in this, as in all others, “the works of the Deity are known by expedients;”—-for as the putrefaction of dead animal bodies is necessary to the accomplishment of the purposes of divine providence—-for “that which thou sowest is not quickened except it die”—-so the living, for whose existence it is, in a general sense, necessary, either do not experience it as an evil, are removed from, or have a compensation for it.



If it be said, (I use the language of Paley) if it be said that this is to enter upon a religious rather than a philosophical consideration—I answer, “that the name of religion ought to form no objection, if it shall turn out to be the case that the more religious our views are, the more probability they contain,—that the more we let in religious considerations, the more we let in light on the difficulties of nature.” True philosophy and religion are one and the same thing;—if the light of the latter exists not, the disquisitions of the former must be enveloped in darkness.—In my opinion, they must stand or fall together.

Clifton, May 9th, 1810.

## II.

*Extract of a letter to N. Bruce, Esq. Surgeon to the Forces, concerning the Endemical Fever of Sicily. Originally communicated in Sept. 1809 to Dr Franklin, Inspector of Hospitals, by ALEXANDER BOYLE, Surgeon, 62d Regiment of Foot.*

As I had observed, some time before the return of the troops from Ischia, a disposition in the fever, prevailing in Melazzo, to assume the form of synocha; and aware of the ravages fever had made among the corps quartered in that district, for some seasons previously to my visiting that part of Sicily, I resolved to watch its progress.

In the first cases which offered themselves to my notice, and which occurred about the beginning of July last, there appeared little which could, in a particular manner, demand my attention, beyond what is generally observed in those fevers to which we usually give the name of synocha.

At this period (from which we may date the commencement of the disease this season), it was ushered in with a cold stage; there was great languor and lassitude; hot dry skin; frequent and full pulse, and great thirst. The tongue was white and moist; the countenance flushed; and the eyes more or less diffused with blood. Headach, giddiness, and lassitude were, however, the symptoms of which they chiefly complained.

Until the middle of July, however, cases of fever were very rare; and such as did occur were easily overcome by cold affusion, a free use of saline purgatives, and plentiful draughts of iced lemonade. Blood-letting, at this period, was not necessary.