

in relation to his career and his work. How much of interest must lie behind these brief and practical records! But the story of his life is long forgotten and only the story of his life's work remains in his prodigious effort to comprehend phthisis and consumption without the aid of that explanation and simplification which was to come only in our own time or shortly before it in the observations of Villemin and the discoveries of Robert Koch.

Let us, as we cannot come by the detailed knowledge that would be necessary to write his life, examine his great work, *Phthisiologia* (seu Exercitationes de Phthisi, London 1688, and in later editions) and endeavour to understand his point of view and his convictions about a disease which, although now well understood from the aetiological side, still keeps us guessing as to how to diagnose it before it has made sufficient progress to be entirely recognizable and, when diagnosed, how best to treat it in the light of our present knowledge.

Morton, taking the word phthisis or consumption to mean exactly what it does mean, *a wasting of the body from any cause*, divides his work into three books, the first dealing with wasting in general, the second with a wasting from a consumption of the lungs, and the third with a symptomatic consumption, a consumption of the lungs caused by and depending on some other preceding disease. When we think how he was straightened for diagnostic facilities and impeded by the want of what we now enjoy in the way of confirmatory measures, this division seems a very sound way of approaching the subject. It was, of course, impossible for him to exclude from it errors of one kind or another. Wasting diseases, for instance without fever, cough or shortness of breath, might still be due to the tubercle bacillus though all unrecognized for tuberculosis! "Fear, Grief and Anger," too, are hardly to be accepted as causes of an "original" consumption of the lungs nowadays, although they may play a part in the psychology of chronic phthisis now so much studied, but we can easily follow his idea in including them. We can readily admit, too, that there may "remain and lurk in the Blood some indelible Impressions and the seeds of a

Consumption that will afterwards follow," as he correctly says of his "symptomatical" phthises. Is not "allergy" an impression on the blood? And we need not quarrel with the expression "Seeds of Consumption" when we recall that tubercle bacilli, freed from foci that otherwise might have remained latent, are often liberated by antecedent diseases such as measles, whooping cough and other such crises.

Let us turn, now, to the consideration of some of the cases recorded by Morton in his three headings:

In the first, or the type of phthisis without a cough, fever or shortness of breath, he treats of "consumptions" from "some evacuation," from "bleeding" from haemorrhoids, from the throat by hawking, from the vessels of the womb, from the urine and from the lungs; in the latter case, however, he does not refer to either haemoptysis or to the vast bleedings which sometimes take place in tuberculosis, but to other occasional haemorrhages; those following bronchiectasis, perhaps, though he did not, of course recognize this condition. He goes on to consider other causes of wasting without lung symptoms; "consumption proceeding from apostemes and large ulcers" for instance, in one case of which he describes a patient who had a swelling from which, when opened, came out first water and then pus and, finally, "small bags filled with water," at least five hundred at one evacuation! It has been my lot to deal with such a case. It was an echynococcal cyst of the right lung. In Morton's instance, the aperture was deliberately kept open for a year and a half "after which she was plainly free from her state of marasmus" and got quite well again. This case indicates clearly the type for which Morton was seeking in his first varieties of wasting; plainly *not* a tuberculous type. And yet he sometimes runs into excusable error. He describes, for instance, a consumption "happening to nurses giving suck beyond what their strength will allow" and cites a patient who "at length falling into a consumption of the lungs with a cough and shortness of breath and hectic Fever, she died plainly choak'd." Here he describes the symptoms correctly but attributes them wrongly but naturally to the long lactation instead of to the tubercle bacilli to which

the lactation gave the opportunity. He gives a first-rate account of yet another case, a consumption "proceeding from a Dropsie," which happened in a child of two years old with a large collection of fluid in the abdomen. At the autopsy the nature of the disease is obvious to our eyes though, to a certain extent, hidden from his. I use the words "to a certain extent" advisably for Morton made as good an attempt as was possible at the time to comprehend the case from the post-mortem point of view. "But when we opened the Body" he says, "after he was dead, we found, for all the difficulty of Breathing and the long coughs he had had, the lungs themselves sound, without any Distemper, but only that, in the hinder part the Wind-pipe, there appeared a great many glands and those pretty large and hard, which made a considerable pressure upon the chyle-duct itself almost in that part where it arrives in the Subclavian Vein; and they were of so great a weight and bulk that it seemed very difficult, if not plainly impossible, for the chyle to pass into the Blood by reason of the pressure they had made upon the Duct which had straightened it as if it had been tied with string." To a man looking for the kind of tuberculosis of the lung to which he was well accustomed, the obviously healthy state of the lungs of this child must have seemed evident, except perhaps, for a primary focus which was not likely to be noticed. The big tracheo-bronchial glands, however, and especially that pressing on the thoracic duct, are beautifully indicated, and the train of symptoms correctly described. "From what I have said" he adds, "it is plain almost to demonstration, first, that these Tubercles or tumified glands of the Lungs did at first proceed from the ill method of curing the Inflammation in his Lungs, that is for want of timely Bleeding and Expectoration." This remark we may pass over with a shrug as we have not yet a cure for the primary complex. But he goes on: "Secondly, that as the troublesome and dry cough was caused by the condition of the Vessels of the Lung which convey the Air, by these swellings, so the difficulty of Breathing proceeded from the pressure of the extra-vascular chyle below the midriff." He might better have attributed the difficulty of breathing to the same cause discovered by him as the

reason for the cough. "Thirdly, that this Consumption was not a true Consumption of the Lungs; because, though there were Tubercles or swellings, yet they were not Apostemes nor Ulcerated." As I have said above he was not in a position to know about the primary complex and its occurrence in healthy lungs. "Fourthly that the Dropsie did proceed from a rupture of the small Lacteal Vessels in the Belly; and, Lastly, that the rupture of the small Lacteal Vessels was caused by that continued pressure which the swellings in the Lungs made upon the upper part of the Chyle-duct." This conclusion seems entirely justified by the facts of the case and, moreover, redounds, I think, to the credit of a pathologist working in the uncertain light of the time.

These two instances are quoted to show how one depending on the absence of symptoms, at first, pointing to lung trouble might be deceived as to the nature of cases and regard certain of them as not tuberculous although the evidence is now quite clear that they were so.

But, this is not to deny that Morton was right in most of his instances and that the consumptions caused by salivation, etc., were, as he thought, of a general nature and not tuberculosis. It would be difficult, however, to say so much for all his types. We refer particularly to the consumptions "caused by Profuse Sweats" and those brought about "by many and large Scrophulous Kernals preternaturally seated in the mesentery . . . by which the passage of the nutritious Liquor, which is separated in the Intestines and taken in by the mouths of the Lacteal Veins into the Mass of the Blood is either totally or in part hindered." Here, while applauding the very rational way in which the essential lesions were discovered and the symptoms rightly attributed to them, we must again invoke subsequently acquired knowledge to attribute them to their true source. The fact is that it is very difficult to differentiate the majority of cases of wasting and to attribute them to diseases other than the tubercle bacillus without having a more thorough grip on the causation of tuberculosis than was possible at that time.

In passing to the Second Book, that which treats "of an

Original Consumption of the Lungs," we pass over, at this stage, his ideas as to the causation of phthisis but we shall return to them later. We turn, rather, to the signs, either "Prognostic, Diagnostic or Pathognomonic" which served him in his examination of cases. Under "Prognostic" he repeats about sixteen of the "causes"; "A troublesome and chronic Heat," etc.; all recognized nowadays as the results, not the causes, of tuberculous disease of the lungs. Morton enjoins, however, certain rules that guided him in the prevention of subsequent disease in those who seemed likely to develop it and which we might very well lay to heart today. "Therefore in the preventing of a Consumption (which is very much easier than the cure of it)" he writes, the great thing is "to take all possible care that no error be committed in those six things that we call 'non-natural.' For in this so slippery a state of Health they are wont, upon every little occasion to fall headlong, into a Fatal Consumption. As, for example, they ought to be prudent in choosing their Meat and Drink that the Chylous may be made to abound with good juice and that the Nourishment may create very little trouble to Nature in digesting and dispensing with it. Let them also heed not to eat too much food, though it be such as affords a good Juice, as also that they do not drink too much Wine or Strong Liquors. *Secondly*, let them sleep in the fore-part of the Night: but let them avoid sleeping in the day time, yea, and sleeping too long in the morning; because such sleep is wont to retain and heap up a great load of Humours in the Habit of the Body. *Thirdly*, let them use every day moderate exercise and rubbing for a good while together, to fetch out the dispirited Humours from the Habit of the Body by the pores of the Skin. *Fourthly*, let them strictly avoid all strong Purges; for as much as they not only weaken Nature but also, by putting the Blood into too great a motion with their sharp Particles, they make it grow acrid and hot and bring it into a more serious and colliquitave state; upon which a Catarrh and a Consumption are wont to follow. *Fifthly*, let the patient by all Lawful ways industrially lay aside care, melancholy and all poring of his Thoughts as much as ever he can and endeavour to be cheerful. For I have observed that

a Consumption of the Lungs has had its origin from long and grievous Passions of the Mind. *Sixthly*, let the patient enjoy an open, fresh and kindly Air and such as is free from the Smoke of Coals, which may not only cherish the Animal Spirits and comfort the nervous Parts, and, consequently restore the weak Appetite, but likewise procure quiet (at least in some measure) to the Lungs. But there must be great care taken that he does not get a new Cold. For the Body being in such a manner filled with a load of Humours, every new Catarrh or Cold tends to a Consumption and from hence come all our Sorrows." What *comfortable* advice! And all of it sound! For the man who has had warnings that *something* may be wrong with him, that the rightness of his adjustments is not quite so right as it used to be, that he cannot respond to the exaggerated claims of these exacting times with a sufficient effort, we cannot imagine better advice. Apart from the calling up of the Humours it might well be given to a possible phthisic today! And especially we may appreciate the sentence under "*sixthly*" where he enjoins fresh air and other things which may "procure quiet (at least in some measure) to the lungs." Is not that what we have been seeking, at every stage of the disease, by "absolute rest," "artificial pneumothorax," "thoracoplasty" and all the measures that we now recommend? It is significant that Morton, too, recommended this "quiet" which we still seek; often in vain!

Among the "Procatartic causes or those which give the first occasion to the Disease," he mentions those that lead to a stoppage of usually got-rid-of discharges as amenorrhoea, and repeats several of the "six non-naturals" already given; "A foggy and thick air and that which is filled with the smoke of Coals" for instance. He goes on, however, to describe others more important and of more immediate concern to us even at the present day; "An Hereditary Disposition from the Parents," for instance, which is by some regarded as of great importance still. This opinion was hardly to be avoided in Morton's time as it was often evident in practice that the children of contaminated parents got, in their turn, the same disease; a fact which could only be attributed to heredity when the bacterial nature of

the disease was not known. We consider, now-a-days, that the occurrence of disease in the offspring, is due to intimate contact of the infants and children with infected parents. While admitting that there is something in the hereditary nature of tuberculosis we maintain that it is this early and intimate contact that leads to the disease being more prevalent in the children of the tuberculous than in the children of persons incapable of spreading infection, and we are able to cite the large number of "positive" tuberculin reactions that arise among these "contacts" as compared with others. We affirm, in fact, that the prevalence of manifest disease, and, much more, the high incidence of the evidence of *infection* produced by the tuberculin test, amongst the children of the tuberculous as compared to the children of the unaffected, is *proof* that bacterial contamination, not heredity, is the cause of tuberculosis. Take the following, for example: "Mr. Hunt, a citizen of London, lived almost from his youth to the seventieth year in a consumptive State, doing his business well enough by taking care." From the age of sixty, however, he began to go down hill slowly, but "was easily freed" from his symptoms "by the advice of a Physician." He had three sons who all lived until they were about thirty "about which time they were all, one after another, seized by the same right of inheritance with a consumption occasioned by Passions of the Mind and the drinking of Spirituous Liquors" whereby "the Distemper . . . carried them all off before the emaciated old man died." The "right of inheritance" was, of course, the intimate character of their association with their aged father and their inspiration of his copious output of tubercle bacilli. He probably broke down into a source of large doses of germs at about the same time as he began to go slowly down hill. One of the three was treated by Morton and appeared to get better but relapsed the next summer and died. His widow, also, got a bad touch of the prevailing consumption but, under Morton's treatment, ultimately recovered. She may be noted, we think, as an instance of a bed-fellow being contaminated with the same disease.

Another cause he finds in "An ill formation of the Breast,"

either natural or accidental, due to a "crookedness or distortion" of the thorax; a feature which we recognize as either caused by or causing tuberculosis today. But the next is the most interesting of all: "This Disease (as I have observed by frequent Experience), like a Contagious Fever, does infect those that lie with the Sick Person with a certain taint." Even then and with only the crudest notion as to what infection really meant, Morton was unable to envisage the frequent consumptions arising in the bed-fellows of the tuberculous without being seized with the notion of the transmission of "a certain taint"; he describes several causes of phthisis arising in this way in his notes.

He cites, too, as causes of pulmonary phthisis, "Chalky Stones that are preternaturally bred in the Lungs," obviously the results and not the cause of phthisis, and adds all the maladies which are followed by his "symptomatic" consumption. In his third chapter Morton treats "Of the Diagnostic and Pathognomonic Signs of the beginning of a Pulmonary Consumption." These are "either such as discover it when it is but begun or when it is once confirmed and deplorable." He quite recognizes that the first signs available to him—he was, of course, without either the percussion to be later introduced by Auenbrugger or the stethoscope of Laënnec—were either the earliest signs of tuberculosis or, often, the signs of advanced disease. "The Pathognomonic Signs of the beginning of a consumption of the Lungs are, first, a Cough, which one may, and that by very certain signs, distinguish from a simple Catarrh, how violent so ever and Chronical it may be, because, firstly speaking, the Part affected or seat and source of both Distempers are not the same." "A Consumptive Cough proceeds from a Glandulous Swelling or Tubercle of the Lungs themselves . . . On the contrary, a Simple Catarrh owes its Origin from a distillation of rheum cut out, as it were, in continual drops by the Uvula and Almonds and the other Glands seated in the upper part of the Wind-pipe, yea, and by all the Glandulous Coat of the Wind-pipe itself."

He speaks of the early cough of the tuberculous as something to be distinguished from a catarrhal cough by its characters.

“For as it is dry and without any expectoration, so it is not great nor the Fits long and is rather made up of its own accord to relieve the Oppression of the Lungs than excited by a violent tickling or accompanied by great straining which usually accompanies a Catarrhus and fierce Cough.” It is quite evident that Morton was a close observer and that he had seen the essential differences between the cough of early tuberculosis and the cough of an ordinary catarrh, though he freely admits in his treatise that instances may occur in which these coughs are indistinguishable. There is one passage with reference to tuberculosis of the lungs which seems to me to have been almost inspired, so much is it in conformity with modern views. “Yea, when I consider with myself how often in one year there is cause enough ministered for producing these Swellings, even to those that are wont to observe the strictest Rules of Living, I cannot sufficiently admire that any one, at least after he comes to the Flower of his Youth, can die without a touch of Consumption.”

He proceeds to record the other signs of tuberculosis of the lungs: “As there is always a want of Appetite and a Thirstiness accompanying a Consumptive Cough, so likewise a vomiting after eating uses commonly to follow it.” He must have met a great many rather advanced cases in his search for early ones. “Likewise a hoarse or shrill or squeaky voice joined with a Cough, if it be frequent, much more if it be continual and chronical, shows it plainly to be a Pulmonary and Consumptive Cough.”

“The second Pathognomonic Sign of the beginning of a Consumption is a Fever . . . The third is a Wasting which, in the beginning of a Consumption is very slow . . . until from an Inflammation of the Tissues . . . a putrid Fever comes to be joined with the Hectic . . . so that within a few weeks the Patient has a Hippocratic Face.”

He goes on to describe the type of fever: “A Tertian and that at a certain time of day beginning with a chilliness and coldness, proceeding with a great heat, and so at last ending in profuse and colliquative Night Sweats . . . at which time the Patient sleeps quietly, breaths not so short as before and

plentifully coughs up the Concocted Phlegm without any difficulty or pain. But by how much the Fever is more acute so much the shorter it is; and by how much the more moderate so much the longer it lasts." It is hard to imagine how he assessed the fever. Thermometers were then almost unknown. Although Sanctorius Sanctorius, in Padua (1561-1636) had already invented a "clinical thermometer" which may have penetrated to England. He probably relied upon the *feeling* of the patient's skin at which he must have become very expert; but perhaps he used a thermometer. He goes on to describe the other characteristics of this disease: "From whence there wont to arise two new Symptoms and they are very troublesome ones; to wit, a great heat about the Tonsils and the parts that serve for swallowing." He refers no doubt, to laryngeal ulcerations for he proceeds: "Whereby it comes to pass that the Patient can scarce swallow anything but with grievous pain." And the other is "Marasmus with a Hippocratic Face."

Finally with regard to the pulse: "In the beginning of a Consumption, whilst there is no other Fever but a Hectic, as the preternatural heat is contained and moderate, so likewise the Pulse is somewhat quicker than it ought be according to the degree of the Fever . . . But as soon as ever the Peripneumonic Fever seizes them, the Pulse, as it uses to happen in other Peripneumonias, is not only quick but also hard and strong; yea, rises up more in one plain than another so as to feel somewhat like a Saw when one feels it with several Fingers together . . . Though sometimes, by reason of the violence of the spasmodic pain caused by the Inflammation of the Tubercles, it is no rare thing to observe a weak Pulse."

These tuberculous symptoms are sometimes very chronic and sometimes so acute as to be very rapidly fatal. To illustrate the slow or "chronical" type he describes the autopsy on a Mr. Davison as follows: "For all the Swelled Glands are not disposed to an Inflammation at the same instant of time, as it was evidently apparent to me in the Body of Mr. Davison who died of a Fatal though a Chronical Consumption, when we came to open it. For in the Lungs of the dead Body we found at the same time some Tubercles that were turned to Apostemes

and others that were inflamed and, lastly, some that were crude and unripe."

Let us now pass on to "Book the Third" wherein Morton treats "Of a Symptomatical Consumption of the Lungs," a consumption "caused by and depending upon some other preceding Diseases . . . And indeed this kind of Consumption (as far as I have been able to observe) is the most common of all others." He begins by cataloguing the various diseases that may be followed by a consumption—"Crapulous and Intermitting Fevers, Small Pox, measles, scarlet fevers, a Pleurisie, Peripneumony, melancholy, Diabetes, "Dropsie of the Chamber Pot," as he calls it, the King's Evil, etc."

"So I think 'tis no wonder if those that have the King's Evil who are frequently subject to glandulous swellings in other parts are likewise many times affected with such kind of Tubercles, even in the Lungs themselves, the substance of which is naturally spongy and apt to receive the Serous Particles of the Blood that are plentifully separated by their continual agitation." But he goes on to describe what happens, not only in cases of the King's Evil, but in all consumptions following on other diseases: "These Tubercles of the Lungs (as Scrophulous swellings of other parts) are: Either crude and phlegmatic and so no ways disposed to an Inflammation, or else more hot, which will be seized with an Inflammation sooner or later . . . For sometimes, to wit, when the Matter is concocted and hardened into a chalky or steatomatous substance or into the substance of a *meliceris*, which it commonly is, the inflammation and exulceration that proceeds from thence are not only some considerable time before they happen, but likewise, when they do, they are very slow and almost insensible . . . But whenever these Tubercles are of a hotter nature and therefore more subject to a quick Inflammation and Exulceration this scrophulous Consumption is very acute and terminates in a few months." Thus he draws a sharp distinction between the chronic and relatively mild consumption in persons who "live, though they are crazy and sickly from their childhood 'til they are old with a Cough which is almost continual . . . but yet without any sensible

Fever . . . These people may be preserved from any dangerous and Fatal effects even without Physic"; and the much more acute and usually fatal cases that often occur after other diseases and, we would add, especially after the diseases of childhood, measles, whooping cough, etc.

To give point to this distinction between the chronic and the acute we here describe another autopsy, that of the only son of the Mr. Davison whose post-mortem we referred to as showing the signs of a chronic case. This young patient had, from his birth, "a purulent scab scattered up and down his whole Body" which he finally got rid of "with I know not what Repercussive Plaisters and Oyntments that he made by the advice of some Old Woman." This cure of the "purulent scab," instead of being welcomed as something at least to the good in a poor kind of case, was thought by Morton to be a direct cause of the subsequent phthisis. "Whereupon, presently, he was troubled with a dry Cough all the Summer from Tubercle of the Lungs occasioned by a driving in of his Scab." The patient went rapidly from one stage to another until he died "through impatience and his averseness to medicines," as Morton puts it; the post-mortem took place shortly after. "In the Body, when 'twas opened, we found all the lobes of the Lungs here and there bespattered with Tubercles of a various magnitude; some that were small and newly bred; others that were pretty large though they were crude; but some that were inflamed and exulcerated, containing in them a purulent matter that was of the consistency of Honey. This I took to be scrophulous Consumption of the second sort; that is, Hot and active."

William Bulloch, in his Horace Dobell Lecture delivered before the Royal College of Physicians in 1911, attacked Sylvius for originating and Morton for following a line of thought which, he said, "hampered advance for more than a hundred years. . . . As is well known," he said, "Sylvius derived tubercles from the degeneration of small invisible glands seated in the substance of the lung, and he considered that the tuberculous change was analogous to the scrophulous change so

common in the glands of the neck and mesentery. In his learned *Phthisiologia*, Richard Morton, Surgeon of Newgate Street, could come to no other conclusion." But was the theory which Morton advocated—perhaps referable to the work of Sylvius—as regards the involvement of glands in or of the lung so very wrong? Ever since the days of Ghon, and indeed, before it, we have recognized the part that the glands, both tracheo-bronchial and pulmonary, play in receiving and maintaining the tubercle bacilli from the primary focus in the lung; and does anyone now doubt the tuberculous nature of the "scrofulous change so common in the glands of the neck and mesentery"? And, further back, in primary tuberculosis at any rate, it would be very hard to exculpate the very small and hardly noticeable but still present lymphoid collections at or near the divisions of the bronchioles from being the most early infected parts of the lung; primary tubercles are at least approximated to the glandular and lymphatic circulation. Morton, in his utterance as to the origin of tubercles was guessing—and perhaps guessing wrong—as were Dessault and William Stark, quoted by Bulloch as rectifying his errors; but could any of them have guessed that two persons, Villemin and Koch, should afterwards, in the fullness of time and the rising tide of research, prove that tubercles were really tissue reactions to specific bacteria? To me it seems that the marked stress laid by Morton on the *glands* of the thorax as being the especial seats of tuberculosis and his stress on the similar formations in the mesentery is one of the signs of genius guided by the only correct method of observation, the examination of the body after death. What matter if he mistook the sites of secondary tubercles for glandular sites also; he stressed the *glands* as the places where tuberculosis was invariably present; the tracheo-bronchial, the broncho-pulmonary and other thoracic glands as the most important sites of its accumulation; a wonderful generalization which has at last come to be recognized as of basic importance in the pathology of the disease.

Not but that Morton was filled with the theories of his times. "In a Scrofulous Consumption," he says, "the Blood, by

reason of its Preternatural Acrimony being, as it were, Coagulated and so unable perfectly to unite the new Chyle to itself and the solid parts, is wont to throw it in greater quantity than is convenient upon the Glandulous Parts where the small vessels do not run in a Right Line as in the muscles but spirally; from whence it comes to pass that the Blood is wont to make a longer stay and to make a more plentiful separation of the Nutritious Juices in them; whereby it comes to pass that these parts are apt to swell more and to grow larger and harder than others." This, as a theory as to why the glands were larger and harder than other tissues, might have appealed to Galen but it means nothing to us! Nevertheless, although the *theory* itself is wrong, it is expressed to explain an observation of great weight; the enlargement of the glands; and why should we quarrel with Morton for *thinking* incorrectly though observing so accurately?

That is why we applaud Morton so sincerely. Although his theories are those of a past phase, his *observations* are sound and true. They stand firmly amidst the welter of *views* that constantly trouble the ocean of opinion like rocks that remain firm in the ebb and flow of the tide.

BENJAMIN MARTEN

DR. CHARLES SINGER, in 1911, published in *Janus* an account of Benjamin Marten. "A Neglected Predecessor of Louis Pasteur," he called him. I do not know how Singer found out about Marten but he gives, at the end of his paper, the few places where the first and second editions of Marten's book are to be found; there are only four such in known existence. I read of Singer's discovery of Marten in a paper by Bulloch and at once got the second edition from the Royal Society of Medicine and, finding it of the greatest interest, proceeded to extract it; the results are published here. Afterwards I