Facts and enquiries respecting the source of epidemia, with an historical catalogue of the numerous visitations of plague, pestilence, and famine, from the earliest period of the world to the present day. To which are added, observations on quarantine and sanitary rules / by T. Forster.

12.

FACTS AND ENQUIRIES

RESPECTING THE SOURCE OF

EPIDEMIA,

WITH

AN HISTORICAL CATALOGUE

OF THE NUMEROUS VISITATIONS OF

PLAGUE, PESTILENCE, AND FAMINE,

FROM THE

EARLIEST PERIOD OF THE WORLD TO THE PRESENT DAY.

TO WHICH ARE ADDED,

OBSERVATIONS ON QUARANTINE AND SANITARY RULES.

BY T. FORSTER, M.B., F.L.S.,

F. R. ASTR. S., HON. MEMB. MED. CHIR. SOC.,

CORR. MEMB. ACAD. NATURAL SCIENCES AT PHILADELPHIA, ETC.

THIRD EDITION.

LONDON:

KEATING AND BROWN, DUKE STREET AND PATERNOSTER ROW; AND HIGHLY, 32, FLEET STREET.

PARIS & STRASBOURG:

TREUTTEL AND WURTZ.

1832.

J'ai fait pendant plusieurs années de recherches sur l'origine des epidémiques, et je suis convaincu, à la fin, qu'elles tiennent tout-à-fait à l'atmosphere. Je sais bien qu'il existe encore des médecins qui voudraient empêcher l'entrée de cette maladie par les cordons sanitaires; mais je puis les avertir d'avance, que ce serait également facile d'arrêter une volée d'oiseaux, par un cordon de glu; ou changer la course d'un orage passager, par un conducteur de l'electricité artificielle. Je vous invite donc, à dépouiller de ses ailes et de ses talons un chimère dont j'ai long temps connu le danger et l'illusion.— *Essai Sur le Cholera Morbus, par T. Forster.*

PREFACE

TO THE THIRD EDITION.

A QUESTION of great importance has for some years divided the opinion of medical as well as commercial men, respecting the source of Pestilence and the utility of Quarantine. The point at issue seems to be this—Whether pestilential diseases, such as Cholera Morbus, Plague, and others, be of such a nature that Quarantine and Sanitary Cordons can constitute a defence against their introduction into any country; or whether, on the contrary, they depend on morbific conditions of the air, which, during particular seasons, and for certain limited portions of time, visit various countries, like other atmospheric phenomena, and are incapable of being arrested by any human means? I am strongly of the latter opinion, and though under certain circumstances diseases may be extended to predisposed persons, by confinement in close apartments with those who are already infected; yet it seems to me, that facts do not warrant the belief that travellers, ships, or bales of goods, can convey such diseases into ports or countries where the specific malaria does not exist. When we consider how important, in a commercial point of view, is the decision of this question, I trust I shall be excused for repeating my claims on the public attention; while I offer to the notice of the reader such evidence as may exist on the subject, together with some curious reflections thereon. The following observations will clearly show that the source of pestilence is in the malaria of particular periods, and that it is accompanied by corresponding atmospherical phenomena.

Perhaps no epidemic period, in the memory of any man living, has presented such an assemblage of remarkable phenomena on the surface of our terraqueous globe and in its atmosphere, as the one which may be said to have commenced in Europe in the Autumn of 1828, *and of which*,

according to my belief, *we have not yet seen the conclusion, nor been able to measure the extent of the catastrophe which it is destined to unfold.*

I do not allude to the important political and religious struggles with which nearly the whole world has of late been convulsed, for with these the physiologist has very little to do; they would, no doubt, have interested Kepler and other early astronomers, who attributed to comets and planets the causes of those unwonted movements in the atmosphere of the earth, which, according to them, always accompanied civil commotions; but for the meteorologists of the more modern school, who have long ago rejected the doctrine of astral influence, even in the production of physical effects, such comparisons would be regarded as a useless waste of time.

What I would wish to advert to, as being connected, in my opinion, with the prevalence of pestilential and other popular diseases, is the occurrence of changes in the surface of the globe and the state in the air, which are unusual, and which, though like everything else in nature they may happen over and over again under infinite modifications at periods too distant to be measured by man, nevertheless appear to us as productions of an extraordinary condition of the elements. I have peculiar satisfaction in recurring to the following facts, because they have taken place since the first publication of this work, and they tend in a remarkable degree to confirm the doctrine which I formerly laid down respecting the origin of the exciting causes of epidemics.

In the course of our recent geological enquiries it has appeared to be well made out, that the earth is perpetually undergoing changes analogous to those which have originally produced its various strata and formations; and it appears likewise to be the fact, that there are periods of commotion in which these operations go on with an unusual force and rapidity. I call these epidemic periods, because they are attended with the spread of pestilential disorders which come in the air, and indicate the existence of its hidden and

unhealthy qualities. It was the opinion of Pythagoras, and of many other ancient Egyptian and Indian philosophers, that these times of convulsion, which occurred at long intervals, produced a complete renovation of all sublunary things, almost amounting to a new creation of beings; that after a succession of ages designated, by reference to gold, silver, copper, and iron, as having a graduated scale of excellence, the corrupted state of things, in the last or ferreous change, were at length merged in a general overthrow; after which the period of another golden age began. To these periods of change they referred the deluge and other destructive subversions of the usual order of things.* While I admit the strict conformity of these notions to what History has proved to be the course of Nature, yet it seems that there are other periods of less importance and of more frequent occurrence, in which atmospherical as well as subterraneous phenomena occur, which mark out times of pestilence and of danger. The notion entertained by Kepler that comets were the causes of these periods is not borne out by any calculation of the attractive power of such bodies, which astronomers have made; and therefore the apparent connexion between the approach of comets to the earth's orbit, and the commotions on its surface, is reduced to a mere established coincidence: however, if these phenomena always coincide, although they be not cause and effect, yet they may naturally have a prognosticative relation, so that the presence of the one may be regarded as the indication of the other.

I shall not pursue these speculations any further at present; but after referring the reader to the historical Catalogue of Epidemics and of contemporaneous atmospheric phenomena, which I have published at page 139 of this work, and to what I said in page 90, I shall proceed to

* Refer to the fine animated and truly philosophic speech which Ovid has put into the mouth of Pythagoras, in the 15th Book of the Metamorphoses, and which, no doubt, is founded on the fragments of the doctrine of this great philosopher and moralist.

state some of the most remarkable prodigies of the present times, and to compare them with the prevalent diseases.

The doctrine that I have always maintained is,—That pestilential disorders of whatever character, including the plague itself, were the offspring of an unhealthy state of the prevailing air, which resulted from a derangement, more or less general, of the atmosphere which surrounds the earth. That this state of the atmosphere, which from being the exciting cause of epidemics I have called by the name of weather-bane, was evidently connected with unusual and rapid changes of heat and cold, unwonted meteors, whirlwinds, waterspouts, storms, dark vapours filling the air, fogs of unusual extent and density, and various other unusual phenomena which we call atmospheric, but particularly a distribution of the temperature over the surface of the earth, in a manner often the reverse of the usual order of things. That during these peculiar states of the atmosphere, certain tribes of reptiles, insects, and minute animalcula, frequently overspread and desolate large tracts of country, particularly in the southern and eastern parts of Europe, Africa, Asia, and in India, but also in America. That terrestrial commotions accompanied these vicissitudes, particularly changes in the state of volcanoes, earthquakes, the overflowing of rivers, and torrents from mountains, and other signs that the changes in our globe, which geology proves to be always going on, are taking place with an unusual degree of activity and force. That the epidemics which take place, apparently in consequence of, or which at least accompany, such changes, assume a diversity of character and symptoms at different times, wholly inexplicable, but which proves, notwithstanding the variety of predisposing causes in the human body, that the specific stimulant itself, which comes in the air, is very various on different occasions. That all the disorders thus excited, pursue a course wholly incapable of being arrested by any sanitary regulations; but that, at the same time, large cities are more frequently attacked than small country places; where the infectious power of the air being augmented

by exhalations from the bodies of the patients, those who come into closer proximity or contact with them, are the most likely to take the disorder; and this circumstance gives the idea of *contagion;* and is, in fact, a thing that ought to suggest the propriety of ventilating apartments, the use of the bath, and every sort of cleanliness. That on the actual occurrence of disease, in any given place, *Change of Air by removal*, is the cure most to be depended on. Whether such states of atmosphere and changes in the earth, as I have described, depend ultimately on the influence of comets, as Kepler pretended, is an abtruse and difficult question. *I, for my part, can see no possible means of explaining such influence, and I am bound therefore to refer the fact alluded to, if indeed it can be established, entirely to* COINCIDENCE, *and not to* CAUSE.

I desire the reader now to compare with the above statement, the phenomena which the present period presents. I consider what I call the epidemic period as having begun as early as Autumn, 1828, when that extraordinary Zodiacal Light was seen, September 29th, to stretch across the heavens. I have traced a succession of atmospheric changes since that period: the spring of 1829 became remarkably unhealthy; the mortality in some countries was prodigious: and the cold of the summer, in parts of Europe, was extraordinary. In 1829, I was at Spa in the end of May, and I remember, while engaged in examining the substance thrown out by an earthquake there, I found the cold as great as in winter; and on the morning of the 9th of June there was ice on the puddles of water by the banks of the Meuse, near to the town of Namur. I learned also from couriers, that the cold was severe all along the Rhine, and even in Austria. At Louvain, where we were on the 25th May, they told me everybody was more or less ill, and I heard the same at Aix la Chapelle, and also at Liege on the 8th of June; the air became warmer at Cambrai, and I learnt on the road that it was as warm as usual at Paris; but in Spain I find the cold was great. The winter which closed the year

1829, was one of unusual severity all over the world, even in the south of Spain, in Portugal, in Italy, in Switzerland, and even all over the Levant, and in Africa snow lay on the ground, and in most parts of Europe covered it, from November, 1829, to the end of February, 1830. The *Cholera Morbus* then broke away from India, and began its deadly course towards Europe, but did not arrive in Russia till last spring. The plague, however, broke out at Jassy, and in Moldavia severe illness prevailed. During the present year, the *Cholera Morbus*, if indeed it be rightly so named, has been making a certain progress, while milder sorts of epidemics have either been its precursors, have followed in its train, or have appeared in its outskirts! In England and France, for example, we have had the *grippe*, the epidemic cough of July last, and the affection of the bowels of August and September. Other and various epidemics are spoken of in different places in Europe and Asia, and it is well known that even in our own country various epidemic fevers still prevail, assuming different types in different places, and according to the predisponent causes in the constitution.

Let me now proceed to compare the atmospheric phenomena with these disorders. On the night of the 7th of January, 1831, a most remarkable *Aurora Borealis* was witnessed in England; the whole of the north east seemed of the colour of blood, while yellow, blue, and green light, was conspicuous in the streamers to the south and east. A still more remarkable Aurora was seen in Europe in the middle of August, and strange colours, and unusual refractions in the sun's light, have been noticed all over the Continent, while the whole of the precedent summer had been characterised by sudden changes from heat to cold, and, *vice versa*, in various countries. To the above we may add the still more remarkable fact, that a NEW VOLCANO *had broken out in the Sea near Sicily!* and that soon afterwards, Vesuvius and Aetna ceasing to burn as before, an earthquake was felt in the midst of Italy.

On the 11th of August a tremendous tornado devastated

the isle of Barbadoes, and other parts of the West Indies, and on the 11th of September an earthquake was felt at Venice and at Parma! These are, however, only a few of the remarkable phenomena that I could relate. Rivers have burst their bounds in various parts, and inundations have been extensive. I will not swell the catalogue. They pretend, in some places, that the upper regions of the air are full of insects of an unknown character, but to this I give but little credit. This notion, however, about the insects had gained considerable ground in France; several persons on the coast about Calais and Boulogne, as well as in England, had sent up kites with raw flesh suspended to their tails, which they pretend came down covered with these flies, and the circumstance got mentioned in the papers, coupled with the French accounts of my aërial voyage. This circumstance induced me, while I was in Paris in September, 1831, to write some articles, sur le champ, in the foreign gazettes, contradicting the facts respecting the flies, but admitting, as I do admit, that all my experiments and observations have led me to believe that the air has been subject this year to very remarkable changes, and that insects of various sorts have been numerous. Indeed the subject of animalcular contagion has never been fully investigated since the days of Linnæus, when it seemed to promise some explanation for the remarkable variety of symptoms which different epidemics exhibit.* After all, I am more inclined to ascribe the exciting cause of disorders to changes in the state of the atmospherical electricity, which may be only a modification of animal electricity. The electric fluid seems to permeate everything, and to be the great agent in Nature: its various connexions with heat, galvanism, and magnetism, are very obscure; but recent experiments are throwing much new light on the subject, and may probably lead to the knowledge of other occult agents and modes of influence as yet unknown. In the present state of our knowledge,

* See this subject discussed in my Pamphlet on *Cholera Morbus*, &c. London, 1832.

however, we may venture to say, that whatever may be the nature of the vital power, by which the sentient capacity in all animated beings is brought into connexion with matter and the external world, it is somehow or other under the influence of those electrical powers by which the phenomena of the globe and its atmosphere are brought about. Perhaps one of the most obvious instances to allude to is the effect produced on the whole animal frame by the first occurrence of east wind. The patient subject to headache is then liable to an ephemeral migraine; various nervous disorders attack other persons, even animals feel its direful presence, and if the operations of Nature go on, yet her smiles are suspended; and in the animal machine pleasurable excitation is changed for irritability; while the philosopher finds the action of his electroscopes irregular, the effects of streams of air, and consequently of oxygen gas on flame, either stronger or weaker than usual, ditches of chalybeate water become turbid, and other effects are produced to which I need not advert. With such winds and their varieties in almost every clime, disease, irritability, and lassitude are induced. Such is the sirocco in the Levant, and such the east wind everywhere, often bringing the first symptoms of plague, of epizootie, and of famine; and indeed so general is this influence, particularly if the change take place near the lunar conjunction and opposition, that I have been induced to enquire whether in almost every variety of unhealthy weather, even when the gale below is north or south, there be not an orient current crossing it above? and whether, if we were accurately to observe it, we should not find it to descend sooner or later to the ground: before a permanent healthy gale set in and gentle Zephyr, with his moist wings, should relieve us from the hurtful stings of his antagonist, and call forth again the musky breath of flowers which spread a carpet for the steps of Flora. An accidental amusement of mine led me to the knowledge of the fact, that the upper currents do not coincide with those below, but generally succeed them.

Being accustomed on fine Sunday evenings, and other leisure days in summer, to send up small air balloons and paper kites, by way of diverting myself with their varied movements in the air, I had occasion to notice that the upper currents crossed each other in different directions, and what was of more importance, that the streams of air which had blown aloft in the evening, frequently descended before morning, in a corresponding order of succession; so that of a number of contrary currents, which the balloons might have indicated as existing above, at different heights, that which was lowest came down first, and so on of the others; and this occurred so constantly as to furnish me with a useful addition to our catalogue of prognostics, and one which may I think be made subservient to purposes of nautical convenience. This fact however shows that the current of air blowing next to the earth may not be the prevailing wind above, which in every case of malignant pestilence may possibly blow from the east, that is, in a direction contrary to the earth's rotary motion. The fact itself is indeed highly important in many points of view, as connected with the theory of whirlwinds and hurricanes. And I may here mention that there seems some evidence to prove that tempests are great whirlwinds, and have a circumvolvent motion, instead of blowing in straight lines, as is commonly imagined. A very curious paper on this subject was sent to me by a transatlantic meteorologist some years ago, which I have mislaid; but I allude to it in order to acknowledge that the first idea of gyrating hurricanes was not my own, but was suggested by his observations.

The observations which I made during my last voyage to the higher regions of the air, in a balloon filled with carbonated hydrogen, and in which I ascended to the height of near six thousand feet, fully confirm this hypothesis. For I not only found, as I had previously observed in alpine voyages over very high mountains, that the upper currents came down, but also that the currents of air moved round in a sort of gentle vortex. I was attentive during the whole

of my aërial voyage to the motion of the balloon, at least before we got too high to distinguish well the objects below, and I feel quite satisfied that we ascended in a sort of spiral course. As some very curious observations made by me during this voyage, relate to and confirm some experiments on the organs of hearing, which are detailed in the original edition of this work, I shall give some account of the voyage from my own notes. The experiment was made at Chelmsford, and we ascended form the old gardens of the Dominican Friars.

About a quarter before six in the evening of Saturday, April 30, 1831, the barometer standing at 29. 20., thermometer 63., wind gentle from ESE, the balloon being entirely disengaged from its ropes, we ascended slowly into the air, in a direction towards Writtle, over the green and fresh valley of the river Chelmer. The sensation produced by rising was both astonishing and delightful; the deception of vision, whereby the earth appears to recede instead of the balloon ascending, was, to me at least, lost in a moment, and the consciousness of mounting succeeded as we distanced the crowd and the scenery below, although no motion was felt in the little wicker basket in which we sat, which is called the car of the balloon. We were in a minute above the trees and all the buildings, the tops of which, as well as the gardens, were filled with spectators. As we were wafted by the light breeze over the valley, I could see the gentle motion of the leaves of the trees which grow along the burn; but in a few minutes more this could no longer be discerned, from our increased altitude; and as the motion of the balloon, when rising, turned us slowly round, I could not easily notice the degree of rapidity with which the angle subtended by any prominent object was diminished; the scene was constantly changing, as we turned in succession towards every part of the prospect; and my companion now observed to me, that we had the main ocean in view, and, indeed, we distinctly saw both the Thames and the sea beyond the Nore. In the direction of the Maldon river,

and hovering over its marshy lands, we saw what had evidently been a *Cumulus* now subsiding into a *Stratus* or white evening mist, stretching in such a manner over the ground in its descent, that we at first took it for smoke. Higher up there were *Cumuli* in the air, much nimbiform haze still more elevated, and some waneclouds. The beauty and extent of prospect now increased, and the fields, here and there coloured with the bright yellow of the flowering colewort, green with the young wheat, or richly brown from fallows, chequered with rows of trees whose new green foliage and blossoms enlivened their darker hue, and intersected with rivers, roads, and villages, had a most enchanting effect. All earthly sounds had ceased; we had got above the breeze which swept the surface of the ground, and in a region comparatively calm, and lighter than it was below, we were conscious of no motion whatever. I presently felt a slight motion, heard the great buoyant balloon above us make a noise, as if touched by the wind, and felt a slight jogging in the car. We found that we had got into another current, and being at length nearly over the park at Writtle, we were gently wafted back again, till we came almost over the northern end of Chelmsford, where, at a very great altitude, probably near 5000 feet, we still noticed the variation of objects as we moved round with the oscillating machine. The hanging my head over the basket, and so looking down, was by much the least agreeable mode of surveying the surface of our mother earth, from whose leading strings we seemed to have burst; and would have made persons who were less accustomed than myself to be on high precipices, very giddy—a circumstance which might have been attended with much danger. I felt, however, no sort of unpleasant sensation, notwithstanding our great elevation; for the consciousness of insulation in the air makes one feel more like a part of the balloon above us than of the world below. I now experienced a sensation of pressure on the tympanum of the ear, accompanied by a snapping noise, very like what other aeronauts have de-

scribed, and which I had before experienced in a greater degree, after surmounting high hills in Switzerland, as will be found described in page 57. It was also accompanied with temporary deafness, but not by that sense of fullness which I have found so disagreeable after descending from terrestrial elevations: it is probably similar to what Lunardi, Garnerin, MM. Charles and Robert, and all the early aërial travellers who mounted very high, have described, with the exception of M. Blanchard, who does not seem to have been liable to the affection. We were still throwing out ballast, and the balloon, taking a sort of crescent course while mounting, must, as I have since become convinced, have been slowly ascending in an irregular spiral. At length, at a great but unascertained elevation, we found ourselves perfectly becalmed, and so remained for near a quarter of an hour, the motionless spectators of a vast panorama, over which the most profound and indescribable silence prevailed. Accustomed as I had been, in the course of my varied life, to all sorts of situations, in travelling, on high mountains, in boats upon the waves, or floating on gentle water, I had as yet seen nothing like this. I remember, in crossing to France, the first experience of a steam boat, paddling across the level brine like a fish, was a curious phenomenon, having before been only conveyed by sailing vessels. But this newborn Leviathan of the deep is nothing to an air balloon; neither is the sensation produced by a balloon in motion at all comparable to that of balloon at rest. Picture to yourself, reader, two persons suspended in a small basket, slung under an inflated bag of huge dimensions buoyant in the air, immediately beneath a canopy of mist, and in the elevated plane of evaporating clouds, whose grotesque forms are gradually becoming lost amid the shadows of greyhooded evening, in perfect stillness, without any perceivable motion, and looking down upon a great and apparently concave amphitheatre, divided like a map, and made up of objects rendered too diminitive by their distance to be well defined, and which appear to have no

altitude at the great height from which we view them ;—and you may get some idea of the sensation produced by a view from a becalmed balloon. One seems, as it were, to have been divested of all terrestrial connexions, and, raised above the smoke and stir of that dim spot which men call earth, to be breathing, in delicious tranquillity, the purer ether of celestial regions.

We found at about half past six o'clock that the balloon was still gently ascending; and at this time I became conscious again of increased altitude by a loud snapping in the ears. At length we thought it time to prepare for our descent, and, pulling the valve again, got into a faint breath of wind, probably only some stray eddy from the interstices of clouds, or the replenishing breeze of one of those slight electrical vacuums which I believe often take place in variable weather. A second or third pull made us come down more rapidly, and we were soon floating over the pine trees near Broomfield Lodge, where we got down, and landed shortly after in a field of oats.

The rapidity of the descent perhaps increased the deafness to which I have alluded, and which gradually went off before ten o'clock at night. I find the same sensation mentioned by most aërial and mountain travellers, who have ascended to any great height.*

As I have fully discussed the probable causes of this effect, I shall not repeat them here; it probably belongs to a numerous class of phenomena in the animal economy, of which the air is the cause, and which are more or less modified by electricity. That the blood is determined to different organs by atmospherical changes there is no longer any doubt, but in what manner this is brought about is a question of difficult solution. I would recommend philosophers for the future to

* A long Catalogue of similar affections will be found in "Medicina Simplex, or a Philosophic Enquiry into the Conditions of a Healthy Life, and Happy Old Age; by a Physician." London: Keating and Brown, 1832. In which work the particulars of my aërial voyage are compared with those of numerous other aëronauts.

note down accurately the season in which all their experiments may be made. They should also notice the weather and the soil, and the particular Flora which belongs to it. I may here remark, that the usual division of the year into four seasons is wrong: I object to it as not being the distribution which corresponds with the real changes. There are in fact six seasons, and they respond to the same number as noticed and separately named in India and other tropical climates. 1. The *Hybernal* or Midwinter, which sets in about Advent, and includes December and January, and is a season of leaflessness and gloom. 2. The *Primaveral*, which extends from Candlemas to Ladytide, including February and March, and is marked by the increase of light, and the appearance of early spring flowers. 3. The *Vernal* or True Spring, the germinal season of buds and flowers, extending from Ladytide to the first of June, and including April and May. 4. The *Solstitial* or Summer, the season of full leaf and early fruits, and also of hay time, extending through June and July. 5. The *Aestival*, the early or hot autumn, from Lammas Day to Michaelmas, including August and September, or the harvest season, and that of summer fruits. And lastly, The *Autumnal* or late Autumn, comprehending October and November, or the vintage and wine season, as well as that of the later fruits. Each of these seasons has its appropriate atmospherical phenomena, as well as its Flora.