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ON

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Malaria

The position I assume 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.

ly dry surface, where no vegetation existed, or could exist, but stunted heath-plants. It was universally percolated to within a few inches of the surface, with water which, so far from being putrid, was perfectly potable. Here fevers of the intermittent and remittent type appeared among the troops in great abundance. It is interesting to observe that the soil in Malcheru is precisely similar. Dr Gilbert Blane describes it as consisting "of a fine white sand, known in the eastern countries 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 in that island from the endemic fever, to a degree

which Dr. Furguson 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 desirous to bivouack near them for the sake of using the water. Several of the men were seized with violent remitting fever before they could move from the bivouack the next morning. Till then (says Dr. Furguson) it had always been believed among us that vegetable putrefaction (the humid decay of vegetables) was essential to the

production of pestiferous miasmata; but in the instance of the half dried ravine before us, from the stony bed of which (as soil never could 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 Salaverra, the army retreated along the course of the Guadiana river, into the plains of Estremadura. The country was so arid and 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 courses that had formerly been rivers. The troops there ~~were~~ suffered

from remittent fevers of such destructive malignity, that the enemy, and all Europe, believed that the British host was extirpated. Ciudad ~~and~~ Rodrigo is situated on a rocky bank of the river Agueda, a remarkably clear stream; but the approach to it on the side 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 rainy 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. Gurguson'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, towards 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 periodical rains, with its vegetation and aquatic weeds restored, that it can be

Called healthy, or even habitable with
any degree of safety. Of One circumstan-
ce of contrast I 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 hilly coun-
try; the foundation of ^{the} soil, and of the
beds of the streams, being rock, with
free of air water coursed 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 pro-
lificous. Moreover, in and near Lis-
bon there are numerous gardens, where
they keep water, during the three months
, absolute drought of the summer season; in

Stone Reservoirs. These reservoirs, containing water in the most concentrated state of foulness and putridity, are placed close to the houses and sleeping rooms: the inhabitants 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, & sleep on the sandy shores of the Alerago, where a particle of water at that season had not been seen for months, and where water, being absorbed in to the sand as soon as it fell, was never known to be putrid, he would run the greatest risk of being seized with remittent 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. Whoever, in a malarious ^{country} waits for the evidence of putrefaction, will wait, says Dr. Ferguson, too long for 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 process, the more plentiful, ^{& the more} virulent (more virulent probably because more plentiful)

is the poison that is evolved. The putrefaction of animal is sometimes spoken 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. Harguson'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 phenomena which the ordinary theory of vegetable pu-

refraction did not cleverly explain
there is good reason for believing
that in all cases the poisonous em-
issions proceed from parts of the
surface that have been flooded &
then dried, rather than from parts
that are still wet, or putrid.

And this elucidates a circumstance
very often noticed, viz., that ne-
ighbouring places especially high
and low lands lying near each
other change their character in
respect to salubrity upon the oc-
^{currence} of rains. The low grounds, which
had previously ^{been} 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 margins of the purest streames 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 observation more general than that, in malarious places, agues and remittent fevers abound more in hot and dry years than in those which are cold and moist. And this influence of temperature it is which mainly determines

the differences observable in regard to the
fever at different elevations, and in dif-
ferent seasons of the year. On the high-
er grounds of the West-Indies agues
occur as in this country: as you ascend,
~~and the~~ mean atmospheric temper-
ature increases, ~~immediately~~ are met with
: and in ^{the} lowest and hottest parts, the
fever becomes continued. The fol-
lowing instructive facts are stated
by Dr. Ferguson. In 1816, the Brit-
ish garrison of English-harbour, in
Antigua, was disposed in three sep-
arate barracks, on fortified hills sur-
rounding the dockyard. One of the
the barracks was on an eminence
named Monk's Hill, 600 hundred feet
above the level of Marshes.

The other two were situated on an eminence
the ridge, one at height of 500 hundred,
and the other at the height of 300 hund
red feet. So pestiferous were the mias
mas among which the dock-yard
was placed, that it often happened
to, ^a well seasoned soldier, coming
down from Monk's Hill, and mount
ing the night guard in perfect
health, to be seized with furious del
irium 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 soo-
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. At the barrack 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 belie-
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

felt at all. In 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 com-
parative security against the effects
of the miasmata. Wherever the mala-
ria prevails, it produces its peculi-
ar consequences chiefly in certain
Seasons: and it is in the autumn es-
pecially that agues and aguish fevers
occur; that is to say, after the heats
of summer: and the hotter & dryer
the preceding summer, the more
frequent & fatal the autumnal fevers.
The effects of these morbidic effluvia
upon the human body vary much

under different circumstances. Where they are most concentrated and deadly, their operation may be almost immediate. Witness their speedy influence upon the soldiers who descended at night from ~~Monk's~~ Hill. So also sailors who have gone on shore for a single night only, have been attacked with the fever before they could return to ^{the} ships. I have shown from facts which rest upon Dr. Furguson's authority, that the products of vegetable decay & decomposition may & do often coexist with malaria, but are distinct & separable from it, and by ^{means} no essential to its formation. And their argument which seems to be useless; after such strong evidence

to refute the doctrine of malaria by
vegetable decomposition, is as follows
if it was so produced that it would
be found to exist north of the for-
ty 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 proven 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 other tes-
timony 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 Rosendaal and Oosterhout the soil, at both places, was a level plain of sand, being percolated within 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 & 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 fa-
vorable to its formation. On 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 still
remained here & there among the
rocks, so pure that the soldiers we-
re anxious to bivouack near them for
the sake of using the water. Several of
the men were seized with violent re-
mitting fever before they could move
from the bivouack the next morning.
But in the distance of the half dri-
ed ravine before us, from the strong
bed of which (as said never could be

for the torrent) is a proof that earth
is not an essential element in the pro-
duction of this poison. Air is also
thought to be an essential element in
the production of this agent which I deny,
and will ever do until its advocates
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 ^{might} 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 impor-
tant 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 enable 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 towards which a current of air sets steadily from or across a neighbouring marsh. Nay, the poison may be thus blown over a hill, and deposited upon the other side of it. A knowledge of these facts ought to be valuable in determining the choice of encampments, and of sites for dwelling houses in aguish districts.

Settlers in hot climates, especially where trade winds prevail, would do well to avoid founding towns on the lee side of swampy or suspicious 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 miasmata 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 wild confusion.

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If ^{it} could be produced out at sea
what would become of this agent it
is probable that it would be absorb-
ed by the water as fast as generated,
therefore how can its effects be felt
out upon ^{the} ocean when this ^{is} an utter im-
possibility when it is produced up
on land by heat and moisture the
moment it is conveyed to the wa-
ter by the wind it there stops ceas-
es to move or exist. Many instances
can be referred to, where some of the
crew of ships have landed on a
malarious 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

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"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 epidemic; but ~~also~~ ^{was} the ~~guard~~ ^{guard}-ships which, ^{was} stationed in the narrow channel between this island (Walcheren) and Beveland. 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

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the channel between South Beveland 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 climates. As I stated 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 Fahrenheit's thermometer. The nearer we approach the equator the more abundant, virulent, and pernicious does the poison become, whenever the poison is evolved at all. As we go South, in Spain, and along the shores of the Mediterranean, the remittent becomes the predominant form; and (what is very instructive) remittents there contracted often improve into intermits upon the removal of the patient to a colder climate. Under the tropical heat, in the West Indies for example, the fevers frequently assume

the continued form. There is reason
to believe that flooding of a porous
earthy surface with water & subse-
quent drying of ^{that} surface under a
certain degree of heat; constitute
the sole conditions of the generation
of the poison. About ^{the} year 1838,
a hurricane passed through Mont-
gomery County, Europe near Pal-
myra; blowing down trees, houses,
and nearly everything else along
where it passed. A family of re-
lations of mine living in this por-
tion of country where the hurricane
passed through; had never had in-
termittent, or remittent fever, pre-
vious to this event: but after the
hurricane ^{they were affected with these fevers} 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 malarial 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 & wafted by the wind 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 put 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 chills & fever. If called on I can establish by proof what I have stated about said place. What does this prove that the malaria was produced by the

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hot rays of Sun shining down upon the logs in this timber. The reason that malarial fevers are more life than water courses is because the water 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 beaming down upon these places after they become dry produces the malarial poison. The account for its prevailing to such a great extent in newly settled countries 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 fell the trees & cut some down and the

timber being dead the water that
is in it no longer circulates then
the Sun's rays beaming upon this
water in the wood produces the
malaria. Jan 26th 1857.

William A. Haynes