Winans 2 (Ross

GLEANINGS

FROM VARIOUS AUTHORS

ON

SANITARY MATTERS.

SELECTED, PREPARED AND PUBLISHED

BY

ROSS WINANS.

BALTIMORE:
JOHN P. DES FORGES.
1875.

GLEANINGS

FROM VARIOUS AUTHORS

ON

SANITARY MATTERS.

SELECTED, PREPARED AND PUBLISHED

BY

ROSS WINANS.

BALTIMORE:
JOHN P. DES FORGES.
1875.

GLEANINGS FROM VARIOUS AUTHORS ON SANITARY MATTERS.

[From the *New American Cyclopedia*, p. 97.]

MALARIA.

Malaria, or Marsh Miasm.—An emanation which produces in mankind intermitting and remitting diseases. This poison is not cognizable by the senses, nor can it be detected by chemical tests; it is known only by its effects. The concurrence of vegetable matter susceptible of decay, of moisture either on the surface or a short distance below it, and of a certain elevation of temperature, is necessary for its evolution; of these, long continued heat has the greatest influence in increasing the intensity of the poison. Comparatively harmless in the northern part of the temperate zone, it becomes malignant and deadly in places equally favorable to its production, just in proportion to the increase in the mean annual temperature. As the term marsh miasm implies, marshes, whether salt or fresh, and wet meadows are especially subject to malaria, particularly when drying under the influence of a hot sun. Grounds alternately flooded and drained are fertile sources of it, and it is this

which renders the cultivation of rice so deleterious. Grounds which, from the nature of the sub-soil retain the moisture a short distance beneath the surface, though that may be dry and parched, are favorable to the production of malaria. The process of clearing a new country of its woods, and thus exposing the soil to the full action of the sun, is commonly followed by the prevalence of fevers; and the same evils often follow the ploughing up of meadow lands. It is not necessary that the amount of the vegetable be great or its growth recent, since malarious diseases have often been caused by the drainage of ponds and lakes; and the fevers that prevailed at Bourg-en-Bresse ceased on filling in the half-wet ditches of the fortifications. The low grounds on the margin of lakes and the alluvial lands bordering rivers in warm countries, are always plagued with malaria. In India, ground covered with low thick growths of brushwood, or of weeds and grass, called jungles, are so well known to produce malarious fevers, that they are termed jungle fevers; even open woods in tropical climates are productive of malaria. The steeping of hemp and flax, and the decay of vegetable refuse, potatoes, &c., in confined localities, as cellars or the hold of a vessel, have resulted in fever. The quantity of water required for the generation of malaria is not large, a marsh completely covered with water being innocuous; it is only when the moisture is drying up under the

influence of a hot sun, that it becomes pestilential. So in tropical climates disease prevails chiefly at the commencement and after the termination of the rainy season, and is less prevalent while the earth is saturated. In some cases the quantity of vegetable matter concerned in the production of malaria must be exceedingly small.

[From *The Baltimore Sun*, of May 4th, 1875.]

THE ORIGIN OF TYPHOID.

A discussion which is going on in New York as to the social aspects of typhoid fever has elicited from an old physician the opinion that there is something wrong about every house where a case of typhoid fever originates, and that if a good sanitary condition is maintained, nothing like fever of any kind can be generated. In nine cases out of ten it is produced by poisonous exhalations, or by impure water. In a town of 400,000 inhabitants and upwards, all surface water is impure, and that is, water drawn from wells less than thirty-five feet deep, as the water in such wells is affected by drainage or leach of feculent matter near and remote. The water in artesian wells is from reservoirs from one hundred to five hundred feet below the surface, and quite beyond the reach of all surface impurities. A householder may guard his home from all impurities, but cannot protect himself against the impurities found on his neighbor's

premises, and is at the mercy of those who may care nothing for sanitary precautions until stricken down by some malignant fever.

While all this is true, however, will some one explain how it is that typhoid fever prevails in the purest mountain atmosphere in the United States, and where the water is as pure as the air?

The explanation required by *The Sun* will be found below.

Dr. Ferguson, one of the medical officers in the army of the Duke of Wellington, says: "In Spain, during the month of May, 1809, which was cold and wet, the army remained healthy; but in June, which was remarkably hot and dry, marching through a singularly dry, rocky country of considerable elevation, several of the regiments bivouacing in the hilly ravines which had lately been water-courses, a number of the men were seized with violent remittent fever—the first which had shown itself on the march—before they could move from the bivouac the next morning; and this portion of the troops exclusively were affected with this disorder for some time. In this instance, the half-dried ravine having been the stony bed of a torrent, in which soil never could be, the very existence of vegetables, and consequently of their humid decay and putrefaction, was impossible, and the stagnant pools of water still left among the rocks by the water-course were perfectly

sweet. Yet this situation proved as pestiferous as the bed of a fen."—*On the Nature and History of Marsh Poison.* Edinburgh, 1821.

Here, however, the total absence of vegetable matter would be difficult to prove, and would be in contradiction with all other experience. Whatever may be the nature of malaria, it is most concentrated near the surface of the earth, and becomes weaker as we rise above it; it is also most active at night, probably from the influence of the sun in rarefying and producing currents in the atmosphere, and perhaps too, because it has a peculiar affinity for the fogs that are then apt to prevail. In malarious countries it is well known that exposure to the night air is apt to be followed by fever, and that those who sleep in the upper rooms of a house are safer than those who lodge on the ground floor.

While as a general rule low and damp grounds are much more unhealthy than the hills in their neighborhood, yet there are numerous instances in which this rule does not hold good, or where the reverse is the case. The experience of the British army in the East and West Indies is conclusive on this point. In many instances this can readily be explained by the effect of winds and currents of air carrying the malaria to the higher, which had been generated on the lower ground; thus in Italy the malaria from the borders of Lake Agnano reach as far as the convent of Camaldoli, situ-

ated on a high hill three miles distant. Connected with the propagation of malaria by currents of air is the fact that woods sometimes act as a screen, protecting a place from the malaria which would otherwise be conveyed to it from some neighboring source ; in Italy, fevers have frequently become prevalent on the cutting down of trees which have thus served as a shelter. It becomes an interesting question how far malaria can be carried by winds. This has been variously estimated ; probably three or four miles is the maximum. The effects of malaria are by no means confined to the production of fevers and diseases of an intermittent type, but it is only in warm climates and in certain unfavorable localities that its full effects upon the constitution are observed. In such places the growth is stunted, the complexion sallow, the limbs slender, the abdomen tumid, the hair lank and scant, and the teeth defective ; life is commonly extinguished before forty years of age, and the population is only kept up by immigration from healthier localities. Yet it is remarkable that when in such places persons live beyond their fortieth year, they frequently recover some measure of health and attain to old age.

[From the *New American Cyclopedia*, p. 501.]

HYGIENE IN THE ARMY.

The influence of *soil* and *locality* upon the health of an army is also very important. Some soils retain the

heat of the sun much longer than others; this is especially the case with sandy soils as compared with those of a clayey character, or those composed of decomposed vegetable matter. The latter, on the other hand, retain moisture with great tenacity, and hence are unfitted for healthful camping grounds. A clayey soil, overlaid with gravel, is, of all others, the worst for the site of a camp, and should never be chosen when it is possible to obtain any other. Dry, sandy positions sloping to water, to secure good drainage, with wood at no great distance, yet not overshadowing the camp, and where the sun can have access to the ground and dry up the moisture speedily, are preferable to all others. The locality should not be in a valley if it can be avoided, but rather on a hill-slope.

[From the *New American Cyclopedia*, p. 600.]

DRAINAGE.

While frequent accession of water is a great benefit to lands through which it finds a ready passage, its retention impairs in various ways the fertility of the soil. It prevents the pulverisation of the earth by the plough and harrow, and the circulation of air to the roots of the plants. It nourishes a growth of noxious plants, and in woodlands its injurious effects is seen in the production of many lichens, fungi, and other parasites upon the

trees. Even the cattle and sheep pastured upon wet lands are subject to diseases from which those in dry fields are comparatively free, and are moreover pestered by swarms of flies and musquitoes, which disappear as the same lands are drained.

Man himself is often the greatest sufferer from undrained lands, which tend to engender fevers and agues; and these are known to prevail long after the forests have been removed, showing that the cause is not so much the decay of large bodies of vegetable matter, as the cold dampness produced by the saturation of the earth with moisture. By the recent researches of Dr. H. J. Bowditch of Boston, it appears that consumption also is more prevalent in those localities in Massachusetts which are badly drained; fifty out of fifty-five districts in the State of decidedly consumptive character being found wet by contiguity to ponds or marshes, or by reason of low springy lands.

In the vicinity of the wet and unhealthy localities are often found others which appear to be as free from any tendency to induce or aggravate the disease as the distant regions to which patients are sent for recovery.

[From *The Baltimore Sun*, May 6th, 1875.]

DEATH IN THE PUMP.

The *Baltimore Physician and Surgeon* for May contains a timely and valuable editorial deprecating the use of pump water in cities, especially during the summer season. Many of the larger cities in Europe have entirely abolished pumps, and some of them have prohibited the construction of sink wells, in order to prevent pollution of drinking water in the suburbs. It has long been a belief that there is a purifying influence exercised by earth when water filters through it, but it is now well known that such condition does not apply in cities. Typhoid fever and similar diseases in large towns are unquestionably induced by germs introduced into the human system by water from pumps and similar contaminated receptacles. Latterly in Baltimore there has been great complaint of cyclops and other scalawags in the hydrant water, but the rapidly flowing streams from hydrants are not freighted with germs of disease to any such extent as is the water from pumps and wells, in which such germs appear to be preserved for an indefinite length of time. It is believed, too, that the hydrant water is salutarily influenced by the iron pipes with which it comes in contact. The poetical "old oaken bucket" may do well enough in rural districts, but the unpoetic pump-handle should be sold to Mrs. Toodles as a good thing to have in the house, but dangerous as a

drawer of water, particularly in summer. The Baltimore board of health would no doubt diminish our mortuary statistics by making a vigorous raid on pumps, supplemented by a Balaklava charge on "the bucket and shovel brigade."

DISEASE.

Schwann, of Berlin, discovered the yeast plant independently, about the same time, and in February, 1837, he also announced the important result that, when a decoction of meat is effectually screened from ordinary air, and supplied solely with calcined air, putrefaction never sets in. Putrefaction, therefore, he affirmed to be caused by something derived from the air, which something could be destroyed by a sufficiently high temperature. The results of Schwann were confirmed by the independent experiments of Helmholtz, Ure, and Pasteur, while other methods pursued by Schultze, and by Schroeder and Dusch, led to the same result. But as regards fermentation, the minds of chemists, influenced probably by the great authority of Gay-Lussac, fell back upon the old notion of matter in a state of decay. It was not the living yeast plant, but the dead or dying parts of it, which, assailed by oxygen, produced the fermentation.

This notion was finally exploded by Pasteur. He proved that the so-called "ferments" are not such;

that the true ferments are organised beings, which find in the reputed ferments their necessary food.

Side by side with these researches and discoveries, and fortified by them and others, has run the *germ theory* of epidemic disease. The notion was expressed by Kircher and favored by Linnaeus, that epidemic diseases are due to germs which float in the atmosphere, enter the body, and produce disturbance by the development within the body of parasitic life.

While it was still struggling against great odds, this theory found an expounder and a defender in the President of this institution. At a time when most of his medical brethren considered it a wild dream, Sir Henry Holland contended that some form of the germ theory was probably true. The strength of this theory consists in the perfect parallelism of the phenomena of contagious disease with those of life. As a planted acorn gives birth to an oak competent to produce a whole crop of acorns, each gifted with the power of reproducing its parent tree; and as thus from a single seedling a whole forest may spring, so, it is contended, these epidemic diseases literally plant their seed, grow, and shake abroad new germs, which, meeting in the human body their proper food and temperature, finally take possession of whole populations.

There is nothing to my knowledge in pure chemistry which resembles the power of self-multiplication pos-

sessed by the matter which produces epidemic disease. If you sow wheat you do not get barley; if you sow small-pox you do not get scarlet fever, but small-pox indefinitely multiplied, and nothing else. The matter of each contagious disease reproduces itself as rigidly as if it were — as Miss Nightingale puts it — a dog or cat.

It is admitted on all hands that some diseases are the product of parasitic growth. Both in man and the lower creatures, the existence of such diseases has been demonstrated. I am enabled to lay before you an account of an epidemic of this kind, thoroughly investigated and successfully combatted by M. Pasteur. For fifteen years a plague had raged among the silk-worms of France. They had sickened and died in multitudes while those that succeeded in spinning their cocoons furnished only a fraction of the normal quantity of silk. In 1853 the silk culture of France produced a revenue of one hundred and thirty millions of francs. During the twenty previous years the revenue had doubled itself, and no doubt was entertained as to its future augmentation. The weight of the cocoons produced in 1853 was twenty-six millions of kilogrammes; in 1865 it had fallen to four millions, the fall entailing in the single year last mentioned a loss of one hundred millions of francs.

The country chiefly smitten by this calamity happened to be that of the celebrated chemist Dumas, now per-

petual secretary of the French Academy of Sciences. He turned to his friend, colleague, and pupil, Pasteur, and besought him with an earnestness which the circumstances rendered almost personal, to undertake the investigation of the malady. Pasteur, at this time, had never seen a silk-worm, and he urged his inexperience in reply to his friend. But Dumas knew too well the qualities needed for such an inquiry, to accept Pasteur's reason for declining it. "Je mets," said he, "un prix extrême à voir votre attention fixée sur la question qui interesse mon pauvre pays ; la misère surpasse tout ce que vous pouvez imaginer." Pamphlets about the plague had been showered upon the public, the monotony of waste-paper being broken at rare intervals by a more or less useful publication. "The Pharmacopœia of the silk-worm," wrote M. Cornalia in 1860, "is now as complicated as that of man. Gases, liquids and solids have been laid under contribution. From chlorine to sulphurous acid, from nitric acid to rum, from sugar to sulphate of quinine — all has been invoked in behalf of this unhappy insect." The helpless cultivators, moreover, welcomed with ready trustfulness every new remedy, if only pressed upon them with sufficient hardihood. It seemed impossible to diminish their blind confidence in their blind guides. In 1863, the French Minister of Agriculture himself signed an agreement to pay 500,000 francs for the use of a remedy which its

promoter declared to be infallible. It was tried in twelve different departments of France, and found perfectly useless. In no single instance was it successful. It was under these circumstances that M. Pasteur, yielding to the entreaties of his friend, betook himself to Alais, in the beginning of June, 1865.

As regards silk husbandry, this was the most important department in France, and it was also that which had been most sorely smitten by the epidemic.

ORIGIN AND PROPAGATION OF CONTAGIOUS MATTER.

Prior to Pasteur, the most diverse and contradictory opinions were entertained as to the contagious character of pébrine; some stoutly affirmed it, others as stoutly denied it. But on one point all were agreed: "They believed in the existence of a deleterious medium, rendered epidemic by some occult and mysterious influence, to which was attributed the cause of the disease."

Those acquainted with medical literature will not fail to observe an instructive analogy here.

We have on the one side accomplished writers ascribing epidemic diseases to "deleterious media," which arise spontaneously in crowded hospitals and over ill-smelling drains. According to them, the *matter* of epidemic disease is formed *de novo* in a putrescent atmosphere.

On the other side we have writers, clear, vigorous, with well-defined ideas and methods of research, contending that the matter which produces epidemic disease comes always from a parent stock. It behaves as germinal matter, and they do not hesitate to regard it as such. They no more believe in the spontaneous generation of such diseases than they do in the spontaneous generation of mice. Pasteur, for example, found that pébrine had been known for an indefinite time as a disease among silk-worms. The development of it which he combated was merely the expansion of an already existing power — the bursting into open conflagration of a previously smouldering fire. There is nothing surprising in this; for though epidemic disease requires a special contagium to produce it, surrounding conditions must have a potent influence on its development. Common seeds may be duly sown, but the conditions of temperature and moisture may be such as to restrict or altogether prevent the subsequent growth. Looked at, therefore, from the point of view of the germ theory, the exceptional energy which epidemic disease from time to time exhibits is not out of harmony with the method of nature. You sometimes hear diphtheria spoken of as if it were a new disease of the last twenty years; but Mr. Simon tells me that from about three centuries ago, when tremendous epidemics of it began to rage in Spain (where it was named garrotillo), and soon

afterward in Italy, the disease has been well known to all successive generations of doctors; and that, for instance, in or about 1758, Dr. Starr, of Liskeard, in a communication to the Royal Society, particularly described the disease, with all the characters which have recently again become familiar, but under the name of *morbus strangulatorius*, as then severely epidemic in Cornwall; a fact the more interesting, as diphtheria, in its more modern reappearance, again showed predilection for that remote county. Many also believe that the black death of five centuries ago has disappeared as mysteriously as it came, but Mr. Simon finds that it is believed to be prevalent at this hour in some of the northwestern parts of India.

Let me here state an item of my own experience. When I was at the Bel Alp last year, the clergyman appointed at that station received letters informing him of the breaking out of scarlet fever among his children. He lived, if I remember rightly, on the healthful eminence of Dartmoor, and it was difficult to imagine how scarlet fever could have been wafted to the place. A drain ran close to his house, and on it his suspicions were manifestly fixed. Some of our medical writers would fortify him in this notion, while those of another school would deny to a drain, however foul, the power of producing a specific disease. After close inquiry, he recollected that a hobby-horse had been used both by

his boy and another that a short time previously had passed through scarlet fever. Drains and cess-pools are by no means in such evil odor as they used to be. A fetid Thames and a low death-rate occur from time to time together in London.

For, if the special matter or germs of epidemic disorder be not present, a corrupt atmosphere, however obnoxious otherwise, will not produce the disorder. Corrupted air may promote an epidemic, but cannot originate it. On the other hand, through the transport of the special germ or virus, disease may develop itself in regions where the drainage is good and the atmosphere pure.

If you see a new thistle growing in your field you feel sure that its seed has been wafted thither. Just as sure does it seem that the contagious matter of scarlatina, or any other contagious fever, has been transplanted to the place where it newly appears. With a clearness and conclusiveness not to be surpassed, Dr. William Budd has traced such diseases from place to place; showing how they plant themselves at distinct foci among populations subjected to the same atmospheric influences, just as grains of corn might be carried in the pocket and sown.

Hildebrand, to whose remarkable work, *Du Typhus Contagieux*, Dr. de Mussy has directed my attention, gives the following striking case, both of the durability

and the transport of the virus of scarlatina: "Un habit noir que j'avais en visitant une malade attaquée de scarlatine, et que je portai de Vienne de Podolie, sans l'avoir mis depuis plus d'un an et demi, me communiqua, des que je fus arrivé, cette maladie contagieuse, que je répandis ensuite dans cette province, ou elle était jusqu'alors presque inconnue."

Some years ago Dr. de Mussy himself was summoned to a country-house in Surrey to see a young lady who was suffering from dropsy, evidently the consequence of scarlatina.

The original disease being of a very mild character, had been quite overlooked, but circumstances were recorded which could leave no doubt upon the mind as to the nature and cause of the complaint. But then the question arose, how did the young lady catch the scarlatina? She had come there on a visit two months previously, and it was only after she had been a month in the house that she was taken ill. The housekeeper at once cleared up the mystery. The young lady on her arrival had expressed a particular wish to occupy a nice room in an isolated tower, and in that room six months previously a visitor had been confined with an attack of scarlatina. The room had been swept and whitewashed, but the carpets had been permitted to remain.

Thousands of cases could probably be cited in which

the disease has shown itself in this mysterious way, but where a strict examination has revealed its true parentage and extraction. Is it then philosophical to take refuge in the fortuitous concourse of atoms as a cause of specific disease, merely because in special cases the parentage may be indistinct? Those best acquainted with atomic Nature, and who are most ready to admit, as regards even higher things than this, the potentialities of matter, will be the last to accept these rash hypotheses.

The germ theory of putrefaction was started by Schwann, but the illustrations of this theory adduced by Professor Lister are of such public moment as not only to justify, but to render imperative, their introduction here.

The advocates of the germ theory, both of putrefaction and epidemic disease, hold that both arise, not from the air, but from something contained in the air. They hold, moreover, that "something" to be not a vapor nor a foreign gas, nor indeed a molecule of any kind, but a *particle*. The term "particulate" has been used in the Reports of the Medical Department of the Privy Council to describe this supposed constitution of contagious matter; and Dr. Sanderson's experiments render it in the highest degree probable, if they do not actually demonstrate, that the virus of smallpox is "particulate." Definite knowledge upon this point is of exceeding im-

portance, because in the treatment of *particles* methods are available which it would be futile to apply to *molecules*. In a paper presented to the Royal Society in December, 1869, I thus described the observations which induced me to give more special attention to the question of spontaneous generation and the germ-theory of epidemic disease.