A Thesis
on Epidemics
for
The Degree of Doctor of Medicine
in the
University of Edinburgh
by
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On Epidemics

The subject which I have chosen for my thesis; the subject of morbid poisons, has been more widely discussed, than any other question, connected with Medicine, and it is not to be denied, that a very great and apparently irreconcilable difference has long existed among Medical Men, regarding the exact amount of influence exerted by contagious in the propagation of disease. But the important discoveries which have recently been made in organic chemistry, and the amount of positive knowledge which has been acquired in relation to the chemical compounds of the living organisms, and the nature of the morbid chemical actions (if I may so call them) which influence the decomposition of organic bodies, by presenting to the Profession, a large mass of scientific facts, have greatly assisted to write
Opinions, and has called for more correct reasoning on this subject than at any former period.

As the opinions we entertain respecting the origin, cause, and mode of propagation of disease, are derived, rather from a reference to the great mass of medical facts already collected, than from individual and personal experience (which students are not expected to possess), I have therefore considered this as a most suitable subject for my Thesis, and I will beg to present the following propositions.

1st. That all contagious diseases have their origin in a specific poison, which poison is formed in the living fluids of the body.

2nd. That endemic diseases arise principally from local causes — causes over which man ordinarily has control; that they are not necessarily
contagious, but that under certain circumstances some are capable of becoming intensely contagious.

2d. That epidemics arise from general atmospheric, or telluric causes, or from causes emanating from both these sources, and that they are governed by some unknown laws, and are never contagious.

Lastly, by establishing these propositions, I shall seek to prove that the employment and maintenance of all sanitary cordons and quarantine regulations (except so far as regards the isolation of the sick affected by known contagious diseases) are injurious and oppressive, and are incapable of preventing the introduction and diffusion of disease.

In order the more completely to understand this subject, it is necessary to bear in mind that the human body consists of a mass of organic elements, or chemical compounds, produced and controlled by certain vital affinities
In these various organs and tissues of the body, the most beautiful specimen of mechanism, the most perfect combination of power, and the finest development of action is displayed.

All the functions, chemical affinities, of these organs are carried on, modified, and altogether sustained by that mysterious agent called life. So long as this vital force is in operation, its action is not only opposed to decomposition and organic change in the living body; but whenever any virus, virtue of disease of any kind, is by any means introduced into the system, a vital action which is termed fever, is set up to oppose and prevent the effect of the noxious agent, and to expel it from the system. When however, this influence of life, which preserves and controls the vital elements and organic compounds of the body, is withdrawn, then decomposition and structural change commence at once, and
all the organs, tissues of the body, and of our vital organisms, are resolved back into their primary elements.

From this view of a few leading points, which are by every one received as undeniable facts, I think we must be led to consider the living body, to be a perfect laboratory, in which vital actions, affinities, combinations are being constantly performed, and further that any variation from the perfect performance of these vital actions, or functions, constitutes disease, and is an interference more or less with the chemistry of life. Bearing in mind these facts, I think it is not difficult to conceive how the introduction of any contagious matter into the system, may become a decomposing agent, which shall prove active on the body, and give rise to the formation of compounds in the blood, that are incompatible with life, and which must either have their action arrested...
by removal, or must go on increasing till life is overcome. With regard to contagious diseases I conceive the principle to be kept in view is this: the blood is a compound fluid containing special materials in which alone, the several specific poisons have power to act. Most of the contagious diseases consequently are produced and perpetuated by a specific poison which is formed originally in the blood. This poison, thus formed, on being introduced into the blood of a healthy individual, meets with the same material as that of which it is composed, and will therefore be there reproduced, and in this manner it is evident contagious diseases may be infinitely propagated. This specific poison, or cause of disease may be communicated to others by direct contact, or by the effluvia arising from the bodies of the sick, being inhaled through the medium of the atmosphere, thus find its way through the lungs into the circulation. So thi
mode of communication, the term contagious was formerly restricted, while infection was applied to the latter or that communicated through the medium of the atmosphere.

But as the same results occur in both cases (i.e., the introduction of the specific poison into the system, the terms are considered now synonymous, and are used indiscriminately by some, while others employ the term contagious only. In whichever of these ways the poison is introduced into the blood, it then finds in this fluid, a special material on which it (the poison) is capable of inducing its own peculiar action. It of producing in the system the same form of disease as its own.

A person thus subjected to this modifying action having once undergone the disease as a general rule, secured against a second attack, from which fact we must necessarily conclude that for the development of contagious diseases.
there must be a specific internal, as well as a specific external condition, and experience has proved, that the special materials on which alone the several specific poison have the power to act, though unknown as to their exact nature are various, and frequently finite in the system; that the portion of the system capable of being acted on is generally of limited quantity and not essential to existence, and that when once converted into a new and different condition and expelled, it is not for the most part again reproduced

Among the diseases which are indubitably contagious are the exanthemata, or eruption diseases, such as smallpox, scarlatina, measles, the typhoid fever, together with hooping cough, hydrophobia and a few others.

Liebig in his organic chemistry has attempted to define the action of specific poisons in producing disease, in these words, he says: "If this water..."
to chemical action) be able to impart its own state of transformation to only one of the component parts of a mixed liquid, its own reproduction may be the consequence of the decomposition of that body. Nothing thinks Professor Ludwig can be simpler than this very large question. The morbid poison changes in the blood are fermentations, just such as occur in beer-brewing. The morbid poison acting as a ferment, may be any organically existed in a state of change. The blood represents the sweet wort. The multiplication of the processes analogous to the increase of yeast in fermenting liquors, and as this latter increase is contingent on the presence of gluten in the saccharic solution, so the former increase is dependent on the presence in the blood of some specific substance admitting of transformation. This doctrine when first advanced, was received as perfectly satisfactory by the advocates of the chemical theory of the actions of specific poisons in the
on the system. But Mr. Linnaeus, I think has
plainly shown that it is altogether a too superficial
view, that there is no analogy between the
multiplication of the procus into eruptive contagious
diseases, and the increase of yeast in fermenting
liquids,

that the increase of ferment is quite accidental
in true fermentations, occurring only where some
living growth is employed as the instigator of
chemical change. With regard to the primary
origin of contagious diseases, for all specific
diseases must have arisen from some cause, at
some period of time however remote,

Sir Gilbert Blane says, 'there is not a secretion or
exhalation which may not be potenti-ated as to produce
diseases communicable to others by contact or perspira-
tion, under fortuitous circumstances, of combina-
tions so that there may be more maladies
arising our species which are still to develop
themselves under the endless combinations of the
incidents of human life, through endeavours to come.

In the history of medicine we are enabled to see instances of this. It is well understood that some diseases of ancient times have become extinct, whilst others whose existence was before unknown, have made the appearance since the dawn of medical science. According to the best authorities, until the middle of the sixteenth century small-pox was entirely unknown in the western world, although it is well ascertained that it existed in Asia, and especially in China, for an incalculable period before it was known in Europe. Here at length history teaches us that it was introduced by the wild tribes, from the plains of Tartary, who added this evil to the devastation spread by their arms, over the most civilized portion of the earth. "History," says Sir Bell, "almost forces upon us the conclusion that of all the myriads throughout the world
who have suffered from the disease, not one has been so affected, but by the propagation of new germs, from the original ones produced in the body of some ancient inhabitant of China centuries before the disease was even heard of in Europe. However this may be, I think we may now easily understand the nature, the mode of spreading, of the wonderful discovery of Jenner. Although we cannot comprehend fully the magnitude of the blessing, he has bestowed upon man by this discovery. During the period of more than twelve centuries in which this loathsome and fatal disease, smallpox, had been committing its ravages through all Europe, it is believed, that at least one twelfth of the population of the globe, had either been destroyed or deprived of health, or disfigured by this plague.

But in 1794, by adopting a course of careful scientific inquiry, Jenner exhibited observations, which led to a discovery that has
given immortality to his name, through the agency of which, the health and lives of millions are preserved, without sacrifice of pain or privation. This discovery is a perfect illustration of the agency of a specific virus on its special material. Here a process originating in the human system, and modified by passing through that of the cow, is capable of acting on that modificative material, which exists almost universally in the blood of man, and upon which the small-pox virus, when communicated to the system, exacts its power in such a manner as to neutralize it, or expel it from the system, and by this means renders unconscious the contagion of small-pox.

But to return, it will be recollected that I have stated my belief that all contagious diseases are produced by specific poisons, and that
those have their origin in the living Blood.
The number of diseases however originating in this manner are quite limited. Nearly all other afflictions except those which have already named as indisputably contagious, arise from deleterious or poisoning agents, which are found extraneous to the body, and from elements which do not exist in the blood and are therefore necessarily non Contagious.

In my second proposition it is stated that those diseases which are designated Endemic, or such as are confined to localities, and have their origin in local causes which are more or less preventible, that these are not necessarily ordinarily Contagious, although from mismanagement, and other causes, they may become highly contagious.
The most fruitful cause of Endemic disease are microscopical exhalations, either exhalations arising from the decomposition of vegetable matter, or
mixed products of animal and vegetable matter, emaciations from stagnant water, from cesspools, and from bad and imperfect drainage, the use of putrescent food, imperfect nutrition &c. These causes may operate singly & separately or may act in combination.

Now I conceive that epidemic diseases, on the other hand, differ from the specific, and the endemic diseases, in as much as they in themselves are never contagious, as they arise from causes which do not emanate from the bodies of the sick but from external atmospheric influences. They are extended over the earth's surface, partially so generally that are governed by unknown laws over which apparently man has no control.

Not so however does it appear to be with the local or endemic causes of disease, which I have just enumerated above, for these such as putridous exhalations, putrescent food, foul water, offensive effluvia, and imperfect
ventilation (all of which are more or less, under the control of man) are the poisons which operate in the system, or special liability or predisposition to disease, and which impart to all epidemics their great power.

This relation which these two great causes of disease bear to each other is one of the highest importance; it is a subject, which of late has received a large share of attention from scientific investigators, and one in which not only medical men, but all who regard the health and welfare of their own families, or of the communities in which they dwell, should be deeply interested.

That, what I would convey in my last proposition may be better understood, I will endeavour to explain the modes of operation of these predisposing causes upon the living body, and their connection with the great exciting cause of disease: Epidemic Influence.

You will please bear in mind the proposition.
I have already laid down (viz. that the specific
poison, from which contagious diseases arise,
originates in the living blood, and that on being
introduced into the circulation of a healthy
individual, it there finds the same malleable
material, as that of which it is composed, by
a peculiar chemical change, in which a repro-
ductive ensues.

Now it is admitted I believe by most Pathologists
that the poison of epidemic diseases also acts upon
the blood by determining some chemical change,
probably catalytic. But this poison instead
of being engendered within the body, is always
introduced from without, and besides experience
has established this important fact, that the
presence in the blood of some special element
admitting of transformation, is necessary
to enable the poisons of epidemics to be developed
in the system. Of this peculiar produced
substance, nothing definite of its intimate nature
is knowing; we do know however—that this material does not exist originally in the blood, like the materials morbi, of contagious diseases, but like the poison of epidemics is always introduced from without, and as it arises from local causes, which exist in our midst, may be made subject to our control. I am persuaded that the presence of such a matter is absolutely necessary in a great majority of cases for the mortificatory action of epidemic poisons, which poisons have no direct action upon the healthful blood, and the liability of each individual among a number who may be concurrently exposed to the same epidemic poison, will mainly depend upon the degree in which his blood may be charged with the matter in question.

Whenever the cholera atmosphere, for example is conveyed to any place, what is true of cholera poison is true also of the poison of a large number of other epidemics,
its diffusion & severity among the inhabitants of that place will depend entirely upon the predisposition to the disease existing in their systems from local causes, to which I have already referred. With the origins of these poisons which give to epidemics atmosphere their peculiar mortifying qualities, science has yet to discover. It is only known that in the very same localities, & under identical circumstances, so far as can be traced, different forms of epidemic diseases prevail at successive periods: as typhoid or typhus fever, dysentery, epidemic cholera, yellow fever &c. But could the causes from which these epidemic poisons emanate be discovered, it is not probable, that the extermination of the diseases which they produce could be accomplished by medicine.

Like all other phenomena of nature, these probably are beyond the control of man. But although no definite knowledge on this
Joint has been acquired. Experience has taught observations made in every part of the world where epidemics have prevailed, have shown whenever during their prevalence, any portion of the inhabitants are exposed to any one or more of the local causes, already enumerated, Malaria, putrid food, foul water, or atmospheric impurities of any kind or kind, that upon those thus predisposed, the epidemic poison, whether it be cholera, typhus, or yellow fever, first seizes, and then manifests its highest degree of intensity.

On the other band all who have observed the progress of epidemic diseases, will bear testimony, that without any of these deleterious influences the power of epidemics is completely

insidious.

By viewing the matter therefore in this light, it is easily explained why some localities do remain exempt from disease sometimes for
for years, when without any apparent cause, a severe epidemic will be developed. The existing local cause of disease in such places, may, I often do, prevail for several seasons producing in the mean time only the endemic affections which are peculiar to the localities, or to the nature of the poison.

But this poison is the epidemic morbific influence added to the local poison, therefore is developed some variety of Symptomatic disease, which form of disease will characterize the nature of the special agent, with which that atmosphere is charged, whether it be the poison of influenza of Cholera, or of Yellow Fever.

The conclusion therefore to which a consideration of these facts and observations lead, are.

1st. That the invasion and development of Epidemic Disease, the existence of two conditions is absolutely required, namely the presence of the Epidemic poison in the atmosphere, an agent.
not subject to man's power, and the introduction into the system of a morbid matter that has been germinated in some external source, and consequently is preventable (by man).

And 2nd. That the invasion of cholera, of yellow fever, or other epidemics, is as effectually prevented, by preventing the accumulation of certain morbid materials in the system, as by arresting the development of the epidemic poison itself, which acts upon it.

Now to this morbid condition of the blood, is a condition effects entirely by local causes, over which man has efficient, and positive control. And these views do not appear to be based on theory, but upon opinions founded on observation, and corroborated by the experience of many scientific observers, among whom I may mention the Register General of England, who in the fulfilment of his official duties, has for many years.
enjoyed a wide opportunity for studying the nature, and course of the great epidemics of the earth.

"The cause of Syphilis, of Influenza, of Cholera, and of the like (epidemic) diseases" he affirms, "will not long remain in indelible possession of the earth, or the air. *** The syphilis disappears when the dogs, which are liable to become mad, or to be bitten, are, every summer, removed by police regulations. So will the other Zymotic diseases give way, when the putrid, decaying, noisome atmosphere, exhaled by church yards, by slaughter houses, by the tanks of dirty water, by cess pools, sewers, and crowded dwellings, is desecrated and purified. The sewers and cess pools now under our houses will inflict more pain, and destroy more lives, than ten thousand mad dogs let loose in the streets, and they may as certainly be removed:"

If these words be correct, it must
be plainly understood, that it is possible, not only greatly to mitigate the severity of these epidemics' visitations, but also to keep the greater number of them absolutely at bay, by adopting those sanitary measures which are demanded for the removal of those local causes of disease, which so greatly abound, especially in large cities. And it must be equally evident, that, cannot be accomplished by stretching sanitary cordon around our borders or by establishing quarantine restrictions at our ports of entry.

I cannot advocate the gloomy theories of Wallace, and of Malthus, that Providence, for the purpose of furnishing free, and in order to set bounds to the increase of mankind, hath ordained that pestilence, and famine shall from time to time, occur, that the earth be not overstocked, and men be left under the cruel necessity of killing one another.
Rather would I maintain the benevolent doctrine of Self-sufficiency, that there exists no denial of Providence, nor any insuperable obstacle, in the constitution of nature, to the development of her vast, and varied resources, for surely the "eminence regions of unbounded fertility, long successions of spring groves, trackless pastures watered by oceans, rivers formed to let in wealth to great continents, and islands which lay calmly on the breast of the crystal seas, were not created for eternal solitude and silence."

Until these are peopled and the earth is indeed "replenished and populated" the command and the blessing, "increase and multiply," must continue unrepealable by its Great Author.

Still I believe that as the tornado, the lightning, and the storm have their appointed tasks,
to have epidemics their destined mission
and like these, are the agents of a woe, and
a beneficent creator, and are intended to
effect ultimately a removal of these social
ills which through man’s inhumanity
to man, still makes “countless thousands
mourn.”