AN INAUGURAL DISSERTATION
ON
The
Aetiology of Malaria.

SUBMITTED TO THE
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BY
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W. K. Bowlin MD
Professor of Institutes and
Practice of Medicine

The following Pages are

Sincerely Inscribed

By

The Author.
The Aetiology of Malaria.

The subject of Malaria is one that has been of interest to the philosophers for hundreds of years. By the term Malaria we understand an effluvia that contaminates the atmosphere of certain localities, rending it deleterious to the health of man, producing certain train of phenomena to which various apppellations has been given, such as Chills and Fever, Bilious Fever, Intermittent, &c. Malaria is the great bane of all warm climates. Many
parts of the world might be rendered as the garden of Eden for its loveliness and too as fertile as the land of Egypt, yet it is made desolate by the ruthless hand of this fell destroyer. When certain train of phenomena are produced to palpable to the senses, it is but reasonable that the minds of scientific phisitions should be engaged in making in searching research to ascertain the cause that produced these phenomena. Thus it was previous to the time of Lancisi.

Previous to this time we find no idea distinctly put forth concerning the origin of this poison, living in Raam and observing that near the Ponsine marshes malarial fever was prevalent, also observing that in the marshes vegetation grew luxuriantly.
my naturally be come to the conclu-

sion that it must in some way depend

upon the decomposition of vegetable

matter. The opinions of Lasci

seemed to have satisfied the minds

of the medical world for a century.

All the investigation made with

in that time seems to have been

made with the design of confirming

the opinions set forth by Lasci.

In fact all observations made during

that period were confined to nearly

distinct; sections in which malarial

fevers are usually prevalent. But such

as were disposed to observe for them-

selves, being their minds by passed by the

general opinions, one making their ob-

servations under circumstances similar

to those under which the observation of
Lancisi were made, it could not be affected that they should come to any conclusions different from his.

But from the evidence that we have before us, we do not believe that Malaria depends upon the decomposition of vegetable matter. Nay, we do not believe that the decomposition of vegetable matter has either part or lot in the production of this poison.

This supposition, we think, we are able to prove, at least satisfactory to our own minds. We will first consider vegetation under circumstances accompanying decomposition yet producing the malarial. Secondly, the existence of malarial independent of vegetation. Thirdly, the products of vegetation decomposition, and their effects upon the human
First, it is manifest to every one, who has any knowledge of the health of different localities, that the decomposition of vegetable substances, can and does take place without the production of malaria. Where is there more vegetable substance undergoing decay than in the forests of our southern and southwestern country? When we leave the marshes, get out where the face of the country is undulating, we look not for a chill. We have too the agreeable satisfaction of knowing that we were correct in our anticipations; for there a chill is a stranger. The pine forest of southern country is positively healthy. "Pine settlements where there is plenty of vegetation (says Dr. Dickson) are absolutely
 exempt from the effects of malaria.

To the truth of this assertion every one can testify, who has either lived in the pine woods, or has taken the trouble to make observation in these sections. To exempt are the inhabitants of the pine forest, that it is a popular opinion that it is owing to some exhalation from the pine counteracting the delirious effect of the malarial poison. But as is evident there is no such exhalation from the pine, for as we approach the hammocks we have malarial fever in its most malignant type even in the pine lands.

But it is maintained by some, in order that this poison may be generated, there must be a sufficiency of water as well as vegetable substance.
Secondly, it is proof that malaria can and does exist independent of the decomposition of vegetable matter. We will compare the difference in respect to health between dry and wet summers.

It is well known not only to the medical profession, but to the whole people, who have learned it from their experience, that not only dry summers are more productive of fevers than heat. Does the heat and dryness of the summer promote the decomposition of vegetable matter? Nay, rather preserves them from decomposition, even arresting it after decomposition has already commenced. Wet summers promote the decomposition of vegetables, and are proverbially unhealthy. Here are two both vegetable matter and water.
and with them health.

We find in Wetton's Practice of Physic extracts quotes taken by Dr. Ferguson, a surgeon of the British army. Judging from the position he occupied and the opportunities he possessed of making extensive observations in different and distant sections of country, makes his opinions the more readily received.

He states that in the year 1793 in a campaign through Holland, that the British army encamped at Rosendael and Oosterhout it being hot and dry. "The soil in both places was a fair level and sandy, with a perfectly dry surface, where no vegetation existed or could exist, but withered health plants." Here the troops suffered greatly from
intermittent fever. We are also told
that in Walcheren, the soil is of a very
white sand, and during a very hot and
dry summer the British army suffered
so much an extent that Dr. Ferguson
speaks of it as "being almost unpre-
dented in the annals of warfare."

We are again told that, in the
year 1809, several regiments of the
British army in Spain took up
encampment in a hilly ravine
which had lately been a water course.

Pools of water still stood here
and there among the rocks, so
furne that the soldiers were anxious
to liven up more than for the purpose
of using the water; several of the
men were seized with violent inter-
mittent fever before they could.
leave the hivonach the next morning. Till then (says Tegue) it had always been believed among us that vegetable justification was essential to the production of festiffereous orasmata; but in the instance of the half dried ravine before us, from the story bed of which (as the soil could never lie for the torrent) the very existence of vegetation was impossible, it proved as festiffereous as the bed of a pond.

Again we are told that after the battle of Talavera the army retreated along the course of the Taudiana river, into the plane of Estamadea. The country was so dry and arid for the want of water that the Taudiana itself and all the smaller
But in fact ceased to be streams
and were no more than lines of det-
tached pools in the course that had
formerly been rivers. The troops then
suffered from remittent fever of such
distinctive malignity that the enemy
and all Europe believed that the whole
British host had perished.” When
the British army was passing through
Portugal to Ciudad Rodrigo, situated
on the Aguena river, a very clear stream
they had to pass through an extensive
plain that had been likened to the bed
of a dried up lake. Upon more than one
occasion, when this lowland had been
flinched in the rainy season, had be-
come as dry as a brick ground, with its
vegetation utterly burned up, they ar-
rose to the troops fevers which, for mel
ignity of type, could only be mastered by
those before mentioned on the Stannian.

Again Ferguson tells us, “that in the most
unhealthy parts of Spain we may in vain
attempt the close of summer, look for
lakes, marshes, ditches, pools, or even
vegetation. Spain then generally speaking
is, though as prolific of endemic fever as
Walcheren, beyond all doubt one of the
digest countries of Europe, and it is not
still it has again been made one of the
most by the periodic rains, with its
vegetation and aquatic weeds restored
that it can again be called healthy, or even
inhabitable with any degree of safety.”

We might quote other passages to prove
that malaria does not depend upon the de-
composition of vegetable and other. We think
that those instances already referred to are sufficient
to convince any unbiased mind, that malaria can and does exist independently of vegetation, even in its most malignant forms. We will now proceed to the consideration of the third division of our subject. It is not our design to give the exactness of all substances formed by the decomposition of vegetable matter, but to consider the four principle gases, viz. carbonic acid, carbonic oxide, free carbon of oxygen, and the vapour of water. It is by the production of carbonic acid that nature intends to remove a large portion of debris from the earth. And should that be retained, it would not only result in unpleasant, but fatal consequences, in an atmosphere containing a large portion of this gas, death will result.

But I conceive that death in this
case is not so much the result of inhalation of the carbonic acid as it is from
the want of a proper oxidation of the blood, and a retention of that portion of
gas which is elaborated within the system. We have this gas abundantly
formed by the burning of wood, coal, or also in breweries and in all places where
there is fermentation. Persons exposed to this gas, even in such places where
it is generated most abundantly, do not present any of the symptoms of materi-
ial pern. From the various modes by which carbonic acid is formed, we
find that it does not exceed more than
three parts in ten thousand, than we
then write any show of reason, claim for
it under such circumstances results,
which it is incompetent to effect in its
most concentrated form?

Carbonic oxide, though poisonous, is produced in far too small quantities to effect the system. And under such circumstances when persons are affected, there is no intermittent, but if sufficiently concentrated, instant death is the result.

It seems more probable that the true cause of typhus might be the cause that produced amebic fever than either of the two that we have considered.

The only mode, that we can imagine, by which this gas can affect the human system, is by inhalation the proto carbid of hydrogen becoming decomposed, the hydrogen entering with the sulphur of the blood, forming the sulphid of hydrogen. The carbon being set free.

According to Leibig the sulphid of
Hydrogen acts very deleteriously upon the system by "producing immediate decomposition of the blood." But does this effect upon the blood produce intermittent fever? If so, and the effect is as great as represented by that author, then in cities and in the vicinity of sulphur springs we might expect to find intermittent fever prevalent. But to the reverse, we find cities exempt, and sulphur springs related to health and pleasure. But admitting that the sulphur of hydrogen can effect the system only by direct combination of hydrogen with the sulphur of the blood, then we might reasonably expect that such places as were most prolific in generating the protuberance of hydrogen, would be the most productive
of disease. It is universally conceded that marshes entirely covered by water do not generate malaria. Yet such places as these are among the most productive of the protocid of hydrogen from the decomposition of vegetable matter than any other. In coal mines also this gas is generated in great abundance.

The miner, if it were not for the danger in which his life is often placed by explosions, would regard with this gas. If it was the cause of malarial fever, under such circumstances as these we might omit it even in its most malignant form.

But the quotations which are here made from Ferguson prove that fever can exist under such circumstances as excludes the idea of this gas.
We have now to consider the vapor of water, the least of the products of vegetable decomposition. It is contended by some, that this, when generated under peculiar circumstances, is sufficient to produce all that train of phenomena which we call intermittent fever. I confess, that I am not able to understand in what manner the vapor of water generated under any circumstances can effect the system so as to produce an intermittent fever. That the vapor of water will not produce this effect, is evident from the important part water plays in the physiology of the system. We know that every tissue of the body contains large quantities of water.
and in the blood this quantity is often in great excess. But the system by means of its eunomaries rides itself of this excess.

And this excess, whether taken in by ingestion, absorption, or inhalation cannot affect the system deleteriously as long as the eunomaries are in the full discharge of their various duties.

But when water is placed under peculiar circumstances may and some chemical compound be formed, perhaps isomeric with, or differing from water in the proportions of its elements, and possessing poisonous qualities, to which we may attribute these phenomena.

This looks more plausible than
To believe that it depended either upon the products of vegetable decomposition or the fat of water.

But of this we have no proof.

This subtle poison, whatever it may be, no chemist has ever been able to detect. We can know its existence only by its effects.

But that such a thing as malaria does exist and is confined to certain localities is evident, and acknowledged by the medical world.

Although this subtle poison has eluded the ken of our predecessors, it affords a broad field for investigation, and be that would be so fortunate as to ascertain its true cause and nature.
will be a benefactor to his mind
and an honor to his profession.

Geo. T. Emerson