Some practical observations on so-called malaria being a water-borne disease / by W.H. Daly.

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SOME PRACTICAL OBSERVATIONS ON SO-CALLED MALARIA BEING A WATER-BORNE DISEASE.

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The writer has for the past twenty or more years spent probably an average of two months annually in the recreative sports of the field, forest, and stream. The largest proportion of these holiday jaunts have been passed in the lowlands, or in the swamps of the lakesides, or seaside, in the pursuit of wild fowl shooting.

Many, if not most, of these regions were, and are generally, admitted to be intensely malarial in character, notably the vast Kankakee swamps in Indiana.

In former years, before the writer had noticed certain conditions and used certain precautions, he was subject to malarial disease of a continuous or recurring type, clearly traceable to his having drunk the shallow well- and swamp-water of these regions.

The observations and studies of the subject and the investigations made in the various districts from Manitoba to Louisiana, and all along the southern coast of the Atlantic Ocean and of Cuba, Yucatan, and other districts in Mexico, lead the writer to the conclusion that so-called malarial disease is not easily if at all contracted by inhaling so-called malaria or bad air of the low swampy or new lands, but it is distinctly, if not almost exclusively, due to drinking the water that has come into contact with and become infected with the malaria germ or infusoria that exists in the earth and waters of the swamp and lowlands.

This germ does not ordinarily, if at all, float in the air during the day, neither does it find easily a vehicle in the fog or vapors of the night.

Indeed it is difficult to understand how one is to avoid the night air, even if it is conceded to be deleterious—a condition I much doubt. Does any other air than night air exist at night? Is it possible to breath any other? Is there any habitation sufficiently sealed against the outside air to make the breathing of outside night air impossible?

I understand the United States Navy Department years ago made, and they may still, for aught I know, a point of advising the anchorage of war vessels in streams and waters of malarial districts so as to avoid the air currents from the swamps nearby, lest the air laden with poison should be inhaled by the officers and sailors.

I will venture to say that no air from the foulest swamp can be more deadly than the foul air that is produced by the emanations from the air-passages and from effete matter from human beings crowded into the hold of a ship. That sort of air is, indeed, malarial, while the swamp air I believe to be comparitively safe and wholesome; but of the swamp-water beware if for any other purpose than ablution.

I am fully aware that in taking the ground I here occupy I may be considered to be too radical, and that my position may be regarded as untenable. If so, I can only answer that every observing medical man must, and is bound to, tell honestly and fairly what he has gathered from his own experience, observation, and studies; and it must be considered that my observations have been prolonged, extensive, and fairly intelligent, and made, not, so to speak, second-hand, but personally and upon the ground, and in districts distinctly malarial, and that during the years that myself and others had been careful to avoid the mists and fogs of the malarial regions, as well as the outdoor night air, but all the while using the surface-, swamp-, or shallow well-waters for drinking, I as well as others of my friends suffered from malaria so-called; but later on and during the past twelve years, while abstaining from drinking the surface- or well-water, and with the utmost freedom of exposure to the outdoor night air, fogs, rain and mists at all times, night and day, we have enjoyed complete immunity.

Whoever has shot wild fowl knows full well that the best

opportunities come to a sportsman amid storm and rain, with the early mists of the morning, and when the marshes are redolent with the vapors of the evening, just at nightfall, when the wild fowl are flying to and fro, seeking their favorite haunts in the marshes to sleep.

Then there is the journey of miles homeward to the club-house, farm-house, or camp, in the small ducking boat that brings one to the fireside possibly not earlier than eight to ten o'clock at night, so that exposure is positive and close to the marsh and water as one is sitting in a small boat.

I mention the foregoing as relevant, since the profession are still the readers and learners from the classic text-books of Watson, Tanner, and Niemeyer, not to speak of many others.

Tanner says in his most attractive style: "It is worth remembering that malarial districts are most dangerous at night, and that this poison lies low;" or, as Dr. Watson says, "loves the ground." And Dr. MacCullach says: "It is a common remark in many parts of Italy that as long as laborers are in an erect position they incur little danger, but that the fever attacks those that sit or lie on the ground."

All of the older and most of the new text-books lay stress upon the strictly malarial feature of the disease, that is to say, that the poison is breathed into the system.

Some of the newer writers, it is true, give some prominence to the source of contagion, from drinking the infected land- or swamp-water, but still adhere to the belief in the medium of the air as a chief or equal source of infection.

This latter belief is a gross fallacy, in my opinion, and will not stand the test of practical proof if the factor of drinking land- and swamp-water is eliminated.

In recent years, through the digging up and renewing of the aqueducts which for centuries had supplied the city of Rome with drinking-water, it was discovered that many of her wealthy and leading citizens had, during the period of her grandeur and decadence, actually been guilty of clandestinely draining the sewage from their country and suburban villas into the very aqueduct that supplied the city and their fellow-citizens with drinking-water.

Can there be a greater sample of public degradation, and can any evidence be stronger than this that a larger part of the Roman fever, which is unmistakably malarial, has been due to contaminated drinking-water rather than to infected air?

As I say, during these earlier years that I and others of my sportsmen friends drank freely from the running brooks and streams and from the swamps, we also endured, for the sake of the sport of shooting wild fowl, an occasional shake with the ague and many of the other disagreeable symptoms that, while they do not amount to an actual chill, one feels about as wretched as it is possible for one to feel and go about. And I and the others were all the time taking heavy doses of quinine as an antidote. In fact, no trip was ever taken to the swamp for wild fowl without plenty of quinine and a little whiskey.

But during the past twelve years, and since we have avoided drinking the surface-water, and, when it was possible, even the deeper well-water of the region, unless after boiling the same, I have been quite free, as have been others of my friends whom I have advised.

If one cannot get boiled water any other way, it is well enough to take the water that has been boiled in a brewery, viz., in form of beer.

It is now generally conceded that the malarial germ is the cause of the fever.

Lemaire, Klebs, Cardeli, and others have isolated certain forms of bacilli which they believe to be specific of malaria.

Laveran first, and Richard and Marchiafava, and Cella also found in the blood three forms of protozoa, one of which particularly produced intermittent fever by inoculation. The germ is infusorial and exists in the water and soil.

E. Maurel, in the *Semaine Médical*,[1] announced to the French Association for the Advancement of Sciences that it is always easy to distinguish a healthy from a malarial soil.

The water taken from the malarious districts always contains numerous micro-organisms, some of which are possibly Laveran's corpuscles in an early stage of their development; but it is not yet certain that the germ has been isolated outside of

[1] Annual Universal Medical Sciences, 1888.

the human body. In regard to the real value of Laveran's corpuscles in the production of malaria, he himself believes them to be indirectly concerned in the production of the infection, although their relation to it has not been absolutely demonstrated.

It is probably in accordance with Rougette[1] that the malarial microbe gives rise to symptomatic fever, by reason of its activity in producing leucomaines. During the access of fever the microbe is eliminated by the natural emunctories.

The liver is a destroyer of leucomaines;[2] but as my paper is upon the question of the manner in which the so-called malarial infection enters the human body, whether through the air-passages or the digestive tract by means of drinking-water, I, therefore, must not wander into other phases of the subject.

I am firmly convinced that further investigation will as surely lead us to the knowledge that so-called malaria is, strictly speaking, a water-borne disease, as it is that we are now being led to the right conclusion by Ernest Hart and others that cholera is also a water-borne disease, and it is our duty to educate the profession and the public, especially those who make up the population of the malarial districts, that it is the water they drink, and not the air they breathe, that decides whether they will suffer from malaria or not.

It is a great pleasure to have come into contact with many of the intelligent medical men who practise in the southern and malarial districts of our country, who are far in advance of the vague and obsolete views of many of our writers of text-books.

If there were as many such men in our profession as there ought to be, the use of quinine as an antiperiodic would soon become unnecessary.

In fact, I regard the malarial type of fever in the United States at least as clearly preventable as any other disease that we have to deal with, and by the simple method of drinking only carefully collected and uncontaminated rain-water, which, for a simple precaution, might be boiled.

I have observed on some of the plantations of the South that among certain cattle and horses that have been shipped from

[1] L'Union Médical.

[2] Annual Universal Medical Sciences, 1888.

the North for breeding purposes many of those that were turned out on the marshes to drink the surface-water sooner or later sickened and died with what was known as climatic fever (malarial), but the animals that were kept stabled and drank only the deep well- and cistern-water would thrive as well as they did in the North.

In the *British Medical Journal* of October 21, 1893, Oswald Baker, Surgeon of the British Army, writes that on the steamer "Scindia," which sailed from Bombay for Marseilles on August 5, 1893, there occurred several cases of acute malarial fever that were, from the account given by Mr. Baker, clearly traceable to the drinking-water, which was taken on the ship at Bombay, and not in any way due to the air that the patients breathed.

It is a pleasure to note in the medical journals—the great educators of those who write text-books—the accumulating testimony of careful observers, who agree with my observations and experience herein set forth.

In the *Medical Record* of January 28, 1893, E. D. S. writes "that five out of a family of six adults and children had suffered pretty continuously for the past six years with malaria (so diagnosticated by the best physicians), at times being quite seriously ill; with temperature 104° F.; quinine was administered. Seven months ago a Pasteur filter was introduced, and quickly every symptom of malaria disappeared. Another family had the same experience."

Dr. L. L. Von Wedekind, U. S. N., in the *Medical Record* of February 11, 1893, gives a history of some cases which indicate that to drinking the land-water on the coast of South-western Africa was traceable the cause of malarial fever.

The Doctor further says "that land-water is considered as a cause, and a prominently exciting cause, with naval medical officers," as is proven by the orders issued by medical officers of the different ships serving on the coast, prohibiting the use of native water for drinking purposes.

In the region about Elizabeth City, N. C., some years ago, in conversation with some well-educated medical men—among others Drs. W. J. Lumsden and Oscar McMullen—who were

and are careful observers, I learned that their outbreaks of malarial fever (fresh cases) usually occurred in the early autumn, following a period of rainfall and a few subsequent warm days, but new cases only occurred among those who drank the land-water.

The inhabitants who use the storm-water, carefully stored in clean cisterns, especially above ground and uncontaminated with the soil-water, are immune from the attacks, and while the disease during the past two years has presented some varying features to these gentlemen, such as catarrhal jaundice, of an endemic character, traceable to malarial influence, as well as other forms, there does not appear to be anything to controvert the evidence that these patients took their malaria in water, either as drink or upon the leaves of the turnip top, greens, kale, spinach, cabbage, or other vegetables that grow close to the ground and have surface-water on their leaves. These vegetables are abundant and usual in the culinary supplies of the region.

One may ask why do not the New Yorkers and Philadelphians also get malaria from the same surface-water, dew, and moisture upon the leaves of these same vegetables shipped from this productive region to those cities. The answer might well be that they do, unless the leaves are well washed in uncontaminated running water before being presented for use as table food.

Dr. R. E. Boyken, of Smithfield, Isle of Wight County, Va., informed me that thirty years ago he had studied this subject, and had since induced as many of his patients and fellow-citizens of his county as possible to adopt the cistern-water as a beverage, and all those families who fell in with and followed out his views are of healthy and ruddy complexion and free from malarial disease, while those who continued to drink the land-water are subject to the attacks of malarial fever.

That so-called malaria is an autocthonous disease, finding its way into the human body through the food channels, there can be little or no doubt in the mind of the original and unfettered observer.

It is true we have not found what we know to be the

malarial germ and isolated it outside the human body, and we are not sure either that we have found the typhoid germ in the soil or in the suspected drinking-water; yet we are quite sure that we trace typhoid origin through these sources.

Let us eliminate the atmospheric factor in malaria by noting in each case if the soil, surface, or shallow well-water has been drank by the patient. If this has been done, the case is obviously one that has been exposed to the infection in its most potent form.

There can be no scientific question more strictly in the line and touching the true object of this learned Association than this, and it is to be hoped that in the future papers will be invited from those who have had an opportunity of observing data bearing upon this the chief phase of this unsettled question.

We do not want merely a rehash of old dogmas from the text-books, or echoes from time-worn unfounded opinions, garbled by one so-called authority from an antecedent authority, but let us have the fresh and unbiased observations and views of the thousands of intelligent medical men who have the opportunity in their own neighborhoods to make original observations and report them.

Dr. W. J. Lumsden, of Elizabeth City, North Carolina, recently wrote me that his case-books show fully 98 per cent. of patients that have suffered from malaria for the past ten years got their supply of drinking-water from the dug wells of the region.

Those inhabitants who used the water from driven wells, thirty or more feet deep, have had unmistakable improvement in the health of their families. A driven well is made by driving an iron pipe with a perforated inlet down deep into the earth through strata of clay or marl which seals off the surface land-water. So it will be understood that the water from the driven wells is pretty securely sealed against surface-water by its small calibre and tight fit in the soil through which it penetrates.

Since writing the foregoing article I observe the growth of medical opinion is gaining strength along the lines and in the direction of the contention of this paper.