AN INAUGURAL DISSERTATION
ON
Malaria

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Malaria

The position of my own is that vegetable decomposition has nothing to do with the production of malarial fevers. I take this stand with a great many others of the medical profession; notwithstanding the labours of so many celebrated physicians who have written volumes to prove to the contrary. As a proof of the opinion I entertain, I will cite you to several instances of this fever killing whole armies where there was not the first vestige of a vegetable nor never had been.

In August, 1794, after a very hot and dry summer, the British army in Holland encamped at Rosendaal and Oosterhout. The soil, in both places, was a level plain of Sand, with a perfect...
by dry surface, where no vegetation existed, or could exist, but stunted heath- plants. It was universally perceived to within a few inches of the surface, with water which, so far from being brackish, was perfectly potable. Here fever of the intermittent and remittent type appeared among the troops in great abundance. It is interesting to observe that the soil in Helahern is precisely similar. Dr. Gilbert Blane describes it as consisting of a fine white sand, known in the eastern counties of England by the name of silt, and about a third part of clay. It was after a hot and dry summer, also, that the British army suffered on that island from the endemic fever, to a degree
which Dr. Ferguson speaks of as being almost unprecedented in the annals of warfare. In the year 1809, several regiments of the army in Spain took up an encampment in a hilly ravine which had lately been a water course. Pools of water here and there among the rocks, so pure that the soldiers were anxious to be near them for the sake of using the water. Several of the men were struck with violent diarrheal fever before they could move from the bivouac the next morning. Still the (says Dr. Ferguson) it had always been believed among us that vegetable nourishment (the humid decay of vegetation) was essential to the
production of pestiferous miasma; but in the instance of the half-dried ravine before us, from the stony bed of which (as evil never conceal lie for the torrents) the very existence even of vegetation was impossible; it proved as pestiferous as the bed of a few. After the battle of Talavera, the army retreated along the course of the Guadiana river, into the plains of Estremadura. The country was so arid and so dry for want of rain, that the Guadiana itself, and all the smaller streams, had in fact ceased to be streams, and were no more than lines of detached pools in the course that had formerly been river. The troops there suffered
from remittent fevers of such destructive malignity, that the enemy, and all Europe, believed that the British host was exterminated. Elvira, called Rodrigo, is situated on a rocky bank of the river Agueda, a remarkably clear stream; but the approach to it on the hills of Portugal is through a bare, open, hollow country, that has been likened to the dried up bed of an extensive lake; and upon more than one occasion, when this low land, after having been flooded in the early season, had become as dry as a brick ground, with vegetation utterly burned up, there arose to the troops fevers which, for malignity of type, could only be matched by those before.
mentioned on the Gaudiana. Many more facts to the same purpose are related in Dr. Ferguson's paper, which is in every way well worth the perusal of any one desiring further information upon the subject. He tells us "that in the most unhealthy parts of Spain, we may in vain, toward the close of the summer, look for lakes, marshes, ditches, pools, or even vegetation. Spain, generally speaking, is then, though as prolific of endemic fever as Walcheren, beyond all doubt one of the driest countries of Europe; and it is not till it has again been made one of the wettest, by the periodic rains, with its vegetation and aquatic drinks restored, that it can be
Called healthy, or even habitable with any degree of safety. A few circumstances of contrast we will now mention. The river Tagus is, at Lisbon, about two miles broad, and it separates a healthy from a very unhealthy region. On the one side is a bare sandy country; the foundation of the soil, and of the beds of the streams, being rock, with free open water courses among the hills. This is the healthy side. But the Alentejo land, on the other side, though as dry superficially, being perfectly flat and sandy, is most productive. Moreover, in and near Lisbon there are numerous gardens, where they keep water, during the three months, absolute drought of the summer season; and
Stone Reservoirs. These reservoirs, containing water in the most concentrated state of four
mgs, and faubritely, are placed close to the houses and sleeping rooms: the in
habitants literally live and breathe in their atmosphere. "Yet no one ever heard
or dreamt of fever being generated amongst them from such a source; though
the most ignorant native is well aware that were he only to cross the river, a
sleep on the sandy shore of the Atar
ugo, where a particle of water at
that season had not been seen for months,
and where water, being absorbed
to the sand as soon as it fell, was
never known to be putrid, he
would run the greatest risk of
being seized with intermittent fever.
Now these facts, and facts like these, seem to prove that the malaria, and the product of vegetable decomposition, are two distinct things. They are often in company with each other, but they have no necessary connection. Wherever, in a malarious country, there is evidence of putrefaction, it will wait, says Dr. Surgenor, too long before producing malaria; it appears to be requisite that there should be a surface capable of absorbing moisture, and that this surface should be flooded and soaked with water, and then dried; and the higher the temperature, and the quicker the drying, the more potent the virulent (more virulent, probably because more plentiful).
is the poison that is evolved. The poisons of animal and vegetable are sometimes mixed up and still of as an element in the formation of the malarious poison. But the evidence I have just set before you refutes this supposition as completely as it excludes the alleged necessity of vegetable decay. Therefore neither animal nor vegetable decomposition is sufficient to generate fever of any kind.

Dr. Hurgon's facts are generally in accordance with the observations which others have made upon the same subject; and his views will be found to account for some phenomenon which the ordinary theory of vegetable po-
Trefaction did not cleverly explain there is good reason for believing that in all cases the poisonous emanations proceed from parts of the surface that have been flooded or then dried, rather than from parts that are still wet, or putrid. And this elucidates a circumstance very often noticed, viz., that neighbouring places especially high and low lands lying near each other change their character in respect to salubrity upon the occurrence of rains. The low grounds, which were previously very dangerous, become healthy when they are flooded over: And the higher lands, which are made wet, and
which rapidly dry again, produce
the malaria abundantly. For the same
reason, the edges or borders of swamps,
which of course expand or contract
according to the wetness or dryness of
the season, are more unsafe than their
centers. The drying and half dried mar-
gins of the purer streams may be
prolific of the evil, when, from
the want of confining banks, those
margins have been flooded by the
rising of the waters. There is no obser-
vation more general than that, in mal-
larious places, aches and remittent fe-
vors abound more in hot and dry
years than in those which are cold
and moist. And this influence of
temperature it is which mainly determi-
the differences observable in regard to the fever at different elevations, and in different seasons of the year. On the higher grounds of the West-Indies age, occur as in this country: as you ascend, and the mean atmospheric temperature increases, symptoms are encountered, and in lowest and hottest parts the fever becomes continued. The following instructive facts are stated by Dr. Ferguson. In 1816, the British garrison of English Harbour in Antigua, was disposed in three separate barracks, on fortified hills surrounding the dockyard. One of the barracks was on an eminence named Monk's Hill, 600 hundred feet above the level of the sea.
The other two were situated on an eminence on the ridge, one at a height of 500 hundred, and the other at the height of 300 hundred feet. So pestiferous were the marshes among which the dock yard was placed, that it often happened to a well seasoned soldier, coming down from Monk's Hill, and mounting the night guard in perfect health, to be seized with furious delirium while standing sentry, and to expire within less than 30 hours after being carried up to his barracks, with a yellow skin, and having had black vomiting. Those in the barracks on Monk's Hill who did not come down, the superior officers, the men, children, and drummers,
had no fever of any kind. Seventeen artillery men, in the barracks at the
height of three hundred feet, did not come down to the night guards. Every
one of these men was attacked with
remittent fever, of which one of
them died. As the barracks on the top
of the ridge, at the height of five
hundred feet, there scarcely occur
red any fever worthy notice. Thus,
in the same place, the malaria,
in the level plain, caused con-
tinued fever, resembling, and I be lie
ve identical with, yellow fever:
at the elevation of three hundred
feet it gave rise to remittent fever;
and at the height of five or six hun-
dred feet its influence was scarcely
I fell at last. On the neighbourhood of the Pontine marshes you see the villages perched curiously on the intervening hills; the Italians having been taught by experience that these elevated spots afforded comparative security against the effects of the miasmata. Wherever the mala red forewarns, it produces its peculiar consequences chiefly in certain seasons; and it is in the autumn especially thatague and aguish fevers occur, that is to say, after the heats of summer: and the hotter the day the preceding summer, the more frequent and fatal the autumnal fevers. The effects of these morbific effluvia upon the human body vary much
under different circumstances, where they are most concentrated and deadly, their operation may be almost immediate. With their speedy influence upon the soldiers who descended at night from Punch's Hill. So also did old who have gone on shore for a single night only, have been attacked with the fever before they could return to the ships. As have shown from facts which rest upon Dr. Parry's authority, that the products of vegetable decay & decomposition may do as often coexist with malaria, but are distinct & separable from it, and by means so essential to its formation. And then argument which seems to be useless, after such strong evidence.
To refute the doctrine of malaria by vegetable decomposition, it is as follows if it was so produced that it would be found to exist north of the forty-fifth degree of north latitude where vegetable matter is very abundant, but malarial fevers do not prevail there. You never hear of a case north of this line. Having proved beyond a doubt that vegetable decomposition has nothing to do with the production of malaria. The foregoing facts are data from which, I shall endeavor to draw some conclusions to prove that heat & water are only necessary to produce this agent, besides others among that will be brought forward to substantiate the same thing.
Earth is said to be an essential element in the production of malaria, which is by no means a necessary condition of its evolution at all times, as I expect to prove before I close this subject. An argument to advance against this theory is to show that miasm is extricated by different kinds of soil in Holland at Rosendael and Rotterdam the soil, at both places, was a level plain of sand, being percolated by a few inches of the surface with water; which sent out this malarious principle and at Walcheren a similar but different soil composed of white sand and clay evolved this same agent. Clay soil will do the same thing and any kind of soil
on the habitable globe that is loose, penetrable, and porous, that will absorb moisture appears highly favorable to its formation. On the way to 1809, several regiments of army in Spain took up an encampment in a sultry ravine which had lately run a water course. Pools of water still remained here and there among the rocks, so pure that the soldiers were asking to bivouack near them for the sake of using the water. Several of the men were seized with violent melon fever before they could move from the bivouack the next morning. But in the vicinity of the half dried ravine before us, from the rocky bed of which we said never could we
for the torrent) is a proof that earth is not an essential element in the production of this poison. Air is also thought to be an essential element in the production of this agent which it carries, and will ever do until its advocacy bring forth proof that it exercises an influence in the production of Malaria. The only thing it is capable of doing in my opinion is to convey it from the spot where it was generated, and to other places which, else be free from it and healthy. This conveyance of the poison, like a cloud or fog, from one part of the surface of the ground to another, it is very important to attend to in all places; and especially so in tropical climates.
where the wind blows for a long time together from the same quarter. We are thus enabled to account for the apparent exceptions to the last mentioned property of the malaria, viz., its preference of low to elevated situations. You will readily understand how the miasmata may roll up, and hang accumulated upon, the side of a hill toward which a current of air sets, steadily from a scarp a neighbourly marsh. Nay, the poison may be thus blown over a hill, and deposited upon the other side of it. Knowledge of these facts ought to be valuable in determining the choice of encampments, and of sites for dwelling houses in aquifer districts.
Letters in hot climates, especially where trade winds prevail, would do well to avoid fouling along on the lee side of swampy or suspecting ground. It is said if heat and moisture were alone adequate, we should find the fever prevailing among sailors when out at sea, but it is not so whatever be the temperature under which they cruise. Every well-informed medical man knows that miasma lose their noxious properties by passing over even a small surface of water, would show the great inconsistency of the assertion above, and scatter the tendency of the argument as it were with a mild confusion.
It could be produced out at sea, what would be some of this agent it is probable that it would be absorbed by the water as fast as generated, therefore how can its effects be felt out upon the ocean when this is an utter impossibility when it is produced upon land by heat and moisture the moment it is conveyed to the water by the wind at there ships cases to move or exist. Many instances can be referred to, where some of the crew of ships have landed on a malacious coast, and have all been attacked by the fever, while the rest of the sailors, who remained on board, continued all healthy and well, though the ship was close to the shore.
You could not have a better or more striking example of this than what took place at Walcheren. Not only the crews of the ships in the road of Flushing were entirely free from the disease; but also the gale was on ships which, stationed in the narrow channel between this island (Walcheren) and Breslau. The width of this channel is about six thousand feet, yet, though some of the ships lay much nearer to one shore than to the other, there was no instance of any of the men or officers being taken ill with the same disorder as that with which the troops on shore were affected. Commodore Mitchell's squadron, which lay at anchor in
the channel between South Cleveland and the island of Walcheren, in both which places the distemper raged, was neither afflicted with the fever nor the flux, but amidst all the sickness enjoyed perfect health; a proof that the moist and putrid air of the marshes was dissipated, or corrected before it could reach them. To the production of this deleterious agent, a certain degree of temperature seems necessary. It does not exist within the arctic circle: nor does it manifest itself during the colder seasons of more temperate climate. As it existed before it is not traceable beyond the 45th degree of North Latitude;
and it is supposed to require for its development a continuous temperature higher than 60 degrees of the
Jenner's thermometer. The nearer we approach the equator the more abundant, virulent, and pernicious does the poison become, when
ever the poison is evolved at all. As we go south, in Spain, and along the shores of the Mediterranean, the intermittent becomes the
predominant form; and (what is very instructive) those who contracted often improve into intermittents upon the removal of the patient to
a colder climate, under the tropical heat, in the west Indies for exam
ples, the fevers frequently assume
the continued firm. There is reason to believe that flooding of a porous earthy surface with water under a certain degree of heat constitutes the sole conditions of the generation of the poison. About the year 1836, a hurricane passed through Montgomery County, Pennsylvania, near Palmyra, blowing down trees, house, and nearly everything else along where it passed. A family of relations of mine living in this portion of country, where the hurricane passed through, had never had in terminating, or remitting fever, previous to this event: but after the hurricane, almost annually.
My father's family who lived at a very sickly place; where these fevers prevailed nearly every year in his family. Concluded from this unfortunate circumstance that he would send some one or other of his family when labouring under these fevers to see their relations who lived at the identical place which has been spoken of above where these material fevers did not exist for their health which he did for a good many years previous to the hurricane where they were always restored to their former state of health. The prevalence of these fevers at this particular locality cannot be accounted for.
or traced to any local cause at a distance from this place, if such a cause did exist the poison would be generated by rotted wood, as it is blown through the open space occasioned by the falling of the timber. Most of the trees that were blown down are now forming the soil and a new growth of timber has sprung up waving about in great luxuriance and since all this which happened according to the common course of nature there has not been a case of chillis & fever. If called on I can establish by proof what I have stated about said place. What does this prove that the malarial was produced by the
hot rays of Sun shining down upon the banks of this timber. The reason
that malaria fever are more frequent here during the winter
overflow the low-land and a great deal of it is absorbed and the hot rays of the Sun
of the succeeding summer beam down upon these places after
they become dry. Produce the malaria poison. To account for its
prevailing to such a great extent in newly settled country in this
way the inhabitants when they move in the first thing is to
build houses, which must be done out of green timber they bell the
trunk & cut some down and the
Timber being dead the water that is in it no longer circulates thus the Sun's rays beams upon this water in the wood produce the malaria. Jan 8th 1857.

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