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ON PULMONARY CONSUMPTION.

Norman Stevens Esq
(Phenarah)
with the sincere regards
of his unknown friend
the author

ON THE

NATURE, TREATMENT, AND PREVENTION

OF

PULMONARY CONSUMPTION,

AND INCIDENTALLY OF SCROFULA,

WITH A DEMONSTRATION OF THE CAUSE OF THE DISEASE.

BY

HENRY M'CORMAC, M.D.

LONDON:
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1855.

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DEDICATION.

TO JAMES COPLAND Esq. M. D.

My Dear Doctor, I do not know to whom with greater propriety I can inscribe an attempt to further medical science than to yourself, you who by your ever-memorable and indeed imperishable work, have done so much to promote its interests. I would however by this my personal tribute, additionally commemorate my appreciation of the kindest heart, the clearest of intellects.

I am, my dear Doctor, with every sentiment of personal regard and esteem, ever faithfully yours,

THE AUTHOR.

mined, the cause and radical cure, in short the prevention of consumption and scrofula with all their concomitant ravages, are placed as absolutely as small-pox itself has been placed, within human control. There need now be no more consumption, no more scrofula, and diseases which have actually advanced as civilization itself has advanced, henceforth, now indeed and for ever, may be set aside.

I.

PRELIMINARY REMARKS.

S'il est possible de perfectionner l'espèce humaine, c'est dans la médecine qu'il faut en chercher les moyens.—DESCARTES.

If it be possible to improve the human species, it is in the art of medicine that we must seek the means.—DESCARTES.

1. For generations phthisis has been the opprobrium of medicine. No disease perhaps has been more patiently investigated, yet none has more frequently baffled inquiry, or has been more extensively abandoned to empiricism and despair. It is the object of this essay to shew that the subject of phthisis may be cleared up, that its nature and origin may be demonstrated, and that a rational system of treatment and prevention may be laid down. The writer is of opinion that the malady which constitutes nearly a third of all chronic diseases, and perhaps a fifth of the actual mortality of the human race, may be brought into narrow limits, if not entirely set aside, inter chronicos φθισις duos fere trientes jugulat, Baglivi. If society, if medical science, were on a normal footing, multitudes now cut off by consumption would no longer perish in what might else prove the very fulness and vigour of their prime. Cum hic morbus, observes Celsus, preceded

indeed by Hippocrates, aetate firmissima maxime oriatur, id est ab anno duodevicesimo ad annum quintum et tricesimum. From researches by the Count Chabrol, at Paris, the greatest mortality is between 20 and 30. The mortality, he asserts, is also 15 per cent. greater among males than females, and 19 per cent. more fatal in towns than in the country. In the Edinburgh Infirmary, from 1833 to 1837, there were 155 male and 63 female cases, while, in a total of 109 cases of phthisis in the Hôpital Cochin, there were one-tenth more males than females. Louis however had 70 female and 57 male cases in wards of 48 beds equally divided among the sexes, while Benoiston de Chateauneuf declares an enormous excess of females over males in the Paris hospitals. Phthisis, its history and symptomatology, have been described even to its minutest detail, but little if anything has been accomplished in the way of prevention, or in the reduction of the enormous and almost incredible mortality. It is time that the disease should be looked at from a loftier point of view, and subjected to more searching and patient investigation.

2. It is worthy of remark that the author of the Traité de l'Auscultation Médiate, the man to whose penetration and sagacity the world is so largely indebted for the more correct discrimination of the signs and symptoms of diseases of the chest, without question the most frequent of any, sans contredit les plus frequentes, was so unaware of the proper mode of guarding against phthisis, as to fall a sacrifice to the malady. He is

however but one out of many who in the same profession have become victims to consumption. I cannot entirely agree with Bacon, that medicine lies wholly in observation, ars medica tota in observationibus. It must be observation doubtless, but also observation conjoined with rational inference. If observation alone had sufficed, we should not still have occasion to witness the insatiate ravages of phthisis, not only among the poor and miserable, but also among the intelligent, the wealthy, and the refined. Consumption, with all its frightful train, is simply, and truly, and only, a violation of the physical laws of our being. Scrofula, observes Baudeloque, commonly, if not always, is the result of an infraction of some hygienic law, très souvent pour ne pas dire toujours, la maladie scrophuleuse est l'effet d'une infraction prolongée aux loix de l'hygiène. Here, as in other instances, medical men must lead the way to the better appreciation of those laws. Medicine indeed, must be studied by the light of experience, but we have also to add the light shed by a yet loftier science, the science which co-ordinates not merely medical philosophy, but the universal principles of all philosophy. The world desires to be informed on all points, des clartés de tout. It will require of medical men, as of others, a reason for the faith that is in them. Nature indeed is sparing in causes, but she is exuberant in results. If Van Oven and Flourens, in their recent works on human longevity, be correct in estimating the natural duration of man's life at one hundred years, un siécle de vie ordinaire, in the words of Flourens,

the actual duration of huma
years for the poor, and forty fo
digious amount of social inep
arrangements. The more ge
physiological science inclusive,
and the more intelligent memb
large, would tend to superse
flowing from a narrow spirit
which accrue from the absence
tion.

II.

ON THE NATURE OF CONSUMPTIO

3. Sir James Clark, in his treatise on Pul
Consumption, after stating that a third of the m
in England arises from tuberculous disease, p
to add, that in proportion as the practitioner
quainted with the exciting causes, so shall he be
to treat successfully the cases which come un
care. One of the first things then to be con
in the investigation of consumption, is the im
source of the symptoms which bear the name.
the unhesitating reply is, that they, these sympto
owing to the presence of the matter of tubercle, t
in the tissues and tubercle in the blood, sanguin
crasia et prava ejus indoles materiam alibilem pe
Burserius, Venetiis, 1817, vol. 7, p. 79. What

views of Aretæus were less advanced. In his book on chronic diseases, chap. 8, he ascribes consumption simply to abscess of the lung, or spitting of blood, *αποστάσιος ἐν τῷ πνεύμονι, ἢ ἀναγωγῆς αἵματος*. The opinions of the Arabian physicians appear to be simply borrowed from the Greeks. Their opinions indeed, or those of any of our predecessors, may not be of much direct importance, but they are of very great interest in relation to the development of human observation and thought, which followed the same laws in those days as in these, and of the history of human errors just as characteristic then as now.

4. Tubercle, crude tubercle, has been compared to decayed cheese, to which in appearance at least, it bears no inapt resemblance. Tuberculous matter may be present in at least all warm-blooded animals, and by this its presence in the blood and in the tissues, constitutes alike the essence of consumption and scrofula. As to the fundamental identity of phthisis and scrofula there is at present hardly any difference of opinion, at least I do not myself entertain any. There is this peculiarity in respect of tubercle, that it is entirely a foreign and unnatural product, occurring however in virtue of a universal law of disease, in all warm-blooded creatures when placed in the circumstances which occasion it, having no presence or existence whatever in a sound and healthy state of the solids and fluids. There may be tumours of bone, and tumours of hair, and fatty tumours where they have no business to be present. Still, these are natural in kind though abnormal in position, having

a normal existence in point of constitution in the human frame. Tubercle however, has no normal existence anywhere, and only makes its appearance in virtue of a profound, deeply-seated degradation in the vital functions of man and animals. Consumption then, is owing to tubercular deposits, and to that superinduced state of the constitution which leads to such deposits.

5. In pulmonary consumption tubercles are deposited in the lungs, but very often, oftenest indeed, in several organs concurrently, as the lungs, larynx, liver, bronchial glands, and mesentery. They are commonly in one lung to a very much greater extent than in the other, and preferably, though not always, in the upper and back portion of the lobe. The immediate seat of tubercle, according to Dr. Carswell, article tubercle, Cyclopædia of Practical Medicine, is the dilated air-cells and bronchial terminations. Doubtless this is so at first, but subsequently, and I speak from careful observation, no tissue is respected, and parenchyma, blood-vessel, and bronchus, and cell are alike destroyed or displaced by the encroaching invader. In other respects, as Rokitansky informs us, Pathological Anatomy, vol. 1, Swaine's translation, tubercle occurs as an exudation or effusion out of the vascular system, taking place almost imperceptibly to the patient and the onlooker. The tubercles themselves may be many or few, and may vary in size from a pin's head to a walnut, or larger. They soften and are discharged through the contiguous bronchus, the cavity remaining open and perhaps lapsing into other cavities. In a certain number of in-

stances, the cavity heals up, which effort of nature would much oftener terminate in recovery were it not for the deposition of fresh tubercle, unless when the tendency to these fresh deposits is happily overcome. The tubercle also may dry up by a continuous process of absorption and fresh deposit which appears to be going on in every case of tubercle, and be converted into a cretaceous mass, the calculous phthisis of Bayle, but which, in effect, like the healed-up cavity, the tubercle not being otherwise eliminated, is an effort of nature at cure. Sometimes these cretaceous masses are only discovered after death, at others they are expectorated during the lifetime of the individual. They have indeed been adverted to by Aretæus, Morgagni, Boerhaave, Portal, Laennec, Louis, and many others.

6. The presumptive existence of tubercles, may be inferred from the general aspect and condition of the patient, the rational in short as opposed to the physical signs. Both these classes of indications however, are occasionally a little uncertain, and for this and other reasons are best combined. The aspect of a patient labouring under phthisis is quite peculiar. It is seen, more or less, in the gait, the countenance, the expression, the complexion, the voice, the cough, the respiration, the manner of getting up and sitting down even, the pulse. For every tissue, every function, every fluid, every solid, labours little or much, more or less, under the complaint. Scores and scores of times have I diagnosticated the existence of phthisis, before the patient has spoken a word or emitted a sound. Language has

been exhausted in describing the malady, ingenuity in detailing the physical signs. Of the numerous and able inquirers, both in our own and other countries, who, after the great French observer, have made the signs of phthisis their peculiar care, Skoda assuredly holds a high place. His treatise on auscultation and percussion, Dr. Markham's translation, merits the careful attention of every one who would do justice to the important subject of which it treats. In Skoda's explanation of the variations in the strength and clearness of the voice, in virtue of a consonance within the thoracic cavity, Professor Wintrich of Erlangen conceives that he has gone to an unnecessary, indeed erroneous extreme, einen unnöthigen Missgriff, Virchow, Handbuch der speciellen Pathologie, vol. 5, p. 139. Here I must expressly observe that the sounds of a lung containing a few merely solitary or scattered tubercles do not necessarily differ from those of the healthy lung. In short tubercles do not always afford a sign. This fact is also distinctly affirmed by Skoda, Andral, and others. It is owing to the circumstance of this important fact being overlooked that many have been pronounced exempt from tubercles who really laboured under them. In fine, the stethoscope is not in each and every case the criterion which the public and even the profession are wont to imagine. I have often met cases of evident phthisis, evident from the rational signs, in which neither auscultation nor percussion sufficed to declare the existence of tubercles. We cannot indeed, as Weber tells us, in his Handbook on Auscultation and Percussion, Cockle's translation,

infer the non-existence of tubercle simply from the absence of the physical signs. When these then, are deficient or absent, or when the practitioner, as Stokes judiciously observes, has not entire confidence in the physical signs, he should look so much the more attentively to the rational or vital signs, as the streaky gums, the incurved nails, the clubbed finger-ends, the habitually-quickened pulse and respiration, the expectoration, whether hemorrhagic, or purulent, or even tuberculous itself, the diminished air-capacity of the chest, the sweating, the diarrhœa, and the hectic, the loss of weight, of muscular firmness, and of muscular strength. It is, indeed, a momentous error, entailing serious loss of time and opportunity, to pronounce the absence of phthisis merely from the latency or obscurity of the physical, overlooking or neglecting the rational or vital signs. The public however, exclusive of the over-confidingness of medical men in their means of investigation, are in many instances themselves to blame, for extorting as it were, as they very often do, a certainty and a positiveness of diagnosis which the circumstances of the case do not always yield.

III.

TUBERCLE, ITS CONSTITUTION.

7. What is tubercle? It is an inorganic deposit from the blood, which may take place at any and every point, the cartilaginous, epidermoid, and dental formations excepted. Wherever capillaries occur, whether in the common vascular organs or in new tissues, there tubercles may present themselves. Certain vascular textures however, the muscles very particularly, are more exempt than others. The bones even are not free, although their liability had been long overlooked. The small blood-vessels are also liable to diffused tubercular or as Dr. Hall terms it, fatty degeneration. To this degeneration, indeed, he ascribes the frequent early occurrence of hæmoptysis, literally from a broken vessel in tuberculous lungs, British and Foreign Medico-Chirurgical Review, April, 1855, p. 493. The lungs however, are the more particular place of tuberculous election, so much so that when tubercles occurred anywhere, Laennec affirmed that pulmonary tubercles would also present themselves. But to this I have witnessed several exceptions, so that Laennec's law, if we may so term it, can be only looked upon as approximatively true.

8. The composition and constitution of tubercle, from whatever part of the body derived, whatever be the age

or even the animated being which is the subject of observation, are mainly alike. It consists principally of a hydrocarbon, a circumstance, as I shall be prepared to shew, of the utmost importance in arriving at a clearer knowledge of the nature and constitution of tubercle. There is the tubercle proper, deposited or not in the compound or many-nucleated cells, as described by Virchow and Van der Kolk, and the fatty matter incorporated with it. But this fat, which is likewise almost a pure hydrocarbon, is itself I conceive, a constituent of tubercle. So much so is this the case, that liver really only tuberculous, and in tuberculous cases termed by Louis and others fatty degeneration of the liver, yields fatty, otherwise tuberculous matter, freely on compression between the folds of bibulous paper. Further, Guillot, in the Comtes Rendus, assures us that the dried parenchyma of tuberculous lungs actually contains from 40 to 50 per cent. of fat, which, as I have already intimated, is in fact tubercle. In short tubercle, though not a mere fatty degeneration, seems invariably complicated with such degeneration. It is stated by Scherer, in Simon's Animal Chemistry, vol. 2, Day's translation, that crude pulmonary tubercle, supposed to be recent, deprived of foreign ingredients, and containing little fat or extractive, yielded in 100 parts, of carbon 53.888, hydrogen 7.112, nitrogen 17.237, oxygen 21.767. That carbon then predominates in tubercle, is here conclusively shown. It is not possible that any evidence can be more conclusive.

IV.

RATIONAL OR VITAL CAUSE OF TUBERCLE.

9. Before tubercle was so well known as it now is, tubercular deposits in different parts of the body, as the neck, joints, spine, bones, brain, mesenteric glands, lungs, were looked upon, and indeed treated, as essentially distinct complaints. These must now however be considered as ramifications of one great malady, under varying aspects and manifestations, arising from tubercular deposits, coupled with that habit of body which leads to such deposits. The pathology of one class of these affections is mainly the pathology of them all. For although we cannot well determine the principle of election, in no instance and under no circumstances whatever, will tubercles be deposited in the absence of the tubercular temperament itself! This is a truth, as it seems to me, of the very last importance. If we keep away the tubercular temperament, we also keep away tubercle! If we permit the encroachment of the tubercular temperament, we likewise invite the encroachment of tubercles. One, we cannot have without the other. They follow, one the other, in inevitable and unvarying sequence, as gravity follows or rather attends, the presence of matter. This is no idle or illusory distinction, but a great pathological fact! Neither inflammation, nor colds-taking, nor starvation, nor inferior

nourishment, nor chills, nor deficient clothing, nor excessive moisture, nor low spirits, nor bodily inaction, nor the suppression of eruptions, nor the retention of habitual discharges, nor exhaustion, nor abuse of mercury, nor intemperance, nor supposed hereditary tendencies, will in any case lead to tubercular deposits, in much or in little, whether phthisical or scrofulous, if there be not a tubercular habit of body, a cachexy, a dyscrasis, term it as we will, to superinduce them. But if there be a tubercular temperament, then these debilitating agencies or any of them, may and do often doubtless lend it a helping hand.

10. It was long a belief and one still entertained in the South of Europe, that consumption was communicable. Contagiosa est, cried Forestus, and very many others along with him. The clothes and bedding of consumptive sufferers were often destroyed in the South of France, where the people dreaded consumption more than the plague, so that these poor sufferers, English and others, found, and indeed still find it difficult to obtain personal accommodation. Even so judicious a writer as Joseph Frank, speaks of the slow communication of the disease, lentam communicationem morbi. But indeed Morton, Morgagni, and others, maintained this opinion now almost entirely exploded from all rational pathology. Consumption is not communicated by any infection, any contagion, any more than a fractured limb is so communicated. It may very well happen however, that persons belonging to the same family, living in the same apartments, exposed to the same de-

teriorating influences, at once producing the malady and rendering it inveterate when produced, shall in succession be seized with phthisis, so that whole families, as has too often happened, shall be carried off by it. This it is, which has led to the belief not only of the communicability of phthisis from person to person, but also of its transmission in families. Thus, I have seen mothers seized with phthisis after nursing consumptive sons and daughters, sisters after having waited on sisters, brothers after succouring brothers! Exposed perchance to the same subversive treatment, breathing the same pernicious atmosphere, they have perished of phthisis more or less rapid, giving rise, as I have just stated, to the inconsequent, yet still not the less popular delusion, of the communicability and transmissibility of the disease.

11. Until recently, no opinion perhaps was more generally entertained than that of the inflammatory origin of phthisis, or as it was very often termed and considered, ulceration of the lungs. Cujus ulceris origo deducitur ab omni causa, quæ valet sanguinem in pulmonibus ita sistere, ut in materiem purulentam abire cogatur, Boerhaave Aphorismi, Phthisis Pulmonalis. A more sound pathology now prevails, and this medical error, like other cast-off things, has descended to the people. The consumptive patient, when he consults a medical man, is generally prepared to tell the how and the when of the pleurisy or the cold to which he ascribes his complaint. Sometimes it is a wetting, at others damp sheets or sitting in damp clothes, which bears the

blame. Nor are medical men themselves altogether free from this misconception, which as adopted without qualification, it assuredly is. Broussais was a very decided advocate of this view. As fever was with him a gastro-enteritis, so consumption was a result, the result indeed, of an inflammation of the thoracic viscera, but very especially of the pleura, and of pleurisies, chronic pleurisy. C'est dans l'age des inflammations pectorales que les hommes craignent la phthisie, c'est en se préservant de celles-là qu'ils se soustrairont à celle-ci. Mais de toutes les inflammations pulmonaires, c'est celle de la plèvre qu'il importe le plus d'anéantir dès le moment de son origine, Histoire des Phlegmasies Chroniques, vol. 2, page 144. This is from the 3d chapter, entitled accidental phthisis. There is however no such thing as accidental phthisis! This opinion of the inflammatory origin of consumption has a very respectable antiquity, for we find Galen in his Book on Definitions, referring phthisis to an ulceration of the lungs, or thorax, or fauces, ἕλκωσις του πνεὺμονος ἢ θώρακος ἢ φάρυγγος, although in his Commentary on Hippocrates, he ascribe it to effusion of blood in the lungs, and between the lungs and thorax. Although inflammation cannot be looked on as an unconditional source of phthisis, still when the phthisical or tubercular cachexy already subsists, inflammation may prove an exciting cause. This seems reasonably proven by the tubercles discovered by Broussais and others in the false membranes after chronic pleurisy, although of course the blood cachexy must implicate the structure of false

membranes, as well as of membranes and tissues which are not false. On the other hand, when tubercles already exist, inflammation has again and again hastened their development, and so impelled them to a final and fatal issue. In short, observes Rokitansky, tubercle is frequently thrown out as the sequel of inflammation. And although it be a law, as Andral has shown, that inflammation in some individuals be followed by tubercular deposits, yet assuredly inflammation does not always develop tubercles even in those already labouring under tuberculous deposits. Dr. Alison relates the case of a boy of five, who died of enormous tuberculisation of the bronchial glands, yet this same boy, as Dr. Alison assures us in his paper in the Transactions of the Edinburgh Medical Society, presented not a single tubercle in the lungs, although he had laboured under intercurrent pneumonia. In a young gentleman whom I attended for extensive and fatal tabes mesenterica, there was intercurrent pleurisy, yet on careful examination, I could not detect a single tubercle in either lung. In fine, it may be laid down as a law that has no exceptions, that inflammation, unless in strumous or tuberculous subjects labouring under tubercle interior or exterior, or that dyscrasis which we term the tubercular temperament, will never lead to tubercle!

12. Hereditary phthisis, observes Herman Boerhaave, is about the worst, omnium pessima. This, or something like it, appears to be a very general persuasion. Dr. Thompson physician to the Brompton Hospital, con-

siders hereditary influence strongly marked. Out of 1000 patients one fourth had lost a parent from consumption. Louis states that he could only ascertain that one in ten was born of parents, either father or mother, who died of phthisis. If we consider however, the very great frequency of phthisis, it will not appear that these ratios, even the first, are very striking. It by no means follows because a parent dies of phthisis, that his or her offspring must necessarily contract it. Neither does it necessarily follow when the offspring of a phthisical individual are attacked with phthisis, that even here the phthisical tendency was hereditary. At this very moment, I am acquainted with several individuals in the apparent, and I believe real enjoyment of absolute health, whose parents on both sides died of phthisis! And we all know how many there are who die of phthisis, none of whose parents ever laboured under it. Tubercle is very seldom indeed discovered in the new-born, so rarely indeed, that although tubercles have been, by different observers, discovered in the fœtus, the occurrence may be practically regarded as non-existent. Andral has supposed that there may be an hereditary tendency, that the tuberculous cachexy may be inherited, but unless the same cause which produced phthisis in the parent also be at work in the offspring, so neither will the latter evince the disease. Cœteris paribus, it might seem reasonable to conclude that the children of consumptive or scrofulous parents should be oftener affected with phthisis than others. Children however, as a general rule, are not born tuberculous,

and although instances of incipient congenital tubercle have been pointed out by Langstaff, Husson, Dupuy, Papavoine, Rufz, and others, I will distinctly undertake to assert, that unless in the very rare instance of being born tuberculous, and even here the result is ante partum not post partum, children will not become so unless through the operation of some exciting cause, and very especially the immediate efficient cause, which must, without exception, in every instance concur, if it be not as I believe it to be, the only possible efficient cause of tubercle. It is most certain that persons born of the healthiest parents become tuberculous after sufficient exposure to the exciting cause or causes. For the first time in the history of the disease, I would proclaim that phthisis is absolutely within our control, that no one need become consumptive who does not choose it. To look upon phthisis as the result of dyspepsia, is but to assume an effect, or at most a coincidence, for a cause. Dyspepsia doubtless, often concurs with phthisis, but how many phthisical people are not dyspeptic, how many dyspeptic persons are no ways phthisical?

13. The tuberculous cachexy or diathesis, a term employed by Bayle, is the general source, the sufficient vital cause of tubercles. When the vital perversion is superinduced in man or brute, for this law of disease extends to the whole brute creation, the deposition of tubercles, in larger or smaller masses, in one organ or many organs, is the potential result. Here indeed, exciting causes come next into operation, and more or less further the undesirable result. The deposit may be

external and is then termed scrofula, or internal, when it bears the name of tubercle. But internal and external tubercle is often concurrent, oftener indeed than otherwise. Francis de le Boe or Sylvius, professor in the 17th century at Leyden, was it is said the first to assert their identity. Tuberculous matter if it do not exist in the blood, is at any rate first formed and deposited from materials abnormally subsisting in the vital fluid. According to Carswell indeed, it has even been detected in the blood-fibrin deposited in the cells of the spleen. Once deposited in the lungs, however infinitesimal the amount, unless the tendency be counteracted in time, it augments the weight and lessens the motility of these organs, becoming the foundation of the formidable degeneration which hands multitudes to destruction ere their time. Tubercular deposits through one organ or several organs, are the invariable result of the tubercular dyscrasis. We possess few certain indications observes Louis, Dictionnaire de Médecine, 2d ed. volume 24, as to the blood-alteration in pulmonary tuberculisation, nevertheless everything leads us to believe that the matter of tubercle exists primitively in the blood. The blood of scrofulous persons, vide Simon's Animal Chemistry, has been analysed, but without any satisfactory result. It would be most desirable to demonstrate the accumulation of carbon in the blood, but it would be a vain endeavour to place the blood-degeneration within the reach of scale and measure. A very small surplusage of carbonaceous matters in the blood, transformed every minute too into tubercle, could not I

conceive be determined. As I have however stated, Carswell has detected tubercle in the blood itself. The tuberculous matter commonly adheres to the surrounding healthy tissue, running into it, as it were, by insensible gradations, at others the matter is isolated. Occasionally, the tubercle is encysted, sometimes with a soft, at others with a dense, and even cartilaginous investment. In other respects, the vessels are isolated or obliterated in the tuberculous mass, Beclard, Additions à l'Anatomie Générale de Bichat, p. 324. Occasionally indeed, the sufferer is carried off by sudden and frightful hemorrhage, some vessel of magnitude becoming eroded, doubtless through pressure and consequent absorption, at other times through the tuberculisation and consequent fragility of the coats of the vessel itself, thus giving issue to its contents. Not long since, a youth, one of three who had perished of phthisis in one family, was thus seized on horseback, and lamentably perished almost ere he had time to dismount, and hardly an hour after the period of my visit!

V.

PROXIMATE OR CHEMICAL CAUSE OF TUBERCLE.

14. Had the labour and research, observes Sir James Clark, wasted in fruitless experiments to cure an irremediable condition of the lungs, been directed to the discovery of the causes and nature of the tuberculous disease, with the view of deducing rules for its prevention and treatment, consumption would be regarded in a very different light from that in which it is at present looked upon. How indeed, most justly remarks Portal, Observations sur la Nature et le Traitement de la Phthisie, Paris 1809, are we to restore an organ that is disorganised? For the first time in the history of disease, the proximate source of tubercle deposits is, in my opinion, capable of exact demonstration. The problem of causation may now in fine be solved. Tuberculous, scrofulous deposits then, whether in the offspring of scrofulous, consumptive parents, or the offspring of persons free from scrofulous, tuberculous disease, are alike and in every case, owing to the insufficient, imperfect performance of the respiratory function. The carbon is retained, in other words, it is not discharged or sufficiently discharged from the blood in the lungs, and finding no adequate outlet by the liver,

skin, or other possible emunctories, being neither burnt off in the lungs nor expended in the tissues, is deposited mainly as a hydrocarbon, in the lungs and other organs, under the form of the bodies known by the designation of tubercles. The last link in the chain of causation, the bond of inference here seems clear to demonstration. The carbon taken into the system, in consequence of the vice of respiration is not sufficiently burnt off in the lungs, is not adequately discharged by the liver or the skin, is not deposited as sub-cutaneous fat, is not eliminated otherwise. What then becomes of it? The reply to this is, we find it in the foreign bodies which we term tubercles, bodies which inevitably form, when respiration, or rather a respiratory nisus, is continued beyond a certain period in a corrupt and effete atmosphere. A diseased action is necessarily set up, the carbon finds no sufficient natural outlet, and tubercles, hectic, wasting, final decay, and death, are the result. I do not at all mean to assert, that a merely superfluous supply of carbon leads to tuberculous deposits. What I mean is that an imperfect respiratory process fails to purify and renew the blood, which thus loaded with excretions and foulnesses, has as it were, no alternative but to deposit them as tubercles with all their consequent train of evils, in the different tissues. Carbon indeed, continues to be burnt off during the whole period of tuberculous deposit and softening, nature's abortive, simply because too commonly unaided struggles with disease. But if so, it is under irregular, abnormal conditions, and as before under circumstances

which preclude the healthy, efficient discharge of the respiratory function.

15. In the first period of tuberculosis of the lungs, as Dr. Hutchinson by the aid of his stethometer or spirometer, a sort of gas or air meter, has convincingly shewn in the Cyclopædia of Practical Anatomy and elsewhere, there is an average deficiency in the vital capacity of the chest, modified indeed by the height and muscular strength of the individual, of 33 per cent. which as the disease advances, is reduced to 55 per cent. Dr. Hutchinson's conclusions which are illustrated by diagrams, are founded on some 5000 observations. His method is valuable when the diminished vital capacity of the chest leads, if not to the certainty of tubercular deposits, at least to the inference of impairment in the constitution of the blood and a weakened respiratory nisus. Even where there is no direct auscultatory evidence of tubercle, although minute tubercular deposits by some termed tubercle-dust do actually subsist, the diminution of inspiratory power will in such cases be very obvious. It hardly calls for demonstration otherwise, that if the indraught of atmospheric air into the lungs be diminished, the excretion of carbonic acid will be diminished in a like ratio. Of 6 phthisical persons experimented on twice daily, by Professor Scharling of Copenhagen, quoted by Mr. Ancell in his Treatise on Tuberculosis, 5 expired less carbonic acid than did healthy individuals of the same age and sex. The circumstances indeed, which lead to the production of tubercle, are also those most calculated to lead to impairment of respiratory

action, lessening the vital capacity of the lungs and reducing the respired atmosphere itself to a condition quite unfitted for the healthy sustentation of animal life.

16. One of the chief advantages of spirometric researches is to determine, or at least to enable us to suspect, the existence of pulmonary disorganisation. Hence, the importance of Dr. Hutchinson's instrument. The capacity of the chests of individuals increases eight cubic inches with every inch of stature. The average amount of air inspired by an adult man is estimated by Professor Valentin, Grundriss, Brinton's translation, at about 30.5 cubic inches. I myself made it by actual admeasurement 22 cubic inches. And Edmund Goodwyn in his book on the Connexion of Life with Respiration, London 1788, estimated it so low as 14 cubic inches. The absolute capacity of the lungs however, amounts to not less than 500 inches cube. It is obvious as Valentin justly remarks, that if the air inspired one instant, were expired the next, the air and the blood would have but a very short time to act on each other. Thus the equalisation of temperature, the formation of watery vapour, and the more perfect purification of the blood alike result from this arrangement. It is not sufficiently adverted to, that during active muscular effort, in short exercise in the open air, the measure and frequency of the inspiratory act, with the physiologico-vital changes thence accruing, are alike vastly multiplied and enhanced. Rudolphi too, in the second portion of his Grundriss der Physiologie, correctly remarks, that one lung is often smaller than the other, also that

their capacity is variously affected through prior disease. On examining the remains of aged persons, he truly observes that we rarely find the lungs quite sound, wir finden wenige Leichen alter Menschen in denen die Lungen völlig gesund wären. A respiratory function is however discharged by the skin, but since it is to a comparatively limited extent, as well as affected by the conditions, the purity, and the impurity of the atmosphere, already adverted to, I do not think it necessary to dwell on it further in this place.

17. The whole problem of respiration owing to the number of the factors concerned, is somewhat intricate. The general conditions of the process are however, readily appreciable. Exclusive of caloric sufficient to raise the inspired air to 99·5 F. there will be a varying amount of nitrogen, watery vapour, and carbonic acid, bearing a tolerably constant relation to the amount of oxygen absorbed. The average amount of carbonic acid sent out by the lungs, observe Kirkes and Paget, constitutes about 4·48 per cent. of the expired air. If however the air which is breathed be impregnated with carbonic acid as is the case when the same air is previously respired, then the quantity of carbonic acid exhaled becomes much less, Handbook of Physiology, p. 169. In one of two experiments by Allen and Pepys, in which fresh air was taken in at each inspiration, 32 cubic inches of carbonic acid were exhaled in a minute, while in the second experiment, in which the same air was repeatedly inspired, the quantity of carbonic acid emitted was only 9·5 cubic inches in the minute. And

so long as the same air might be respired, even if until it shall be no longer capable of sustaining life, it does not become charged with more than 10 per cent. of carbonic acid. Valentin also reckons the volume of carbonic acid in the air expired in ordinary respiration at from 4 to 4·5 per cent. By rapid respiration this may be diminished to 2·9 and even 2·4 per cent. and by slow and full respiration from 7 to 8 per cent. shall be obtained. The air given out at the close of a deep expiration contains more carbonic acid than that at the commencement. The carbonic acid in the expired air is increased during the period of digestion as well as pending bodily effort. During exercise indeed, the amount of carbon expired is about one-third more than in a state of rest, nor does this increased discharge cease for some time afterwards. It is diminished by the use of tea and of alcoholic drinks. Andral and Gavarret found the amount of carbonic acid to increase from 8 to 40 years of age. A boy of 10, gave off 385 grains, and men of from 16 to 60, gave off from 482 to 771 grains per hour. Women in general excreted less carbonic acid than men, or from 340 to 397 grains, healthy girls from 300 to 400 grains hourly. Valentin himself, weighing 119 pounds, emitted on an average 604 grains per hour. As a whole, Valentin estimated that 28·52 ounces of oxygen were taken up, and 33·16 ounces of carbonic acid, or about 9 ounces of solid carbon, were given off by the lungs and skin in the 24 hours. This, or any considerable portion thereof, if retained, is more than adequate to occasion an excess of carbonaceous impu-

rities in the system, and consequently to induce tubercular deposition. The cutaneous transpiration of carbonic acid indeed is very small, not more according to Scharling than from one twenty-fifth to one fifty-second part of that given off by the lungs. Old age diminishes the amount, which again is increased when menstruation is absent or is interrupted by pregnancy. The scarlet hue imparted to the dark red venous blood in the capillaries of the lungs, is due, as Servetus pointed out long ago, to the oxygen contained in the respired air. It will be evident then, how enormous must be the influence on the constitution and condition of the blood of anything injuriously affecting the respiration itself, or the condition and composition of the respired atmosphere.

18. It is during its passage observes Servetus, from the one system of vessels to the other, from the right side of the heart through the lungs to the left side of the heart, that the blood comes in contact with the air, assumes a scarlet colour, and is purged of its impurities which are expelled by expiration, ex expiratione in fuligine expurgantur, Christianismi Restitutio. The respiration of foul air forthwith taints the blood, and indirectly the general assimilatory processes. The carbon and other impurities inadequately discharged during the process of respiration, are retained in the circulation, which, if the proper depuratory action be interrupted beyond a certain period, inevitably end in tuberculosis of the blood and consequent tuberculous deposits throughout the frame. Nor is this the only instance in the human animal economy of matters re-

tained in the blood, either owing to morbid absorption, excess of nutrition, deficient waste, else imperfect assimilation and defective excretion, and instead of being eliminated, are arrested or laid down within the organisation, with results commonly less disastrous however, than in the case of tubercle. In pyæmia, not to mention uræmia from direct disease, the pus generated during phlebitis, finds admission into the circulation, and as pus, is deposited now here, now there, throughout the organisation. If nitrogenous food be taken in excess beyond the wants of the system and supply of the azotised tissues, deposits of urate of soda will be formed from the blood, in the joints, irrespective of calculi in the bladder and kidneys. And thus it is, that a morbid or perturbating influence, deranging the excretory and secretory functions of the blood, shall cause the deposition of tubercles in one case as it does that of uric acid deposits in the other.

VI.

REMOTE OR PREDISPOSING CAUSES OF TUBERCLE.

19. We do not after a due consideration of the Greek, Roman, and Arab medical records, I conceive find that phthisis, by them indeed often confounded with other diseases of the thoracic organs, occupied that place in their attention which, had it been equally frequent in their times as in ours, it must needs have done. The ordinary habit of the ancients, Greeks, Romans, and Arabs alike, was not only to spend a great deal of their lives in the open air by day, but also to pass the night in chambers communicating by an open door with an open court. Modern usages are very different. The shut-up bed-room with its closed doors and windows, its curtains, carpets, blinds, and hangings, in short its every apparent expedient for promoting the stagnation and impurity of the atmosphere, is now the rule, as in former times it was the exception. If we admit as we must needs admit, that air was given to be respired, and the lungs to respire it withal, how shall we explain our management of the atmosphere, which we treat as if air pure and unalloyed, were not day and night, ever and always, the most absolute and unconditional of all requirements, impossible short of disease and death to

be done without? The habits and usages of daily life, the palliation sought in, if not yielded by our climate, the requirements real or artificial of trade, commerce, industry, combined with the almost incredible ignorance and indifference as to organic necessities of the masses, all unite to create and aggravate the disastrous results flowing from the respiration of an atmosphere loaded with human excretions, and almost utterly unfitted for human requirements.

20. For a long period of years, indeed ever since my attention was turned to this important subject, I have with an increasing fulness of conviction discerned the undesirable results, flowing from the respiration of an ill-renewed atmosphere, rendering the proper purification of the blood a next to impossible thing. I have seen hosts as it were of promising young men and women, children under age, old persons even, consigned to destruction through the agency of causes whose every stage I could trace, though unhappily unable to exercise a countervailing influence and control. The physician is too commonly consulted when disease becomes deep-seated or when the individual is placed in circumstances whose malignant influence he cannot set aside. The close student who shuns air and exercise in his eagerness for the lore which unhappily is never to avail him, the professional man, the merchant, the artist, the artisan, the young workwoman, the labourer, pass in long array before the medical man, each labouring under the varying stages of the malady which is to put a stop to their short-lived careers. When the lad or the

young girl who has had the full range of a parent's house to come and to go, to work or to pause, is confined in an utterly unventilated apartment with a number of others, to toil unintermittingly, all day long, presents himself or herself before the physician with hæmoptysis, or hectic, or dulness beneath the clavicle, or progressive emaciation, one or more, while brothers and sisters remain free from disease, what is it but an experimentum crucis of the potent, the inevitable efficacy of seclusion and inaction, midst an irrespirable or not healthily respirable atmosphere, in the production of phthisis? The history of these cases is almost uniformly the same. It is a mournful and wearying iteration of disease-engendering influences! Let the cause only come into continued operation and the result is certain. Sometimes a whole family is cut off, as when the evil agency extends to all. At other times a portion only are destroyed, as when the operation of the injurious influence is itself partial. How often have I seen father and son pursuing the same sedentary calling, taken off in succession? On the other hand, the profligate member who would not subject himself to unhealthy industry, as I have witnessed again and again, has escaped! I have known one unwholesome workshop to afford three fatal phthisical cases within the year! The poor are decimated, more than decimated, by consumption. Delicate mothers who make slow recoveries after their numerous confinements, shut themselves within doors apparently without dreaming of the necessity of an out of door existence, or of the needfulness of living a life

in strict relation to the climate with all its damps and chills and vicissitudes. It is pitiable to see some young sickly mother among her infants, her wistful looks of love and affection, conscious to herself how soon they must lose her fostering care.

21. The influence of a foul atmosphere on the general prevalence of disease has been long the subject of meditation to the philosophical practitioner. The poisonous nature of certain exhalations from the soil must have struck even the least observant. As to indoor sources of disease, it is now upwards of a couple of centuries since Zacutus Lusitanus recognised the ill results of a pent-up atmosphere, in respect of the spread of fever, and on this account commended the evening and morning throwing open of windows, qua de causa fenestræ cubiculi mane et vesperi debent aperiri. Maxime nocet somnus nimius, says Kortum, writing at the latter end of the last century, si in lecto sordido, madido, vel in cubiculo quod vitiatus aer replet. Baudelocque however, more effectually than any other, turned the attention of the medical world to the production of scrofula from the more or less continued respiration of foul air. His writings, Clinique de l'Hôpital des Enfans, Revue Medicale, Paris 1832, and his Études sur la Maladie Scrophuleuse, Paris1834, with those of Fourcault, Causes Générales des Maladies Chroniques, Paris 1844, should be in the hands of every physician, every philosophical thinker, I had almost said every parent. These writers to be sure, often err in their general reasonings, as well as in regard of the treatment which they recommend,

else however they are in unison as to the infinite malignity of a deteriorated, unrenewed atmosphere, which the one looks upon as the source of scrofula, the other of consumption, esteeming them in short infractions of the hygienic law, a formula which as the embodiment of an eternal truth, and rendered in some intelligible phrase, should be hung up in every nursery, school-room, and asylum throughout the world.

22. Personal experience, the perusal and meditation of numberless facts, the analysis of many observations have afforded me, says Baudelocque, the deep conviction that scrofula has a leading cause, a cause which takes precedence of every other, and without which the disease rarely or never develops itself. This cause resides, and resides alone, in certain atmospheric peculiarities. However indifferent or insubstantial the nourishment, whatever be the absence of cleanliness, the sufficiency or insufficiency of clothing, the climate, the amount of exercise, of sleeping, or of waking, if the abode be one in which the atmosphere is readily renewed, if the sun's rays play directly, if the house be airy, well lighted, and duly proportioned to the number of the occupants, scrofula will never visit it! On the contrary, however excellent the nourishment, however exquisite the cleanliness, whatever be the goodness of the clothing, sufficing the amount of sleep, waking, and exercise, if the locality be badly sunned, the air imperfectly renewed, the dwellings narrow, low, dull, badly aired, there infallibly shall scrofula develop itself, Revue Médicale, Clinique de l'Hôpital des Enfans, Memoire, 1832, vol. 1, p. 10!

Scrofula, says Baudelocque, never attacks any one who passes his life in the open air, whereas wherever there is scrofula, there if we examine, we shall also detect foul air, on découvrira l'alteration de l'air, Etudes, p. 164. He refers the frequency of scrofula, in other words of tubercle, in villages and country districts, to the wretched construction of the dwellings rendering the atmosphere unhealthy and irrespirable. Outside the town of Bourg St. Andéol, the bise he says, from Madier, blows freshly and purely, but the streets are close and narrow, and the houses wretchedly ventilated, the ass and the pig below, the miserable living room above. Scrofula is there most common, Etudes, p. 135. This, Madier absurdly ascribed to the presence of strangers! If indeed 8 hours out of the 24, be spent in sleeping-apartments where the atmosphere is such as to render a healthy hematosis impossible, whether it be in the houses of the rich or the abodes of the poor, it will be sufficient to induce disease. Children who sleep with older persons than themselves, are rarely healthy. Irrespective of the increased deterioration of the atmosphere, the child's head, as Baudelocque remarks, is commonly covered when the person with whom he sleeps draws the clothes up about the shoulders. The habit of covering the heads of sleeping children, whether practised by themselves or perpetrated by others, is fraught with ruin. The wretched, ill-constructed village of Oresmeaux nigh Amiens, was devastated by scrofula, Etudes, p. 144. The village was burnt in detail and rebuilt, whereupon scrofula disappeared! But how many are the towns

and villages which resemble Oresmeaux? The houses of high and low, rich and poor, both in town and country are as if devised to breed disease. It signifies in truth very little, how pure the atmosphere may prove without doors, if it be impure and irrespirable within. It is the indoor life, the indoor climate and environment, which to a large extent govern the production of health and disease. This so important truth I have urged more or less in my various medical writings, as the Treatise on Fever, Methodus Medendi, Sanatory Economy, also in my paper on the connexion between atmospheric impurity and disease, read before the British Association, at their meeting in Belfast, September, 1852.

23. Fourcault as well as Lombard, has taken very great pains to determine the influence of sedentary occupations in the production of phthisis. During the stationary, the sedentary, and the recumbent position, as I have elsewhere pointed out, the hematosis of the blood is comparatively imperfect, one-third less impurity being excreted from the blood as contrasted with what is excreted during active occupation in a pure atmosphere. Tuberculous diseases Fourcault observes, p. 19 of his work, rage among needlewomen, tailors, and others of sedentary pursuits, whereas butchers, carters, smiths, carpenters, joiners, drovers, and others, men and women alike, though exposed to every climatic, atmospheric vicissitude, are commonly exempt. Schools, convents, and penitentiaries, in default of air, exercise, and insolation, are alike ravaged by consumption. In the men-

dicity depots at Amsterdam, Laon, Nancy, Auch, Metz, St. Denis, and elsewhere, the phthisical mortality, what from seclusion, the absence of pure open air life and exercise, was 6·20. He cites indeed a multitude of prisons and penitentiaries throughout France where the inmates were scourged with phthisis, the tainted atmosphere in which they passed their days, rendering the proper hematosis of the blood impossible! The cellar population of Lille in Flanders, as of other manufacturing towns, are carried off by phthisis and scrofula, the very dogs, Fourcault assures us, being tuberculous! In a memoire read May 1841 before the French Institute, Fourcault adverts particularly to the case of the Hôpital Général of Lille, containing 1200 inmates, old men and foundlings. The boys sent to active employments escape, whereas the girls condemned to sedentary pursuits, contract rickets, chlorosis, mesenteric disease, the carreau of the French, scrofula, and caries of the bones of the spine, so that their prolonged abode in the asylum is literally and truly a sentence of death! Of Vienne in the department of the Isère, Marseilles, Lyons, Nîmes, Bourdeaux, Fourcault relates facts alike disastrous and deplorable. He adverts to the frequency of consumption among the military of Belgium, Holland, France. It is not less prevalent among our own military population, the Dragoon Guards as for example, in which the mortality from this cause, is ·63 per cent. whereas among the population at large it is but ·37! But soldier-craft as managed is a species of incarceration, a military monasticism in short, and men will die of bad

ventilation in barracks just as readily as elsewhere. The mortality in lunatic asylums from phthisis is very considerable, particularly where the patients pass the nights, sleeping after their wont with covered heads, in small ill-ventilated cells, those relics of the cruelty and barbarism of former days. In prisons Dr. Baly ascribes the great prevalent mortality from tuberculous disease, to deficient ventilation, chill, want of bodily effort, dejection, and inadequate nourishment. The annual mortality occasioned by consumption in the prison at Pentonville up to the close of 1844, was 11·14! But in 1845 proper ventilation having been introduced, the disease almost entirely ceased! In Paris, Rome, Naples, Geneva, London, Dublin, Edinburgh, Berlin, Munich, Vienna, Petersburg, New-York, confinement, in man and brute alike, gives rise to tubercle, while life in the free open air yields complete and entire immunity.

24. If says Fourcault, we shall transport ourselves to the penitentiary of Roquette, and the remark will be as applicable to many a poorhouse, school, and penitentiary nearer home, we are struck with the pallid aspect of the children, their dry, scaly, and torpid skins. Similar phenomena everywhere arise from the operation of similar causes. Breathing the pure air throughout the day observes Baudelocque in his Études p. 165, is insufficient, it must likewise be breathed at night. Many shepherds he remarks become scrofulous although exposed to every atmospheric vicissitude, but it was not observed that they spent the nights in a sort of caravan

which they drew about with them, entering it by a little door, which they carefully closed after them. Among the inhabitants of New-Zealand, scrofula, king's evil, consumption, suppurating neck glands, psoas, and lumbar abscess are painfully prevalent. This is alike confirmed by Dieffenbach, passim, Colonel Mundy, in his Our Antipodes, p. 229, Bishop Selwyn in his visitation tour in 1848, and Dr. A. S. Thomson. Dr. Thomson ascribes these diseases to the low airless hovels, in which with closed door and window both small, men, women, and children, for 10 hours out of the 24, respire an atmosphere as unwholesome as in the most crowded and worst ventilated houses in the poor parts of London, British and Foreign Med-Chirurg. Review, April 1855, p. 521! The great experiments of life and death in short, are in course of performance throughout every town, every family, every community. Etiolation, anemia, chlorosis, debility, rapidly-accruing tuberculisation and scrofula, with premature, unnatural decay, follow in the train of confinement, inaction, and more than anything else, the respiration of an impure effete atmosphere, as the iron follows the load-stone, or the tidal wave the course of the sun and moon. Air in short, as Hippocrates designated it, is a source of nutriment, but foul air is about the worst of nutriment, for it serves but to awaken disease. Wherever there is foul air, unrenewed air, impure air, for it comes to the same thing, there we meet consumption, there we meet scrofula and untimely death! It is unnecessary to seek for a number of causes when nature contents herself with one, and that one

the cause which I have so often had occasion to signalise.

On the other hand, where the insolation is good, where a pure, sweet, well-renewed atmosphere is breathed by day, and breathed by night, there, we have no consumption, no scrofula. Whenever and wherever such air is respired, tubercles will no longer be deposited in those organs of mutually ancillary functions, the liver or the lungs. It is certain to use the words of Baudelocque, Études, p. 212, that a vitiated impure atmosphere, is the cause, in short the condition sine qua non, of the malady. Wherever there is foul air, there soon or late, although never rapidly, we shall witness consumption and scrofula, and wherever there is no foul air, there, consumption and scrofula will be alike unknown! It is as impossible that consumption, or scrofula, tubercle in any form, should exist where the air is pure, as it is impossible that the respiratory processes and the circulation of the blood can be healthily or properly effected where the air is foul, pent-up, imprisoned as it were from the rest of the atmosphere, and therefore not safely or fitly respirable. I may most safely and truthfully assert, that I have witnessed I shall not say how many cases of consumption in one and the other sex, which on being traced back, were directly referable to an impure, and therefore irrespirable atmosphere. The whole course of very many of these cases passed almost directly under my own observation and investigation, so that I could entertain no doubt as to the exciting and proximate causes.

25. Warm climates enjoy no immunity as such, contrasted with cold. Tubercle indeed is frequent in the preparations of the pathological museum at Calcutta. If a pure sweet atmosphere be there habitually respired, people will contract no phthisis, but if this lung-food, so to speak, be foul and indoor, consumption will prove the sure and inevitable issue. Children says Baudelocque, Etudes, p. 130, are put to sleep anywhere and anyhow, so there be room for a bed, hence even in opulent families we witness outbreaks of consumption and scrofula which are referred to every cause but the right one. The structure and requirements of the lungs and liver, of the human frame in fine, as well as the composition of the atmosphere, are the same in warm climates as in cold, and violations of the conditions of health will lead to similar results. In warm climates as in cold, people as Dr. Chevers quaintly but most truly tells us, continue to fall under the self-imposed curse of dying, Treatise on the Removable and Mitigable Causes of Death, Calcutta, 1852. There must be something morally as well as physically debased, the author continues, page 3, in a people who have sacrificed the power of attaining to old age! On the western coast of Africa, where the perennial warmth of the climate forces the people as it were, to give constant access to the pure fresh air, I saw no phthisical persons. The houses of the negroes are not purposely well ventilated, but the atmosphere finds admission by numerous chinks and casual openings. Up the river Sierra-Leone they are wont to sleep in a kind of cell which they can close in

front, with the view of keeping snakes and other vermin from falling on them from the interior of the thatched roofs. For myself, during my stay there, I slept with no other covering than a sheet, in a chamber open to every pulse of the atmosphere as it was wafted from the ocean or the river, through the adjoining open gallery of the dwelling. In the East and West Indies however, Egypt, the south of Europe, the shores of the Levant, wherever people spend a portion of the year in close narrow chambers, there too, phthisis is sure to assert its devastating empire. The natives of India says Dr. Wilson, Indian Annals, form no exception, in respect of phthisis, to the dark races in other portions of the globe. The average annual mortality in the Zillah jail at Raishye, was 8 per thousand, nearly the same rate as in England. In six years, 165 men died, out of an average of 846 prisoners. Tubercles were discovered in 41, or one-fourth of the whole! In Egypt indeed, the people from the burning regions of Sennaar, to whom Egypt is as it were a cold climate, are more liable to phthisis Clôt-Bey informs us, than either the natives or Europeans. The negroes brought from Sierra-Leone for the sake of their education to England, perish of phthisis and scrofula, supposed victims of the climate, but in reality of foul air. The same fate I must repeat, assails the herbivora and carnivora, the lions, tigers, monkeys, and birds of our menageries. It will be clearly understood that I only look upon cold, or damp, or insufficient clothing, as an indirect agent in the production of phthisis, by causing people debarred of personal comforts,

or having like the Dutch and Russians adopted a lighter clothing, to give a preference to close foul rooms instead of the pure, fresh, but chill exterior atmosphere.

26. Many pathologists although they only conditionally concede the morbid influence of foul air in the production of consumption, yet do so one with another to such an extent, as to strengthen if not wholly decide the general issue in the direction which I have taken up. Clark admits that there can be no doubt that the habitual respiration of the air of ill-ventilated, gloomy workshops, manufactories, and even schools, powerfully augments the hereditary disposition to scrofula, and may even induce it de novo. It may prove hypothetically convenient to refer a disease to hereditary sources, generations back, or to some supposed collateral taint which can satisfy no strict inquirer, yet when we have gone back to our grandfathers, we have still to inquire what produced the malady then? An hypothesis must prove serviceable for the present day as well as for the past. I know at the present moment young people healthy, beautiful, robust, both of whose parents in two instances perished of consumption, in others but one parent. We too, though I could fervently hope it might be otherwise, may have our consumptive descendants who shall ask the question I have asked, as to what it is that first proves productive of phthisis. The supposed variety of causes may all by a rigid examination, subjecting them to the method of exclusion, be reduced to one. In other respects, the rational investigation of the causes of disease has been lost sight of amid the mass

of petty trivial details, or almost wholly neglected. This supposed hereditary influence is made to play much the same part as the elephant and tortoise in the Hindoo mythology. I do not know if Sir James Clark still feel satisfied that scrofula may be induced even while the patient breathes a very pure air, Treatise on Consumption, p. 232, but I can most truthfully declare that within my experience I have found no example of scrofula or consumption occurring in one who breathed a very pure air. I do not look upon it as possible. I consider it as alike opposed to observation and facts. If the air of ill-ventilated alleys be indeed capable, as Sir James Clark admits it is, of inducing scrofula de novo, what must the air of the dwellings which open upon these alleys, be capable of inducing? It cannot be that a foul, unrenewed atmosphere should be productive of internal and external tubercle at one time, and not be productive of it at another. Other influences may co-operate, but this is the sufficient exciting cause, and the etiology being once conceded, it becomes equally superfluous and unphilosophical to seek for any other. How striking is the instance cited in the Mémoire of Bordeu? Nor is it says he, the only one which I might relate. It is that of the little shepherd boy to whom a princess took a fancy at Barèges. He had slept upon the hard ground or at best on the naked turf which he shared with his sheep, le gazon qu'il partageait avec les brebis. A crust and a cup of sour milk were his food. Withal he enjoyed glorious health, till he was taken in hands, clothed, lodged, fed, and educated, to such purpose that

within a year, the liver and mesenteric glands became engorged, scrofula broke out, and he perished miserably! The same writer Bordeu also mentions another striking case. The youngest sons says he of our peasants are designed for the church, and in consequence of their town studies, they change so remarkably as to be the only weak and scrofulous persons in their respective families, les seuls ecrouelleux de la famille!

27. It was at one time supposed that the respiration of air defiled with dust, spiculæ of metal or stone merely, was productive of tubercle, but this supposition has been disproved by Alison and others. The dry-grinders who reside in the confined and deteriorated atmosphere of their Sheffield homes, die between 28 and 30, whereas those who work in the country attain to 40! Dry-grinders, flax-dressers, masons die often of tubercle no doubt, but bronchial irritation and inflammation also conduce to the fatal issue, Thackrah on the Diseases of Artisans, 2d ed. passim. Previous to the introduction of steam-power observes Dr. Holland in his work on the Diseases of the Lungs from Mechanical Causes, all dry-grinding was on rivers, so that the grinder had abundance of fresh air and daily recreation, besides holidays from the occasional want of water. Absent ventilation and sedentary pursuits observes Dr. Guy, are the greatest, he might have added the only sources of phthisis. Of all the causes productive of tuberculous blood, Ancell considers a vitiated atmosphere the most frequent and effectual. This is much as if one were to say that heat affords one of the most frequent and effectual ways of warming the

body, but it is not the only one! Or that food is one of the most frequent and effectual sources of nourishment, but that it is not the only one! Leges philosophandi, observes Gregory in his Conspectus, vetant plures causas fingere vel quærere, quam quæ ad rem explicandum sufficient. There is no satisfactory reason says Mr. Ancell, why the children of the richer classes should become tuberculous. I fear there is! Three or four hours open-air life daily, observes M. Baudelocque, will not do away the ill effects of the bad air respired in close rooms and curtained beds during the remaining twenty hours. Even shepherds Baudelocque remarks, who spend all day in the open air, nevertheless contract phthisis owing to the frightful atmosphere of the ill-ventilated cabins wherein they pass their nights. Simon and Farr enlarge alike on the evil influence of foul air. The latter of those writers, and author of the Registrar-General's tables, adverts to the appalling fact of 30,000 women dying in one year in England of consumption alone. This great liability he most justly ascribes to excessive indoor life, along with artificial bones and bandages debarring full draughts of vital air, the altered blood depositing tuberculous matter with fatal, unnatural facility. Carswell as I have more than once stated found tubercle in the blood contained in the cells of the spleen. Mr. Queckett also and Mr. Rainey, discovered tuberculous matter in a scrofulous subject, mixed with the blood of an artery going to the diseased part! While Fournet detected small rounded tuberculous masses in a clot of blood contained in the aorta of a

tailor who died with lungs studded with miliary tubercles and numerous caverns. Lastly, Andral found minute tubercles, tubercules miliares à l'état naissant, in blood extravasated in the lungs, Clinique, vol. 2, p. 40. Consumption and scrofula are terribly prevalent in Scotland. A late writer thinks that one or the other subsists in almost every family in this climate, at one time or other, Mackintosh, Practice of Medicine, 3d ed. vol. 2, p. 421. Dr. Thomas Young who perished himself of phthisis, sets down the mortality throughout Europe at one-fourth, from this disease, Practical and Historical Treatise on Consumptive Diseases. Indeed, Lugol goes so far as to assert that a fifth of the human race labours under tuberculosis, Mémoires sur l'Emploi de l'Iode.

28. Lepelletier de la Sarthe, admits, though he do not give it exclusive prominence, in his Traité sur la Maladie Scrophuleuse, Paris, 1830, the influence of foul air in the production of scrofula. Kortum does so likewise, Commentarius de Vitio Scrophuloso, 1789. The strikingly important influence of atmospheric air on the constitution of the blood, in relation to tuberculosis, has been overlooked by Dr. Edwards in his work, On the Influence of Physical Agents on Life, Hodgkin and Fisher's translation, London, 1832. Yet where is the physical agent whose importance in every possible point of view, equals that of atmospheric air? He relates much interesting matter on the interchange of carbonic acid and oxygen in the lungs, and winds up page 102, with merely saying, hence we may conclude that the differences in the phenomena of respiration depend on

the change in the constitution effected by the influence of the seasons! Medical science however, like Rome itself, is not built in a day. In truth, medicina non est ingenii humani partus, sed temporis filia, Baglivi.

29. In the second portion of Laennec's memorable Traité de l'Auscultation Mediate, he mentions a conventual institution in Paris, in which such was the austerity of the rule, that during the ten years in which he was physician to the establishment, all the inmates, the superior, gardener, cook, nurse, and gatekeeper excepted, were severally twice or thrice removed by death! At the end of a couple of months, for the disastrous issue was the same in all, the menstrual discharge would cease, then manifest phthisis would ensue, and unless in those instances in which he was able to persuade the poor ailing creatures to leave the locality of their immolation, death! Most of those who went away, although the symptoms of phthisis were strongly manifested, quoique plusieurs d'entre elles présentassent déjà des symptômes de la phthisie d'une maniere très manifeste, recovered. The evidence of the late Mr. Carmichael as to the prevalence of scrofula in schools and asylums is very striking. In his essay on Scrofula he speaks of a parochial school of 24 girls well fed and clothed, yet 7 out of the number became scrofulous although not one had the disease on admission! No yard or court of any kind was attached, and the children had to remain in their schoolroom or bedroom during play hours. In a school of 600 boys at Norwood scrofula was prevalent until Dr. Arnott rectified the ventilation, whereupon the ma-

lady ceased. In Cornwall, Dr. Mackworth mentions in his late Paper on the Diseases of Miners, read before the Society of Arts, that while 30 out of 100 of the general population die of chest diseases, 60 per cent. of the miners thus perish! Colonel Sykes has described in the Statistical Journal, March 1847, a disease termed mithooa, very fatal among the children of Upper Hindoostan. This mithooa appears to be nothing else than mesenteric tubercle as developed in children cooped up in the inner recesses of ill-ventilated houses. It seems indeed hardly practicable to produce stronger evidence in favour of the results I have been endeavouring to establish, as to the inevitable consequences of the continued respiration of a pent-up, unrenewed atmosphere.

30. Want of exercise along with a constrained unnatural posture, tends indirectly to the promotion of tuberculous disease. A passive life indeed if it were only in the open air, would not lead to tuberculisation. The Turks sit from morning to night in their open shops, their courts and galleries, and are not thereby, so far as I can learn, observed to become tuberculous. In most climates however, and certainly in this, inaction and indoor life are virtually synonymous terms. Those who remain habitually within doors, not only lose the benefit of active vigorous effort in the open air, but they respire an ill-conditioned stagnant atmosphere, an atmosphere as I must a hundred times repeat, utterly unfitted for the healthy hematosis of the blood. Impedita respiratio, observes Gregory, § D. c. 2, qualiscunque ejus causa fuerit, motum sanguinis plus minusve impedit, et simul

expulsioni materiæ noxiæ e pulmone, et mutationi isti salutari et necessariæ sanguinis. An active varied existence in the open air, is life to the young, whereas inaction and confinement are death! Le repos est toujours meurtrier aux enfans, Baumes, Traité sur le Vice Scrophuleux et sur les Maladies qui en proviennent. Mr. Carmichael in the essay already cited, dwells on the evils of deficient exercise, the motion of the diaphragm when the body is at rest, only sufficing to prevent complete stagnation of the blood in the liver. Dr. Guy found the pressmen about one-fourth less liable to tubercle than the more stationary compositors of the same office. Lombard's important testimony I shall more particularly advert to again. Anything, as indolence, low spirits, insufficient clothing, bodily debility, inadequate nourishment, lessens the inclination for an open-air life, and directly or indirectly conduces to the morbid hematosis of the blood, the inevitable result of continuously respiring a decayed and decaying atmosphere.

I remember once seeing a gentleman. It was in one of the midland English counties. His voice was hollow as were his cheeks, his eyes glistened with a preternatural fire, his finger-ends were clubbed, else spent and emaciated, he expectorated great masses of matter without cease, his whole person was shrunk and attenuated, while he laboured under a continual chill, sure harbingers of the shadow of death! He was attired with the most careful precision. Surrounded with every comfort apparently that wealth and solicitude could supply, he had needed but one thing the absence of which destroyed

him, as it had destroyed and was destroying myriads of others, and that was fresh air. The spectacle made an impression on me which I never could forget. It is to insufficient exercise, indoor, sedentary occupations, unventilated habitations and impure air, and not to cold, as was long believed, that the tubercular diathesis is owing. To such, remarks an able observer, is the development of the malady to be referred, Drake on the Diseases of the Interior Valley of North America. Not even climate, in short all the environment of life, is the same for the rich man as for the poor, Cabanis sur l'Homme. But the whole entourage of existence is different. The cheerless, dirty, ill-ventilated abodes, the habits often most repulsive, unwholesome, and improper, the unhealthy pursuits, unhealthy at least as conducted, all fall upon the poor with a double virulence, and render consumption at once more frequent, as well as more rapidly destructive, so that what with this and other maladies, the mortality among the working-classes is precisely double what it is among the rich! The dwellings of the rich indeed, are badly ventilated, but the deficiency in this respect is dreadful among the poor. Bent all day long over some sedentary, and therefore unwholesome pursuit, the poor man repairs at night to a chamber, low, dirty, unventilated, and there, in the narrow precincts, amid the festering exhalations of a whole family, perhaps whole families of souls, he consummates the organic ruin which in a lesser degree, had beset him throughout the day. The idea as yet only seems to dawn on the civilised mind of these countries,

that houses, that bedrooms, sitting-rooms, workrooms, need a constant interchange, in respect of air, with the exterior atmosphere, not only by day, but also by night. However it may be with the civilised portion, the masses are utterly uninformed. In truth they need instruction on this point. They should be taught in school, in the church, in the lecture-room, from house to house, and from man to man. Sir, said a half-distracted woman to me this very day, one who had gone to reside in Scotland and who for some time I had not seen, what am I to do? My husband, my sisters, and my brothers, have all died or are dying of consumption! The constant formula to be used then, to rich and poor, is to sleep with the upper portions of their windows largely open by night, to wash in cold or tepid water every morning on rising from head to foot, to go much into the open air, and to take or send their children out! Some indeed will intelligently comply with these suggestions, while others treat every direction with indifference. But to cleanse the Augean stable was a very trifle compared with the difficulties encountered by him who would unmask a single prejudice, supersede a single habit, however hurtful and pernicious to his kind!

VII.

ON THE TREATMENT OF CONSUMPTION.

31. The immortal essays of Laennec, that by Louis, along with the numerous more recent treatises, are perfect treasuries as to the general symptoms and history of phthisis. The subversive and contradictory opinions however, hitherto entertained as to the real origin of phthisis, render these treatises comparatively unavailing. Nisi consulueris antecedenti causæ quæ fovet morbum, observes Riolanus long ago in his treatise De Strumis, operam perdis. As a great inquirer, Treviranus, has said, it is the first sentence of his admirable Biologie, it is not so much what we possess as the application thereof, that is esteemable, nur die Anwendung, nicht der Besitz, macht den werth des Reichthums. A few well-observed, fundamental facts, he continues, leading to certain, determinate, well-connected results, are preferable to the unconnected attainments were it of the most indefatigable inquirer. How are we to induce practitioners to attempt the removal of a malady, the origin of which, in their estimation, goes back to a grandfather. If my personal conviction can avail anything, if convictions based on a prolonged and most conscientious inquiry, have any weight, I am assured that if the views here adduced as to the etiology

of consumption were accepted and the legitimate consequences enforced, this dread malady would be placed as effectually under man's control as small-pox itself has been, small-pox once deemed equally remediless, equally uncontrollable. Could the Deity in truth intend that this fair fabric, the human frame, this so surprising and wondrous result of the Divine intelligence, should wither and decay, as in innumerable instances it withers and decays, before the time? Religion would answer no, philosophy already answers no, but medicine is silent! Have we then sufficiently, as the Father of our art imposed it on himself to do, introduced philosophy into medicine, medicine into philosophy? I am perhaps the only physician of my time and standing, possibly the only one, who is intimately and entirely convinced that the disastrous and wretched malady which it is the object of these pages to illustrate, is not only when taken early very often removable, but what is of still greater importance, that with proper means and appliances it is in every single instance preventible! In no instance in the wide history of disease, have medical investigators I conceive, fallen into greater misconceptions than in overlooking to the extent they have done, the influence of foul air in the etiology of consumption. I am anxious to keep my assertions within the boundaries of truth, as to base them on a foundation of fact, and inferences rigidly logical. The morbid phenomena which jointly bear the designation of phthisis, most indubitably owe their origin to an infraction of the laws of our organization. The continuous

or prolonged respiration of a foul, unrenewed atmosphere namely, is the ever urgent, ceaseless source of tubercle. But nature observes Dr. King, soon or late brings these inflictions to a close. For nature is the great physiological friend and restorer of the human race, exterminating those who would otherwise ruin it by rendering every man a cripple, London Medical Gazette, November 1847! This in brief, is to resume the philosophy of the subject, and each single case of mortal phthisis illustrates its truth just as effectually as the myriad instances which have occurred for generations throughout the world.

32. In considering the question of the curability of phthisis, we must take into our best consideration the reciprocal influence of our organization and the atmosphere. We act upon the atmosphere, and the atmosphere acts in turn on us. It is requisite in order to a sound and wholesome result, that the reciprocity itself should, on both sides, be sound and wholesome. If we poison the atmosphere with the products of respiration and otherwise, the atmosphere so empoisoned, will poison us in turn. But if instead of narrowing our organic requirements to a few cube feet of air, which at every act of inhalation becomes if possible yet more unfitted to support life than before, we draw upon the atmosphere at large, health and vitality so far as they are dependent on the respiration of a pure atmosphere will be the unvarying results. In case we do not continually breathe a pure atmosphere, first the fluids, the blood in especial, are disordered, then the solids. For what reasonable

man observes Reil, can maintain that the fluids in becoming diseased, fail to act injuriously on the solids, niemals auf die festen Theile krankhaft einwirken können, Entwurf einer algemeinen Pathologie, Vol. 1, Halle, 1855. Thus we have the humeral pathology back again, but it is a rational instead of an absurd and irrational humeral pathology. It is the atmosphere, continues the same writer in the third volume of his most suggestive work, p. 139, which animates, belebt, the blood, which in turn animates all the organs. It is the air, remarks Rudolphi, which keeps up life, all other gases fail, alle andere Gasarten sind dazu unfähig, vol. 2, p. 267. The threefold sources of vitality says Barlow, article on Physical Education, Cyclopædia of Practical Medicine, are the sanguineous, the digestive, and the nervous. If the blood be inadequately acted on by the air, its composition will be impaired, and cease to afford the usual stimulus and support to the organs. When the respiration is performed in a limited quantity of air, the breathing becomes oppressed. All warm-blooded animals remarks Edwards, when confined in the sa me air alter it to nearly the same degree, and though it contain a little oxygen, it proves as fatal to them when placed in it as does submersion in water, Influence of Physical Agents on Life, p. 93. The average amount of carbonic acid, as I have already stated in Section V, and must here re-state, sent out by the lungs, exclusive of other impurities, constitutes about 4·48 per cent. of the expired air. If however the air which is breathed be impregnated with carbonic acid, as is the case when the same air has been

previously respired, then the quantity of carbonic acid exhaled becomes much less. In one of two experiments by Allen and Pepys in which fresh air was taken in at each respiration, 32 cubic inches of carbonic acid were exhaled in a minute, while in the second experiment in which the same air was repeatedly respired, the quantity of carbonic acid emitted was only 9.5 cubic inches in the minute! They likewise determined that the same air however often respired, even if until it be no longer capable of sustaining life, does not become charged with more than 10 per cent. of carbonic acid!

If facts then such as these do not render obvious the necessity of a constant supply of fresh air, whether in the treatment or the prevention of consumption, how is conviction to be enforced? But the respiratory movements of the chest, during alternate effort and repose, are necessary to the healthy furtherance of the circulation itself. The mere act of inspiration as Mr. Carmichael and Sir David Barry have shown, is favourable to the venous circulation. How important under all circumstances the circulation of a pure blood is, will appear by some experiments of Hering on horses. Hering found that a solution of the ferrocyanide of potassium mixed with the blood, took from 20 to 30 seconds to pass from one jugular vein to the other, although in the course of this transit it must have gone through the right side of the heart, the lungs, left side of the heart, and the general circulation! Kirkes and Paget look upon a minute as rather above than below the usual time, and Valentin calculates that all the

blood may pass through the heart in from 43 to 62 seconds. Thus the heart consists of four cavities, two auricles and two ventricles, those of the right or venous side having no communication with the left or arterial, except at the capillary terminations of the vessels proceeding from them. The blood transmitted by the systemic veins to the right auricle or receiving cavity, passes into the right ventricle or propelling cavity, and thence through the pulmonary arteries, so named, for purification in the lungs of both sides. After being there arterialised by exposure to the atmosphere, it is brought back to the left auricle, then into the corresponding ventricle, and thence through the systemic artery or aorta transmitted throughout the frame, Carpenter's General Physiology, 3d ed. page 709. Anything that adds to the functional energy of a part, will stimulate it to increased nutrition, increase the supply of blood. And if the whole mass of the blood pervade the human frame in less than a minute's duration, how important to every portion of the organisation must be the condition of the blood for health or disease? Within this brief period, in childhood yet briefer, every impurity received into the blood, or retained by the blood, will pervade the entire mass of the organism, 60 times in an hour, or 1440, though probably 2000 times would be nearer the measure, within the day and night! I have gone into these details, since without taking them into account, it is impossible to form any rational theory of treatment or prevention in reference to phthisis.

33. Once the lungs undergo complete disorganization,

there can be no rational prospect of recovery. There is a popular error indeed, derived as usual from medical men, that a person may live with only one lung. But when one lung is so tuberculous as to be unfit for respiratory action, the other lung is always deeply implicated, and death is not far off! In pneumo-thorax to be sure from tubercle escaping into the cavity of the pleura, and in ordinary pleurisy with copious effusion, the lung may be thrust up and rendered inactive, but this does not convey the popular notion, and is further beside the question. Once a lung becomes wholly tuberculous, its regular tissue superseded and weighed down with tubercle, and else infested with enormous cavities, the change is too great, the foreign bodies are too numerous, the irritation, the hectic, the exhaustion, and the decay have gone too far for any reasonable hope from human intervention. Short of this disastrous term however, there are certain cases, states of disease where if rational indications be sedulously and resolutely followed up, there is not only a possibility, but a prospect of recovery.

Multitudes however, would recover from phthisis but do not, simply because the evil influences productive of the malady, also subsist during its continuance! How can we by any of the contradictory, irrational, subversive methods in use, hope to remove the disease, when the causes which are productive of it remain actively in force? And every method must be subversive, irrational, contradictory, which attempts the removal of phthisis without also essaying to remove the exciting cause. If, says Pujol speaking of scrofula, and the re-

mark applies equally to consumption, one could flatter oneself either through reason or experience, to have discovered a remedy for the scrofulous virus, combining with it chemically and removing it, the treatment would become simple and almost a matter of routine, Œuvres, Paris 1823, Essai sur le Vice Scrophuleux. What the remedy is, I have already often enough had occasion to declare. How should it be possible for such things as wire-respirators, or codfish oil, or a regulated temperature, hydrocyanic acid even, or digitalis, or antimony, chlorine or iodine inhalations, or steel, or meats, or drinks, or change of air, to have influence on a malady which is occasioned by the respiration of foul air, yet during the presumed treatment of which, foul air, or air more or less fouled, continues to be respired? For let us only consider if it were possible to live entirely in the open air, or in air as pure as the open air, a thing which we should aim at by night and by day in all our chambers, there could be no such disease as consumption! If a rational, instead of a subversive treatment then were pursued, we might reasonably look for recoveries in those cases in which the organic changes in the lungs had not proceeded beyond a certain point, and in which the constitutional powers of the individual were not too far exhausted. With zeal, energy, discretion on the part of the enlightened acting physician, coupled with docility, fidelity, and good-faith on the part of the patient and his friends, much, very much, subject to the conditions above laid down, might indeed often be accomplished.

34. Bayle, says Laennec, Art. 3, La guérison de la phthisie est elle possible, considered the cure of phthisis quite illusory. Nevertheless continues Laennec on examining persons who perished of various maladies, but who had previously presented symptoms of consumption often considered irrecoverable, there were discovered anfractuous cavities lined with a semi-cartilaginous membrane similar to that which lines old pulmonary ulcers, and otherwise resembling these ulcers except that they were free from the matter of tubercle. Furthermore, persons who had laboured for years under tubercle, commonly presented after death cavities more or less completely lined with cartilaginous membrane. These cavities Laennec looked on as the result of an effort of nature, natura medicatrix, and most justly. He cites a case by Bayle of a lady who laboured under evident phthisis for 14 years. She had pectoriloquy in the summit of the right lung, nevertheless contrary to all expectation she perfectly recovered. Laennec declares that many similar cases, exclusive of those recorded in the journals, had been communicated to him, and considered that with increasing stethoscopic experience such cases would become more numerous. He then narrates the particulars of some 6 or 8 instances in which either a recovery had been effected, or the patient dying of some other malady, it was seen that the tuberculous cavity was converted into what he terms a cartilaginous fistula. But Copland, Cruveilhier, Rogée, Bennett, Quain, Andral, I myself, and indeed very many others, record cases of recovery in phthisis. And since doubtless they come more or less

within the observation of every intelligent practitioner, the aggregate of instances must be numerous indeed. Many cases too get better, then relapse, incur a fresh attack of the disease in fact, and either finally get better or are carried off. It was this, these successive efforts of nature, that induced Bayle to say that phthisis might last forty years, Rogée, Essai sur la Curabilité de la Phthisie Pulmonaire, Bayle, Recherches sur la Phthisie pulmonaire. I have known it myself to last from ten to twenty years, the patients dying at last of intercurrent bronchitis or pneumonia, as verified on their remains. And here I would earnestly insist on an important point, never I believe before distinctly adverted to, namely that a single tubercle is to be held sufficient to constitute an attack of consumption. One tubercle too in the lungs may be the source of death as recorded by Dr. Townsend, Cyclopædia of Practical Medicine, as in an instance in which a single tubercle escaped into the pleural cavity inducing fatal pneumo-thorax. Each several tubercle in the lungs is to be considered a case of consumption, and each successive tubercle, may be justly looked on in a sense as so many successive attacks of consumption. Hence, in all attempts at the rational cure of phthisis, we must if possible not suffer a single additional tubercle to be deposited, for unless this very obvious indication however difficult, be fully realised, our efforts must, so far, necessarily prove in vain.

35. Phthisis, says Louis in his Recherches, chapter 4, terminates with almost invariable fatality after a period varying from a few weeks to several years. Neverthe-

less, he relates instances in which cavities as demonstrated by examinations after death had healed up, in other words were lined with false membranes! He also cites the important investigations of Rogée published in the Archives de Médecine. It results he says, from these investigations, unfortunately cut short by the death of their author, that the calcareous or cretaceous concretions formed at the apex of the lung, are always the sequel of tubercles cured or transformed. Now, half the women whose remains were indiscriminately examined at the Salpetrière, presented one or more of these concretions at the apex of the lungs! Louis in short virtually concedes the inferences flowing from the anatomical researches of Rogée, Laennec, Cruveilhier, and Andral, or to cite his own words, on sera forcé d'admettre que ces cicatrices à cavité vide ou renfermant une matière cretacée, sont une hereuse terminaison des excavations tuberculeuses, Dictionnaire de Médecine, 2d ed. vol. 24, p. 330. Andral himself sums up the matter in the second volume, 2d ed. p. 390 of his Clinique Médicale, by observing that tuberculous cavities which have existed for a certain period, sometimes diminish, and occasionally become obliterated, adding however the very important remark that this occurrence seldom benefits the patient owing to the simultaneous existence of other tubercles, l'existence simultanée d'un grand nombre d'autres tubercules!

Not only then has the cicatrisation of tuberculous cavities both in the living and the dead, been demonstrated after death by the great pathologists I have named, but by

many others after them. In fact, and I cannot too often repeat it, nature endeavours to remedy every case of tuberculous deposit, and would succeed vastly oftener in her endeavours, as they may most justly be characterised, did we only second them by suitably adjusted treatment. Sublata causa tollitur effectus. The etiology of phthisis and therefore the treatment both curative and preventative hitherto pursued, have been little better than nugatory. Laennec adverts to the occasional efficacy of a residence by the sea-shore, but does so incidentally, and without any real appreciation of the advantages conditionally derivable from it. Indeed such are the contradictory, subversive opinions maintained on the subject, that many decry a sea-shore residence for the consumptive altogether. Phthisis may last in certain habits comparatively latent for years, till continual accretions perchance hasten the process of elimination. Occasionally severe and repeated attacks of inflammation develop this morbid process. Among the recoveries from phthisis which I recollect to have witnessed, three in particular, strongly impressed me. The first was a street-hawker who had consulted me on three different occasions ere unequivocal phthisis made its appearance. He came into the hospital under my charge, with profuse purulent expectoration, pectoriloquy, emaciation and hectic. He rallied and left the hospital, eventually regaining ordinary health and stamina. The second was a medical man in whom every evidence of phthisis, rational and physical, was complete. The purulent expectoration was ex-

cessive, the emaciation extreme, he was nightly drowned so to speak in sweat, his hair came out in handsful, while an abscess formed in the perinæum. He never lost his courage however, though I did not entertain the colour of a hope. Nevertheless, he rallied, grew better, grew well in short, and died three years subsequently of Asiatic cholera in a distant region. The third case was that of a lady two of whose sisters died of ordinary phthisis, only that in one of the two, the larynx was apparently tuberculous before the lungs. A third sister died of what we may term cancerous phthisis, cancer penetrating the intercostal spaces and extending to the left lung. A fourth sister had ordinary tuberculous scrofula in the neck, and as sometimes happens, escaped in respect of the lungs. The fifth and last sister, was in her turn seized, after nursing her other sisters, with every symptom of exquisite phthisis, incessant hacking cough, purulent sputa, ardent hectic followed by drenching nightly sweats, while her long tresses were reduced to shreds. She had colliquative diarrhœa too, and repeated attacks of intercurrent pleurisy only abated by copious leeching. Withal she recovered, and lived, yet lives indeed after an interval of many years, exempt from every complaint!

36. It is now desirable that I should make a few remarks on the natural history of recovery from tubercles. It is at once interesting and melancholy to witness the slow yet certain progress of improvement and discovery. A Laennec applies a roll of paper, a cylinder of wood to the naked chest, and finds that it directs his unassisted

hearing somewhat in the localisation of morbid sounds. He further detects, a yet more marked innovation and discovery than the other, the healing of tuberculous cavities both in the living subject and after death, then contracts phthisis himself and perishes, without ever attaining almost to a single rational idea as to the causes and treatment of the disease! In respect of the physical diagnosis indeed, after observers have done little except repeat and partially modify his conclusions. This remarkable man mainly contented himself with observing. The precept was afforded him by his master, the father of medicine. It is the motto of his work, *μέγα δὲ μέρος τῆς τέχνης τὸ δυνασθαι σκοπεῖν.* Doubtless a great part of the art of medicine is to observe, what were medicine without it? And yet what is the art of medicine without the art of introspection, the power of drawing conclusions, its most needful ally and complement? About 14 or 15 years after Laennec had produced his great work, de l'Auscultation Médiate, another observer Baudelocque, came forward with his Études sur les Causes, la Nature, et le Traitement de la Maladie Scrophuleuse. Here, the field of observation was extended. Baudelocque furnished the antithesis to Laennec's thesis, as my own observations and inferences based on what they have done, will I trust prove the synthesis and complement of their labours. Laennec has determined the seat, natural history, and occasional cure of tuberculisation. Baudelocque referred the source of tubercle in the case of scrofula, to which I would conjoin pulmonary and all other tubercle, to the respiration

of foul air. To all this, I further add that the mechanical amorphous deposition which we term tubercle, is itself chemically and physiologically owing to the retention and conversion of the carbonaceous and other impurities not discharged from the blood. These carbonaceous matters, the impurities of the blood namely, are not, cannot be, eliminated in foul air, and having no practicable healthy outlet, are, with the addition of watery moisture, and a small amount of earthy salts, converted into the substance named tubercle. This tubercle, the lung-tissue not being otherwise implicated or diseased, undergoes progressive softening and expulsion through the nearest practicable bronchial tube, else by successive deposition and absorption, is converted into a cretaceous mass or masses, and is either eliminated in that form by expectoration, or retained till death in the lungs. I thus complete the last links of the chain of morbid causation, and as I would fain believe and hope place the problems hitherto incomplete and unresolved, of the treatment and prevention of pulmonary and other tubercle, upon the sound and unassailable basis of medico-scientific observation and inference.

37. When tubercle softens I have said, it is converted into a thickish yellow matter, which shortly after finds its way by a process of ulceration into one or more of the bronchial ducts and is evacuated. The cavity or cavities thus ensuing, have received the quaint designation of caverns or vomicæ. They may remain unchanged or as I have stated heal, forming what are termed fistulous cicatrices, as delineated by Cruveilhier

and Laennec. They may also be without a cavity, in the state of a fibro-cartilaginous cicatrix, according to Laennec leaving a sort of puckering or depression on the surface of the lung. These are results which although there may be differences on minor points, have been determined without any colour of uncertainty. The cretaceous masses common enough in the aged, are undoubted conversions of tuberculous matter. In my own opinion, these cretaceous masses afford conclusive evidence as to the occasional, probably the habitual absorption of tuberculous matter. Recent tubercle contains only minute quantities of earthy salts. In one analysis by Simon, there were but 4·44 parts of insoluble earthy matter in 100, whereas in 100 parts of a concretion found in one of the bronchi of a man who died of phthisis, Scherer discovered only 20 of organic matter, but of the phosphate of lime 69·92, carbonate of lime 9·09, with traces of chloride of sodium, sulphate and phosphate of soda. These results are of extreme importance. They show not only that tubercles may be directly expelled and the cavities heal, but also that the tuberculous matter is susceptible of repeated, continued, and complete absorption, with the exception of the earthy ingredients indeed, with or without the subsequent elimination of the consequent cretaceous mass or masses, and followed it may be by a complete and perfect recovery or death itself. Every such absorption of tuberculous matter, philosophically speaking, must be looked on as an attempt at recovery, every fresh deposit of tuberculous matter a fresh attack. How numerous

then might be the happy issues from these critical librations, these balancings of nature between life and death, did more fortunate circumstances only happily second her efforts?

38. I have not proposed to myself a complete history of phthisis or of the painfully interesting changes mental and bodily attending its course and development, but merely of such points as were calculated to throw the proper light on its etiology and pathology, and consequently on its treatment and prevention. This object fulfilled, I now proceed without delay to the question of the treatment. The treatment of phthisis then, is divisible into palliative and curative. In practice indeed, both these modes so far as possible are to be combined. When the lung or lungs however, are in a state of utter disorganisation and decay, the blood completely poisoned by the habitual retention of the excretions, and the whole system as it were given up to the enemy, we cannot hope to do much. It is in fact death with which we have to deal, and where is the physician who shall cope with death? Short of this disastrous issue however, much very much may often be accomplished. We may always alleviate suffering, and if we only witness the malady early, may prolong life, perchance effect a cure. For as I have sometimes, totidem verbis, told the patient and his relatives, when pressed on the subject of a probable recovery, what is life itself in many cases but a long decay, a process of composition and decomposition, a never-ceasing combat with disorganising agents, to which in the first instance or the last, all must finally yield? It

is not those the healthy and the stout, as medical men are well aware, who always make the best struggle. Phthisical sufferers indeed, their malady being overcome, often live to a very advanced age. An aged physician, one who had encountered much toil of body and mind, assured me that during his youth he had laboured under hæmoptysis and other phthisical signs. In cases apparently desperate, there is sometimes a ground for hope. Even the pneumo-thorax consequent on tuberculous perforation, does not seem of necessity fatal, as we learn from an instructive case by Dr. Banks, Dublin Medical Quarterly, May, 1854. The judicious physician, the longing sufferer, and the anxious friend, are aided by a sleepless and most potent auxiliary, in subordination to which it is the ceaseless duty of the practitioner to act. The more indeed he acts in conformity with it by an active, vigilant, and wise expectancy, staying and averting the operation of each and every noxious principle, the oftener may he hope to effect a cure.

39. The kind and judicious physician however, while he invokes the potent aid of nature, will not lay aside the well-digested efficacy of art. And here I must explicitly and distinctly declare that the medical man or the patient who desires to realise a recovery in phthisis, whatever be the agent employed, else neglecting to enforce day and night, ever and always, the respiration of a perfectly pure and untainted atmosphere, an atmosphere renewing and revivifying the blood, need hope for no success. This indeed must be the indefeasible correlative of every and any mode of treatment. Combined with

this, any treatment not directly or indirectly hurtful may succeed, without it no possible treatment can otherwise than fail. A pure, fresh, untainted atmosphere, at all hours, times, and places, is the one single condition, which nothing whatever must interefere with or set aside. Arrangements therefore must be made, in which, while by means of flannels, silks, furs, chamois vests by day, bedclothes warm and fleecy by night, aided if needs be by coverlets of cotton, goose or eider down, and open fires, bodily warmth is effectively sustained, there shall be a ceaseless, unlimited supply, day and night, winter and summer, of a pure, fresh atmosphere in the apartment of the sufferer. The simple rule is, let the chamber atmosphere be pure and untainted as the open air, in which indeed the patient should spend as much time as his strength, the weather, the season, and his means will permit. It is obvious that indoor exercise in this pure atmosphere on foot, taking care not to quicken the circulation, or in a bath chair, may be taken at times when it may be undesirable to leave the house. The fires should be open fires so essential to cheerfulness and ventilation. These should be kept up in winter and in summer even, whenever the weather is cool, so that the patient so far as it may by artificial warmth be possible to prevent it, should never experience a sense of chill. I do not at all mean to say that a well-constructed, ventilating stove, the Boston stove for instance, or some ventilating stove, with plenty of fireclay about it, and a hot-air chamber to receive masses of open air and emit it

warm, might not answer as well or better, and more economically than an open fire. But then it must be a good stove, heating abundance of sweet pure air, and emitting it at a low temperature, say at from 50° to 60° F.

For this atmospheric purity is the one needful thing, the alpha and the omega, without which all treatment is a thousand times worse than nugatory. And what I may be asked, is the criterion? Why, the senses when unperverted, must be the criterion. In their delicacy of apprehension nature has furnished us with a sure and certain test, a test in which, when one has not spent one's days in a frousy, fusty, tainted atmosphere, there can be no error. Irrespective of this test however, measures plain and obvious must be adopted. The windows, if French casements, must be thrown day and night, largely and freely open in summer, to a less extent in winter. At the same time, precautions must be taken, by the choice of a suitable apartment and otherwise, to keep out drifting wind, and rain, and snow, although none of these are so much to be dreaded as confined air. If the windows however, be of ordinary construction, they must be pulled down, say as far as they will go in summer, in winter a foot or so, save when the patient is dressing or undressing, taking a bath, or during any other needful proper occasion. A good deal depends on the wind and atmospheric temperature, since a smaller aperture will suffice at one time than at another. But the arrangement it will be understood is such, however small or large the apartment, that the patient shall not if it be possible to pre-

vent it, breathe the same atmosphere a second time, much more breathe it again and again. So far from this precaution being observed however, I appeal to medical men themselves, to the philosophical observer, the intelligent community, if the rooms of the phthisical sick be not too generally maintained in a state rather calculated to breed disease than to aid in remedying it.

I cannot but recal to mind with a sort of sickening horror, the apartments which it has been my duty to visit in the course of my attendance on the consumptive. I cannot, nor is it necessary that I should recount the impurities flowing at once from the necessities of the poor sufferer and of those about him, too often must, dust, and closeness indescribable. The chamber atmosphere says Baudelocque, Etudes p. 131, has been overlooked, yet there says he, in the narrow, hermetically sealed space, isolated for perhaps ten hours, amid curtains, in the perishing and unrenewed atmosphere, we shall often find the source of the evil. It proved fatally so with two sisters whom I vainly tried to draw from their narrow sleeping-rooms, where every crevice was pasted over, and where they spent their nights, each in a couch where the curtains with homicidal ingenuity, had been closely and carefully pinned. One perished indeed, after a long struggle, of pulmonary tubercle conjoined with cancer of the breast and axillary glands, the other of simple tubercle, the rest of the family who would practise no self-immolation remaining perfectly healthy. Even when these more gross deficiencies are not observable, there is often a chamber atmosphere

devoid of freshness and elasticity, an atmosphere in short, dead, inelastic, unrenewed, corrupt. I have this moment within the scope of my mind's eye sleeping-chambers, airless closets, which have produced tubercle, and must continue to produce tubercle in all who have occupied or should occupy them. Suffice to say it, the air day and night, must be pure and incorrupt, else there can be no prospect of recovery or even of rest or partial relief, short of being drenched and stupified with narcotics, drugged with prussic acid, or chloroform. It is impossible that the blood can be purified, it is impossible that it can discharge its carbon, it is impossible that it can be regenerated by the vivifying oxygen, it is impossible in fine that the patient can recover, if the atmosphere which he habitually respires be not suffered to be as pure as God hath made it and given it to us, and, convinced as I am of my existence, as he intended us all, sick and well, to make use of it. Sound respiration will not, cannot ensue in an unsound atmosphere! This is a sentence which I should wish to inscribe on every stethoscope, every sick-room, indeed over every chamber-door. It is a precept however, which is continually, and indeed, all but universally violated. Yet, it is one which must be as continually and universally observed, if we would accomplish any good in the treatment or in the prevention of consumption.

40. The continual and most unnecessary dread of taking cold, which haunts the minds of patients and their friends, is doubtless one cause why fresh air is so thrust aside. They cannot distinguish a cause, or even a con-

currence from a consequence. Every post hoc is with them a propter hoc. They are all too sensible of the evil of taking cold, but almost wholly insensible to the infinitely greater evil of respiring an unrenewed, contaminated atmosphere. The body is able to bear a certain reduction of temperature, and cold is only taken when natural warmth is inadequately sustained. The inferior animals are provided with sufficient means and appliances by nature, but man has reason wherewithal to secure artificial warmth, what by fires, what by superadded coverings, by night and by day. Our clothing is really too light for the varying requirements of the climate. More and warmer clothing should be habitually worn by young and old. Our rooms should be more perfectly heated. Thus, and aided by our natural warmth, we shall be able, with every advantage and impunity, to court the utmost desirable open air exposure, as well as to admit the exterior atmosphere freely and sufficiently into our abodes.

It was once a general medical prepossession in truth, that taking cold, that the damp night air, was a source, the source indeed of consumption, but this was a great error. The respiration of the coldest, dampest air will never, never did since the world began, induce consumption. It is only the respiration of dirty, foul, unrenewed air that induces consumption, else, so far as this is concerned, the coldness or the warmness, the dryness or the dampness makes no sort of difference. If only the air be pure, however cold, however damp, however dry, there will be no consumption. But if the air be impure, however dry, however warm, there consumption, if this impure

air be habitually respired, will be sure to follow. It is only necessary in order to avert the sense and the reality of a chill, to obviate by the means at our disposal, the artificial evaporation induced by damp day or night coverings. If the air be sufficiently warmed in-doors, if the body be sufficiently protected out of doors, there will be no chance of taking cold, whether by night or by day, certainly none of consumption, even in the case of the most sickly and delicate persons. It is not breathing cold air or admitting it into our dwellings merely, it is the insufficient protection of our persons, not by warm foul air, but by warm pure air and warm coverings, that occasions taking cold. Contrary to the general prepossession, air is as good, nay better by night than by day. The night air as such, never injured any one, it is only impure or chill air that does so. How indeed is it possible to have any air at night except night air? Impure night air kills, just as impure day air kills. Not so pure night air, which should be most freely admitted into the chambers of the consumptive, until the air in these chambers shall be as pure and as fresh, else heated at pleasure, as the air outside the chamber beneath the free heavens. For years I have slept with my chamber window open! For years my family, protected by sufficient night-coverings, have done so. For years too, those whom I have induced to follow the same course, have slept with their chamber-windows open, with every conceivable advantage, so far as the respiration of a pure, genial atmosphere, instead of an atmosphere else necessarily close and corrupt all night through, can prove advanta-

geous. If the open air by night had been hurtful, the birds of the air and the beasts of the field must have perished long ago. If the night air were pernicious, the myriads of our species who for months of every year never see the sun, and who for that period can have no day air at all, must also have perished. If indeed pure air were a thing of price, of factitious price I mean, for otherwise it is priceless, if people had to dive for it into the sea's depths or grovel for it in the mine, they would duly value and appreciate it. Yet as God's free and inestimable gift, why should they not value and appreciate it as it is?

41. The phthisical sufferer then should spend as much of his time in the open air as his strength and the weather will permit. This, his clothing being suitably adjusted, he should do in all seasons. A light, yet warm covering in cold weather for invalids, is a silk or fine cloth pelisse or overcoat, wadded with cotton or down, and lined with silk. It should be made very loose. It need not weigh more than a few ounces, and keeps out the cold most effectually. Thus, and otherwise guarded and protected, the open air will prove not only harmless, but most grateful to the consumptive sick, whether they be on horseback, in carriage, or on foot. For the words change of air, I would substitute change the air. The precious influence of the pure fresh atmosphere, if not always sufficient to prolong the patient's days or to aid in the removal of his too deep-seated complaint, at least calms and soothes his sufferings, procures some degree of appetite and digestion, and assures

sleep at night, often up to the very last moments of life. If at all able, locomotion on foot is desirable, and subsequently if available, exercise in an open carriage, or as Sydenham and Desault have recommended on horseback, or on that humble but excellent substitute, a donkey. Sydenham's eulogy on horse-exercise is in fact the eulogy of fresh air, tantum valere equitationem ad phthisim curandam, quantum chinamchinam ad febres intermittentes! If the weather suit and the sea be at hand, I would strongly urge boating. As the heat-producing powers of the consumptive, keeping off the morbid accesses of hectic fever, are greatly impaired, I must again and again urge the importance, on all occasions, by means of suitable clothing, of warding off a chill. This rule holds good by day and very especially by night, when the open air as I would most earnestly urge is freely admitted into the apartment, and the natural temperature of the body is a degree or two lower than by day, Kirkes and Paget's Physiology, 2d ed. p. 178. I am convinced says Laennec in the second portion of his Auscultation Médiate, that we have no better means of opposing phthisis than sailing about and living by the sea shore in the mild season. What is this indeed, like Sydenham or Rush's commendation of riding, but a eulogy, more or less direct, on the efficacy of fresh air? No one now-a-days, will place any serious confidence in fresh wrack, fucus verrucosus, the introduction of which into the chambers of the sick was commended by poor Laennec. The peculiar atmosphere of the sea, however excellent in its degree, will not, apart from its real

efficacy as fresh air, cure any body in consumption. I have witnessed the most lamentable havoc in truth from phthisis in families who lived within the scent and hearing of the wash of the sea. Here however, the usual suicidal, homicidal practice had prevailed of shutting out the atmosphere, day and night, from their sitting and sleeping apartments.

The ceaseless concomitant as I must again and again urge, of every attempt at removing phthisis, must be the respiration of a pure, unadulterated atmosphere. The veriest nurse, the most ignorant parent who should keep this grand, this indispensable requisite incessantly in view, would have greater success, in fact without it there can be no success, than would the most learned, and able, and conscientious physicians in the world who should neglect it. Gentle, graduated exercise in the open air, or in some place as a room or shed to which the open air has the freest access, should be persevered in daily. Even vocal efforts, singing, declamation, reading aloud, guardedly of course, and always in a pure atmosphere, will prove useful. The progress of the lungs and chest in vital capacity may be from time to time determined with Hutchinson's spirometer, Sibson or Quain's chest-measurer, or even a simple tape-rule. As deficient muscular effort is one of the indirect sources of phthisis, so deficient open-air effort will further aggravate the complaint, and so long as there is a chance diminish that chance of recovery. It is perfectly obvious that this muscular effort must be carefully graduated by the skilful attendant practitioner, to the

patient's residuary powers. Unless conducted in the open air however, or in an atmosphere the counterpart in purity of the open air, exercise as a curative remedy will be worse than worthless, exhausting the patient and conferring no compensatory benefit.

42. Change of air it will be obvious from the principles here advocated, must prove mainly useful by raising the spirits of the sick, in short leading them them more and more, and oftener and oftener into the pure, ever-moving, and in some respects ever-varying atmosphere. In any other point of view, it is utterly absurd to look for benefit from change of climate. In fact, the Almighty has placed within our reach, in every climate in short, the remedy close at hand with the disease. Here is the bane, and here the antidote! Else the mere act of travelling, the physical and moral solace which it yields, may often, in respect of the classes who can afford it, prove serviceable. That climate alone remarks Clark, should prove useful in consumptive diseases, could only originate in a very limited acquaintance with the influence of climate on disease. Indeed all judicious observers are now in unison as to the inefficacy of mere climatic changes in aiding a recovery from consumption. Like other professional errors however, it has descended to the multitude, and one of the first things which non-medical people who have the means think of, is to send their consumptive relatives to some tepid climate where perchance they languish and decay with yet greater rapidity than they would have done had they remained at home. I have

been myself in warm climates, and in some of the ordinary haunts of the consumptive, and am of opinion that the languor and listlessness which they so frequently engender, are anything but calculated to infuse vital energy into phthisical constitutions. The inscriptions over the dead in Nice, Pau, Rome, Madeira are full of mournful, yet instructive evidence on this point. As regards mere change of air then, the shores almost any of them of our own islands, the mountain slopes and summits of our higher lands, the airy downs, the heaths, and moors, are severally preferable to any Nice, or Rome, or Pau.

The materials for the possible recovery from phthisis, I repeat it, lie around every door. God, and nature his great revealer and interpreter have alike willed it so. The origin and perpetuation of consumption says Ancell, are less attributable to man's constitution and the necessary effects of the agencies which surround him, than to his own negligence and contempt of natural laws, his ignorance, his imprudence, and his folly, On Tubercle, p. 759. The very great majority it has been well observed, of those who labour under consumption, cannot have change of air were it to save their lives. Happily it is not required. The needful restorative influences, so far as they are available, abound among ourselves. Change of air however, I do not say change of climate, irrespective of the inestimable benefit of respiring a pure, untainted atmosphere, often lightens up the animal spi- spirits as no other restorative can, allays the harassing cough, procures refreshing sleep, and in virtue of what

I would term a species of vital catalysis, enhances the appetite for food along with the power of digesting it, matters all of the greatest importance in the mitigation and possible removal of consumption. How often indeed, have I seen the phthisical sufferer begin to recruit and pick up from the very date of his or her removal to the air of the sea? The food which was previously tasteless, is partaken of with relish, and strength and power of locomotion previously so impaired, are regained along with the appetite. There have been many who might have recovered could I only have succeeded in inducing them to follow up their out-door, sea-side life, either at the sea side or mutatis mutandis, at home. But they got better for a space, and esteeming themselves well or out of danger, they would not. So they returned home, relapsed into their old inveterate ways, and died! There are nevertheless virtues in the air of mountain summits, as contrasted with the close, reeking environment of towns and houses, which even as yet we imperfectly appreciate. Those of the profession who have turned their attention to the subtle and often highly beneficial influences induced by a slight change in the constitution of the atmosphere, chemically and dynamically wholly inappreciable, will be willing to concede all and even more than I have here asked.

43. In nothing is a greater change conspicuous than the regimen, the meats, the drink, and general treatment of the consumptive sick. It was asses' milk, tapioca, and arrowroot, and jellies animal and vegetable,

and soups, nice enough to taste, and smell, and look at, but very useless and unserviceable in everything that regards the maintenance and restoration of the health and stamina of the sick. Roast meats and boiled, fish, flesh, and fowl indeed, both wild and tame, oysters, milk, fresh curd, and farinaceous matters, good bread, vegetables, and fruit, tea, chocolate and coffee, sugar, good wine, porter, and brandy, all under judicious regulation and management, are the fitting aliments of the consumptive. To give these restoratives to the proper extent so far as the patient can obtain them, and to enable the stomach by means of gentle tonics and otherwise to digest them, will be among the medical attendant's more obvious duties. The accomplished physician is perfectly aware of the different bitters, the cusparia, the calumbo, the orange peel, and the quinine, the various and excellent preparations, the citrate, lactate, and others of iron, and the occasional medicines, without further comment, to choose from and judiciously to administer. The rich sufferer will often assuage his hectic pangs with great luxury and comfort, by means of champagne, and sparkling hock, and burgundy, while soda water and the various pleasant preparations it subserves, commend themselves in moderation to every one. I have found quinine carried to quinisation, to relieve intermittent fever combined with hectic, and threatening dissolution by its severity. Dilute sulphuric acid is admirable in the colliquative diarrhœa of phthisis. A tablespoonful after each loose motion of the following, will commonly allay diarrhœa, assuage suffering, and obviate the fever,

discomfort, stupor, and loss of appetite, too often entailed by laudanum and chalk mixture.

R. Acidi sulphurici diluti drachmas duas,
Syrupi croci unciam unam,
Aquæ distillati uncias quinque. M.

Sometimes it will prove expedient to add thereto, half a drachm of the common spirituous solution of morphia, also a little tincture of ginger. It is preferable otherwise, to eat a regular meal at regular intervals, say four times daily, than to eat a little now and a little again, by which the stomach is disordered and the appetite is impaired. Bitter ale or porter, diluted brandy, or wine, one only at a time, is desirable at the dinner meal. If these drinks or any of them be taken at irregular intervals, they are apt to prove hurtful. This rule however, has exceptions. The lady formerly adverted to as among the remarkable recoveries from phthisis, was allowed brandy in milk or water at pleasure, by day or by night. She drank a great deal in this diluted form, and as in other instances, with much apparent advantage. While some are thus benefited, there are others in whom the smallest amount of stimulus kindles unrest, ardent hectic, and proportionate suffering. It is either very early or far advanced in the disease, and when exhausted by copious expectoration, drenching sweats, and wasting diarrhœa that wine and cordials prove restorative. But as a general rule from which indeed there are few, in fact no exceptions, a liberal restorative regimen, both fluid and solid, answers best, and is indeed indispensably requisite in phthisis.

44. A tepid bath of from 80° to 100° F. as was long ago pointed out by the Arab physician Mesue, proves a great comfort in this malady. The patient spent and exhausted with hectic, ceaseless coughing and expectoration, sweating and diarrhœa, perchance hemorrhoids, finds the bath a real luxury, preserving the needful personal purity, soothing and relieving pain and suffering. A few minutes' immersion will quite suffice. The bath should be an open, not a slipper bath, but if the patient cannot bear the fatigue even of this, then tepid sponging is to be resorted to. Medicated baths as such, are useless, else water whether salt or fresh, is immaterial. In France a sort of wicker frame on which the patient reposes, enables him by means of a couple of light cranes attached to the ends of the bath, to be lowered and raised again, without any appreciable fatigue, a great gain when our object is to relieve a poor, tortured sufferer, perchance afflicted with consuming hectic and racking pains, the result of swollen extremities. The margin of the bath I will only add, if of metal, should be double and filled with heated water, so as to avoid the else painful chill induced by coming in contact with it. Marble baths as regards the margins, may be covered with flannel. Indeed, the further this weary disease advances in or towards the colliquative period, the less the prospect of recovery, the greater the difficulty even with the utmost skill and attention of realising relief. Je mehr sich dieser colliquative Zustand ausbildet, desto geringer ist die Hoffnung zur genesung, desto mehr geht alle Therapie blos auf Erleichterung und Aufschub, Gmelin, Algemeine Therapie, Tübingen, 1830, p. 302.

45. The sick demand a variety of attentions and careful kind offices which it would almost require a sick-room code in order to specify. If possible none but respectable, conscientious sick-nurses, so much does the sufferers' comfort depend on it, should be employed. Else all superstitions, untoward, uncheerful, unwholesome influences should be kept at bay. In warm weather a mosquito or other net to keep off insects, will prove very advisable. I have seen the sick eaten up, so to speak, with flies, which the most careful assiduity, in certain seasons can with difficulty drive from the decaying frame. All harsh accents, needless noises, and vexatious contrarieties should be avoided even with the most querulous sufferer. The food should be ever warm and comforting, the service genial and reassuring. The utmost cleanliness, and where it is possible even elegance, should be enforced. A late patient of mine, one who took leave of this life with almost angelic calmness and serenity, got up and dressed herself to the very day of her decease. Fresh flowers and berries of the season were always on her table, beside her keys, and account-book of the day, and poor sufferer her books of comfort and devotion. A word of impatience never left her lips, on the contrary unfaltering gratitude and submission. The summer-air, through the upper part of the open window, alas it had not been always so, came sighing and murmuring into the chamber. One or two little children sat beside the suffering mother, and I could see her looking wistfully at them, though careful to send them to walk and play. In short, she

was not, as she told me, afraid to enter the better life, and like many a one whom the medical man has the happiness of succouring as he best may, clasped my fingers with her burning hands, thanking me ere she died, for what she was pleased to term my goodness to her throughout her disease. In very deed and in truth in consumption as I have often and often witnessed, the heart and soul of man display themselves under a truly winning guise, Der Geist und das Gemuth zeigen sich dabei oft von Sehr Vortheilhaften Seiten, Puchelt, System der Medecin, vol. 2, p. 252.

46. I am most earnestly and conscientiously of opinion that as every case of consumption might be prevented, so ought we to look upon every case of the disease if taken at the earliest period ere the tubercle deposits have become considerable, as removable. Unhappily this period too rapidly passes away. Patients and their friends are not alarmed unless a serious inroad be made upon the health, and then the prospect, although in some recoveries ensue beyond all expectation, becomes vastly less favourable. By always aiming at a cure, we may hope that our success shall be proportionate. But to hope to remove a malady like phthisis, confirmed phthisis, by medicine alone, is the greatest of illusions. Else medicine will palliate suffering to an extent that has suggested, although in my opinion vainly suggested, a cure. Thus, an emetic of the sulphate of zinc, or tartarised antimony, or ipecacuanha, morning and evening, or every morning, or every second morning, as it can be borne, will often relieve a hacking cough or a difficulty of breathing

better than almost anything else. De Vittis' formula was 3 grains of tartar-emetic in 5 ounces of elder-flower water and an ounce of syrup, a tablespoonful night and morning. Hufeland in the second volume of his Handbook, speaks favourably of emetics. Many others have done so, Galen among the rest, curing phthisis as he avers, with vinegar of squills, ἀπὸ του φαρμακου τουτο θεραπευθέντας. If De Vittis could cure 176 cases of consumption by means of emetics, it would be an easy matter to imitate him. The origin of this medical error is simply that of considering phthisis cured, when the cough was removed. Very commonly in phthisical persons, tubercles and purulent matter irritate the bronchiæ and solicit discharge. An emetic furthers this discharge, but it will not remove, nor will any succession of emetics remove the heaped-up tubercles in the lungs, at least until they find their way by ulceration and elimination into the bronchial tubes, neither will emetics nor any succession of them, remove the tuberculous tendency, the tuberculosis of the blood. It may in fine be most truly alleged, that any treatment which does not keep perpetually in view, the rational indications of purifying the blood, inducing a healthy hematosis, sustaining the system, and so far as may be aiding nature in her ceaseless attempts to eliminate or absorb or convert the tuberculous matter, will prove of no avail. Hydrocyanic acid will not do it, nor chloroform, nor opiates, although when cautiously and sparingly employed, they will when as too often happens needs must, soothe present suffering, and calmly conduct the sufferer to the gates of the tomb.

It may then but not till then, be said of each indeed, as Sydenham said of opium itself, sine illo manca sit et claudicet medicina.

I made trials with the extract, well known to the ancients, of common lettuce, the lactuca sativa of Linnæus, recommended by Dr. Duncan in the appendix to his Observations on Consumption. Possibly modern chemistry might evolve some more active principle, some lactucine from lettuce juice, but as prepared it exerts little energy. Swollen feet and the apthous mouth occurring towards the close of phthisis, afford little scope for human intervention. Scruple doses of dilute sulphuric acid further diffused through water, are useful as I have stated, in diarrhœa. Chlorine and iodine inhalations, at one period extensively employed, and boldly pronounced to effect a cure, have alas no permanent efficacy. Remarks precisely similar apply mutatis mutandis, to cod-liver oil, sometimes given in milk, sweet wines, the infusion of orange peel, or by itself. This substance contains no active principle or ingredient of any kind. It is not calculated either directly or indirectly to exercise the slightest favourable influence on the symptoms or the issue of phthisis. And although the extent of its exhibition be perhaps without a parallel in the history of popular remedies, ten thousand a year it seems being expended in advertising, it has not exercised any the faintest appreciable diminution in the cipher of the mortality from phthisis. Of what avail will be the increase of bodily weight ascribed to its continued use, unless the tuber-

cular habit be at the same time abated? In effect, the cod-liver oil can but furnish fresh material for the further deposition of tuberculous matter itself! I quite coincide with Dr. De Jongh, although with a different meaning from his, in his treatise, L'huile de Foie de Morue, Paris, 1853, p. 256, that we have to avow our impotence to solve the very difficult problem, how the varied principles which constitute cod-liver oil should operate, quand ils effectuent la guérison des maladies contre lesquelles cette huile est administrée! There is no remedy indeed but a thorough one. Physicians, the community at large, will groan over the inefficacy of medicine, till nature be appealed to in the only direction in which it is possible, or indeed desirable, to achieve success. Laudantur remedia complura infallibilia, sed tabulæ mortuorum artis inefficaciam demonstrant, Francisci Bene, Elementa Medicinæ Practicæ, Pestini, 1834, vol. 4, p. 275!

VIII.

THE PREVENTION OF CONSUMPTION.

47. In order to delay efficiently the development of a disease, its source must be assailed, its energy weakened, its virulence and potency lessened. To do this we must attack the root of the evil, and neutralise, if not do away with its material principle or agent. Such are the sentiments of Pujol in his prize essay on scrofula, which received the accessit or second place after Baumes, Effets du virus Scrophuleux sur l' economie vivante, from the Royal Society of Medicine in Paris in the year 1786. These sentiments indeed are precisely applicable to consumption as to scrofula, and for that reason alone I cite this record of the past. Important indeed as have proved the benefits of vaccination, the circulation of the blood, and those of other physiological and pathological discoveries, yet greater at once for the individual and the species, would be the advantages derivable from abating the frequency, and if such be possible, getting rid of consumption altogether. In this possibility I firmly believe. If measures based on the actual pathology, the real etiology of phthisis were carried out, the inevitable result would be a proportionate diminution in the frequency and fatality of this hitherto disastrous and intractable disease. If the as-

certained mortality from tuberculosis in England and Wales in 1847, according to the Registrar-General's tables, amounted to 67·964 cases, what shall it amount to if we add thereunto the mortality in Scotland and Ireland, with all the unascertained but presumptive instances, the white swellings, the scrofula, the strumous diseases of the joints and spine, all the tuberculous subjects who die of concurrent maladies, the examples of recovery? A knowledge of the means of preventing phthisis however, must extend not merely to the profession of medicine but, to the community at large. This however must be the work of time. Yet, that time must of necessity bring round such a change I entertain no reasonable doubt, and the ravages of consumption, at present the opprobrium of the medical profession and of human intelligence, like those of scurvy, or small-pox, or fever, or leprosy, or plague, will at length become the theme of historical comment and posthumous wonder.

48. It has been rightly stated that tuberculous outbreaks, known as struma or scrofula, may subsist without internal tubercle. Scrofula however, is not a prophylactic, more than any other tubercular outbreak is so. Many indeed are the scrofulous subjects as every practitioner is aware, who become the prey of inward tubercle. No, the best and only real prophylactic is the unintermitted respiration day and night, of a pure and untainted atmosphere. If this be only continually respired, there can be no consumption, no tubercle. Just as on the contrary if foul air be continually or habitually respired, consumption after no long, but at the same

time no certain interval, becomes inevitable. There is indeed a border-land of disease where consumption has not actually broken out, but where it is constantly imminent. The circumstances are not such as to induce decided consumption, neither are they such as to insure health. Pure air is respired at intervals, but not sufficiently to realise sound health. Foul air too is respired, yet not sufficiently respired, to induce actual, tangible disease. Such cases I am persuaded, are of necessity very numerous. Many spend their days, live and die as it were, in this border-land, without exactly knowing of what they ail, not feeling sick enough to complain, nor yet well enough to be well. This neutral state however, assumes a terrible significance if we consider that it must precede all actual outbreaks of consumption whatever, that one hundred thousand human beings throughout these islands not now in consumption, will nevertheless display the frightful symptoms of that disastrous malady within half a year! This then is the condition in which the mighty aid of medical science and medical skill might be called in with effect, when as yet the well-directed solicitude of parents and friends might realise a rich result. I once attended three lovely young women, sisters, in one family. They perished successively phthisical, with frightful promptitude. Their surviving brother, a medical man, observed to me not long since, you see how stout I am, in truth he was so. I live well he said, and I live much in the open air. I am determined not to perish as my poor sisters did! Yet this gentleman had requested my professional aid in

behalf of his niece, threatened with tubercular deposit in the spine, which it would seem from the history of the case she must have experienced once before. I found her with a quickened pulse, hardly able to turn in her bed, in a small room, with inadequate air-outlets, in short in a position quite sufficient to reinduce the complaint. In such subjects, a little more confinement, a little more continuous respiration of the foul atmosphere, suffices to generate the tubercle taint with singular rapidity. I have to the best of my convictions, in many instances, averted the outbreak of consumption in persons whose parents or whose brothers or sisters had already fallen victims to the disease. Our power in this respect, let us be assured, need only be limited by our effective employment of the rational principles of prevention, and the full and perfect compliance of patients in carrying them out. It is not the occasional respiration of foul air, for every one unhappily respires foul air, it is the more or less continuous respiration of foul air, that generates the malady! So, in such subjects, the removal or mitigation of the injurious circumstances, in short the more habitual respiration of a pure atmosphere, coupled doubtless with other circumstances, as superior food, clothing, and sufficient exercise, will suffice to restore them to ordinary good health. This is a matter on which I could long dilate. There are thousands and tens of thousands, who, although they do not so far labour under tubercle, are yet as prey prepared for the destroyer. They constitute in short, all those on whom

consumption has not seized, but who, unfavourably circumstanced as they are, shall presently replace the current victims of the disease! One hundred thousand persons at this moment within the bounds of these Three Kingdoms, are perishing of phthisis, while one hundred thousand more are as it were preparing to replace them.

49. Those with the pale and sallow countenance, the tumid abdomen, the cold and tallow-coloured extremities, the flatulent bowels, the white tongue, the foul breath, the soft muscles, the languid, dispirited, weak, inactive, torpid, flushed, and breathless multitude, I would without a moment's avoidable delay, remove from their sickly environment, and while it was yet time, plunge into a healthier, wholesomer medium. For although I most readily admit the possibility of curing recent phthisis, unhappily it cannot when advanced be reasonably looked upon as remediable. So long however as tubercles are not formed, and the blood happily is not too much tainted, it is not only probable but certain, that with the proper means and appliances, consumption may be kept at bay. For if it concern the physician in especial to relieve and to remove disease, it most truly concerns every one, the legislator, the philosopher, the moralist, the magistrate, the parent, and assuredly the physician inclusive, so far as may be, to prevent disease. I would join with Baudelocque and Fourcault in urging the respiration of a pure, untainted atmosphere, with Lombard I would amend the artist's bent and sedentary posture, improve

his habits, and the locale of his pursuits. Out of 1,000 cases of consumption says Lombard, 140 occurred in persons who followed a sedentary, 138 a workshop, and 122 a stooping life, De l'influence de certaines professions sur le développement de la phthisie, Annales d'Hygiène publique, Janvier, 1834. With Ramazzini and Morton I would not suffer the really weakly mother, unable therefore to leave the house, to suckle her infant to her own premature destruction. With Holland and Turner Thackrah I would withdraw the dry-grinder from his den and dusty wheel. And with Alison I would substitute the automatic agency of the steam or water-wheel, and the steam-chisel for the deadly hand-chisel, deadly to himself at least, of the mason. Workmen, more especially weavers, are scourged with the swellings, scars, and hideous deformities of scrofula, Report on the Sanatory Laws and Ordinances of France, Dr. Lewis, London, 1855. Indeed machinery should be substituted for every dreary, fatal, monotonous toil in the world. The monotony, the sequence, and the regularity so pleasing and desirable in the machine, are death and destruction, at once moral and physical, in the long run to the man.

The substances, the moral and physical agencies, whatever they prove, which act injuriously on a human being during the course of his career, durante il corso del viver suo, should be modified in his behalf, Brera, Prolegomeni Clinici, Padova 1823, p. 25. With Bufalini I would correct the organic vice of assimilation, vizio d' assimilazione organica, which leads to the

formation of tubercles, Patologia Analitica, Pesaro, 1830, vol. 2, p. 423. Though far from ascribing phthisis to digestive irregularities or the suppression of cutaneous transpiration, I would with Clark and Bennett attend to the functions of the digestive organs and the skin. With Guy and very many others, I would multiply out of door pursuits. I would concur with Barlow in his excellent article on Physical Education, in the Encyclopædia of Medicine, in bringing fresh air day and night into the apartments of infants and children, indeed into every human dwelling, and so far as might be, rendering it even in a single instance impossible to respire a foul and corrupt atmosphere. With Autenrieth of Tubingen, I would encourage the practice of full and free respiration in the open air. Singing, like dancing, is a desirable exercise, but then it should be practised in an unadulterated atmosphere. For every occupation, however innocent in itself, becomes ruinous if practised in an impure atmosphere! I would coincide with Laennec and others in improving the aspect of houses and sleeping-chambers. With Ancell I would attend to the secretions and excretions, enforce the habit of the bath, improve the process of ventilation, and renovate the blood. I would not however join with him in giving cod-liver oil, of the permanent beneficial influence of which even he most justly entertains doubts. Nothing in fact but our past ignorance as to the nature and pathology of phthisis, could ever have justified the general employment of remedies sometimes effete and useless, at others positively injurious in the quasi treat-

ment of the disease. With respect to the real nature of the tubercular crasis, observe Jones and Sieveking in their Pathological Anatomy, we have scarcely any exact knowledge. It is evidently, they say, a special dyscrasis, intimately connected as we know, with causes of debility, and leading to the effusion of matter which shows only the feeblest traces of organization! Most vague and indeterminate indeed, have been our views hitherto on the nature and origin of phthisis. I feel ashamed at once of myself and of my profession when I find a substance like fish-oil exhibited in tons with the avowed object of removing and preventing a disease like consumption! The codfish in truth, has taken precedence of the cow. But the employment of codfish oil, whether to prevent or to remove phthisis, will lapse into as well-deserved oblivion as the practice, once so general, of sending consumptive persons into cowhouses, among cows perchance themselves consumptive, has done.

50. What further evidence would we have? The narrow and sordid abodes and even the persons of the poor, are loaded with mephitic exhalations which finding no issue into the atmosphere, stagnate at leisure, and thus it is, continues Pujol in his Essai sur le Vice Scrophuleux, that the constitutions of people are ruined by disease, scrofulous outbreaks which spare no portion of their miserable frames, Œuvres, vol. 3, p. 42. Lombard's memorable inquiries were founded on a total of 54,572 individuals carrying on 220 different pursuits, and 4,300 deaths from consumption. The fatal cases from phthisis were just double among persons whose pursuits lay in workshops,

as contrasted with those whose occupations were carried on in the open air. Further, the closer and worse ventilated their dwellings by night, the greater also became the number of phthisical cases. My own inquiries and those of Fourcault, corroborate Lombard's researches in every particular. The Italian editor of Omodei's Annali, vol. 71, p. 357, commenting on Lombard's positions, comfirms them to the letter. La vita sèdentarie, he says, è di gran lunga più favorevole a questa malattia, consumption to wit, che non è il menare una vita operosa. Fourcault dwells on the phthisical school-girls at Marseilles, whereas Louis says that the girls at school in Paris, what from their more regular lives and absence of dissipation, enjoy better health than at home. Clearly the school-girls of Paris would seem to be better provided with fresh air than those at Marseilles.

We may or may not coincide with Virchow, in that tubercle is a transformation of the tissues not a specific exudation, we may deny with Mandle that it has any morphological element, or with Lebert and others be at pains to discriminate between the pus-corpuscle and the tubercular corpuscle, but in any and every case the indication is alike the same, namely to prevent the morbid process altogether, or if that be not practicable, as soon as possible to set it aside. We have in fine to provide for the elimination of impurities from the blood, and the ceaseless inhalation of a pure, unadulterated atmosphere. All remedial, all prophylactic treatment must equally fail, that pays no heed, or that pays insufficient heed to a healthy process of respiration. Either we must pre-

vent the occurrence of phthisis both in the individual and the species, or suffer it by default, by our ineffective measures in brief, to continue its ravages unstayed. Practitioners have tried to remove consumption by means of medicated inhalations. But the only inhalation that can be of any the slightest efficacy, whether as curative or as preventative, is the inhalation of a pure, untainted atmosphere, an atmosphere in short, abounding with the ingredients which nature so fully and amply supplies for the healthy sustentation and security of the life of man and brute. This is the one needful thing which renders all other inhalation else, effete and useless. Chlorine, iodine, and medicated air, have been tried and found unavailing. Warm-blooded animals, man and brute alike, lie under as absolute a physiological necessity of breathing fresh air as plants themselves do, for plants respire air, and as all the world is aware, will not even live unless in a fitting atmosphere. Bring the plant into the ill-aired, ill-sunned hovel, the close and fusty bed or sitting chamber, and forthwith it blights and withers, even as man himself is blighted when placed in a like disastrous environment. We must perforce, whatever be our artificial necessities, submit to nature's conditions. To these it is vain to say a nay! We may palter as we will, but nature abates no single jot of her requirements. If any one inquire how it is that the lungs and liver are so especially tubercle-beset, for the fatty liver is nothing else than liver tubercle-infiltrated, I would simply venture to ascribe it to the local disturbance of their peculiar carbon-excreting func-

tions, carbonic acid in the one case and cholesterine in the other. Nature indeed, does her utmost to supplement the lung deficiency, to make the portion which is whole, discharge the functions of that which is diseased. And since the capacity of the lungs is so much diminished, the task will be in a measure facilitated. The sum total of the result however is so insufficient for vital requirements, the local and general mischief has proceeded such lengths, as finally to render it impossible to prolong life or to retrieve disease.

51. The great thing needful, the object above all others to be desired and aimed at, is the entire prevention of tuberculous deposits. This we can only effectively do, by intercepting the tuberculous tendency, the tuberculous diethesis, cachexy, dyscrasis, in short putting an end to it, term it as we will. I believe indeed, that we can in a great measure get rid of the tubercular habit at any time, but not so readily of the tubercles the deposition of which that habit has engendered. That must be at once a tedious, operose, dangerous, and alas often fatal process. Still, in any and every case getting rid of the tubercular habit must be the first step to a cure. No one let us be well assured, ever contracts consumption, without first labouring under tuberculous blood. And no one let me add, labours under tuberculous blood, without prior exposure to the causes I have named, and the consequent derangement of the general health. If we truly prevent the tuberculous habit or degeneration of the blood, we also prevent tubercle, and most assuredly, nothing potentially speaking is more com-

pletely at our own disposal, any habit, custom, false necessity, or artificial constraint to the contrary notwithstanding. The business of education, of training, of life, must of course be carried on with constancy and assiduity, but I firmly believe with no necessity or incumbency of sacrificing health whatever. The absurd notion that malaria, that intermitting fever, could suspend or supersede tubercle, is now I presume entertained by none. Indeed Lefevre of Rochfort, where ague is urgent and frequent, tells us that phthisis formed a third of his severe and fatal cases! While Hamont, not to mention other testimony, found phthisis and intermittent fever jointly persistent in Egypt.

As cold does not occasion, so neither will heat remove phthisis. The authority of English practitioners alone would be conclusive as to the existence of phthisis in the East and West Indies. It is foul, and not merely warm or cold air which occasions tubercle. If indeed the air be foul, whether it be warm or whether it be cold, forms in this respect no difference, phthisis will assuredly follow its continued respiration, and this simply because it is foul, and not because it is cold or because it is warm. This criterion will enable us to test Mr. Jefferay's ingeniously-constructed respirator, so named, lucus a non lucendo, since it furnishes no real aid to respiration. This so named respirator, never saved any one from consumption, or any one in consumption! How in truth, could it? It warms the air! What then, cold air does not cause phthisis, but only foul air, and this the respirator does not profess to

change. In fact, the respirator impedes respiration! I should suffocate were I constrained, as I have seen many a poor, tottering being constrained, to wear one. The mouth, nostrils, and bronchial tubes warm the air sufficiently in its descent to the lungs, where by a most wonderful natural provision, a large supply is always retained for the purpose of further warming the inspired air and more effectually purifying the blood. If indeed, we must have a respirator and a really admirable one, we have only to close the mouth and breathe through the nasal passages. If an artificial respirator could do good, it would be Stenhouse's charcoal respirator, useful indeed for many purposes, but not for removing or preventing consumption. The more freely and openly we breathe through mouth and nostrils alike, and the purer the atmosphere we respire, the greater will be our immunity from phthisis. The barest and bleakest hill-side is better per se, for these salutary purposes, than all the means and appliances of any hospital. In fact the idea of an hospital, as such, for curing consumption, is nothing less than a pathological solecism. Houseless, homeless outcasts to be sure must be taken into hospital, and no where better than at Brompton where every kindness and attention await them. Yet, as hospital air, indoor air of any kind unless most carefully renewed, serves but to foster tuberculous disease, it should not be had recourse to short of the exercise of every, the utmost precaution. If people cannot keep themselves, let them be boarded among the humble housekeepers of London, enforcing at the same time,

simple sanatory directions, but let them not set up such hospitals. There must be daily vigorous and not merely passive effort in the open air, if we would secure that state of health which is the antipodes of consumption. The extreme importance of active open-air exercise will be if possible yet more apparent from the fact already adverted to, that one-third more carbonic acid and other lung impurities are given off during such exercise than when the body is passive! Any kind of exercise, provided only it be in the open air, riding, walking, running, jumping, vaulting, rowing, not carried to excess, is desirable, for health after all is a great good, conducive in the long run to happiness and usefulness. It is not merely a soul as Montaigne hath quaintly said, but a man that we have to deal with. Exercise sufficiently prolonged in the free open air, with its respiration at all times and in all places, will necessarily and assuredly in every case avert consumption. This is more than can be said in a single instance, of the 70 or 80 tons of codfish or other fish oil yearly consumed in England, or the 600 gallons of the same ineffective substance annually made use of in the Brompton hospital. Indeed all the codfish in the ocean, were they converted into oil, would not relieve or avert a single instance of consumption!

I am not going into any detailed eulogium on gymnastics, but their utility duly regulated and adjusted to the age, habits, and constitution, proves most important. The most morose children observes Colonel Amoros, the celebrated leader and encourager of gymnastic exercises

in Paris, and as I myself have many times observed, become generous and gay after these exercises. Why, said Rousseau, speaking in relation to them, should we sacrifice the precious present to the uncertain future? Hufeland, Combe, Caldwell and many others, with whom I most heartily concur, dwell alike on the extreme importance, as respects the human frame, of conforming to the constitution established by nature. It is quite absurd, in this life at least, to talk of the clog of matter. The body is the means and the condition of our corporeal and mental well-being, and must therefore be maintained in sound working order. Impressed with this great necessity, says Dr. Caldwell, in his Thoughts on Physical Education, there was opened at Germantown nigh Philadelphia, a manual-labour academy uniting bodily labour with academic pursuits. The Report speaks in high terms of the talent, health, and habitual industry of the inmates. Amoros, also Clias in Paris, Ling in Sweden, Huguenin at Liverpool, Chiosso in London, and others, aimed through the instrumentality of gymnastics and calisthenics as branches of ordinary education, at uniting bodily health with bodily grace. Since these along with the reasonable development of the bodily powers, appear to have been realised by their processes, we have reason to feel grateful for what they have done. We need some new Hercules indeed! There can be no real civilisation till the body shall be better cared for than it is. Youth is the natural season of health, activity, and grace, nor is there the faintest occasion for associating human well-being and human

progress. with needless physical suffering or a single tear.

53. I must however again insist that bodily effort, at least bodily effort with a view to health, of whatever description it may be, should be open-air effort, and open-air life, else it cannot, will not suffice. Any amount of indoor exercise may be taken, but alone it will not serve. It will jade indeed and fatigue, but it will not preserve the strength, the appetite, the health, in short it will not avert tubercular degeneration nor avail in removing it when it has ensued. Sailors become oftener tuberculous than is imagined, in consequence of their horrid sleeping-places. Prize-fighters too, after having undergone their training, and won or lost their fight, as may be, not unfrequently run a course of low dissipation, become tuberculous, and die. N. was a native of Dublin. He had consulted me occasionally for trifling indisposition, ere he became a professional gymnast, and by dint of assiduous training, a man of might and muscle. His gymnasium however, was under cover. He lived almost continually within doors, and slept in a narrow, confined apartment. Within about three years of this kind of life, he contracted phthisis, ran through its different stages, and died! The inmates of our close, fetid menageries, the lions, tigers, monkeys, and birds, although in pretty constant motion, very often contract tubercle and perish. The cow too, when kept in a close confined atmosphere, uniformly becomes tuberculous, and would die likewise, only that she is slaughtered in order to become worse than indifferent human fare.

These results have been well determined in England and France alike. If ever, as I have said before, there were an experimentum crucis it is this. The cow that lives a-field, the cow that browses on the lea pastures, or at least as many of them do, occupies a well-ventilated open cow-house, never becomes tuberculous, never! I am not sure that the muscardine of the domestic silk-worm in France and Italy is not tubercle. In the Jardin du Roi at Paris, the apes, we are informed by M. Blainville and M. Reynaud, that abode in magnificent but ill-aired iron cages, perished of tubercle, though gambolling according to the wont of their species, from morn till eve. Those on the contrary, who lived in sheds merely sheltered from the east and north-east winds, enjoyed comparative immunity! It is evident then, in order to become a preservative, that exercise must be habitually taken in the open air. If a person will spend but three or four hours daily in active open-air effort, and sleep in a chamber the windows of which, one or more, shall be pulled down, all night through, say one foot in winter and three feet or more in summer, increasing the amount of bed-coverings according to the season, the reduction of temperature, and the movement in the atmosphere, he may with ordinary precautions otherwise, bid defiance to the invasion of tubercle and consumption, with all their hateful, hideous family. So all-important do I consider the respiration of a pure, sweet, untainted atmosphere all night through, and this can only be realised with certainty by pulling down the windows so as to permit the freest interchange between

the air of the sleeping-chamber and the outer atmosphere, that I should freely stake the prospect of health upon its observance alone, before and beyond any and every other means which omitted this most indispensable and necessary arrangement. There can be no certain or entire security for life without perfect and complete bed-room ventilation, nor any entire or complete immunity, in prospect, from phthisis, whenever and wherever bedroom ventilation is neglected!

54. The practice of confining young persons of either sex, for hours together immoveable on their seats, is one barbarous in the extreme, and fraught with the evilest consequences. To be up and doing is ever the cry of nature to the young! I wish to deal in no exaggeration, but if we would really preserve boys and girls in health and stamina, if we would avoid consumption with all its train of horrors, we must not only permit but enjoin it upon them, to spend hours on hours daily in the open air, and above all perhaps, sleep in a pure night atmosphere. I do not say that this open air iife should be all at a stretch, but at intervals, divided say into the morning, the mid-day, and afternoon hours. I think that an aggregate of not less than four, and not more than six hours, might be daily devoted to this great object. The remaining portion of the day should be spent in apartments, raised to a temperature in winter of not less than 60° F. At night however, this is not necessary, save in case of indisposition or choice, even the during coldest weather, since the night-coverings are so very much warmer than the clothes worn in the day. Nor is there

the slightest risk even in the coldest season, of admitting the atmosphere into the sleeping-chamber, only closing door and window during the operations of the toilette. I do it myself, the different members of my family do so, and never have I, or any of those over whom I had sufficient influence to induce them to adopt this delightful and salutary practice, experienced the faintest inconvenience from it. It must however, if not the whole casement, be the upper not the lower portion of the window that is opened.

We owe it to the young, whose studies will be prosecuted all the better midst the enjoyment realised by the possession of exquisite health and stamina, this mighty, this priceless boon. It is foreign to my task to point out in this place the disastrous results accruing from an imperfectly, or an ill-developed physical life, a body from which health and strength are absent, and a mind ever brooding over unwholesome or forbidden objects. Suffice to say it, these evil results are very numerous. As further ancillary to the great objects I have above named, each young person should learn some suitable handicraft, or better still a number of handicrafts. To some they would prove a recreation and a solace, to others a resource, and to all at once a means of health and a safeguard against disease. At the present period the muscular development of the upper extremities, so very essential to the proper discharge of the function of respiration, and often to the direct preservation of life itself, is almost entirely neglected.

The regulation and amendment of particular states of

ill health, must be matter for the deep consideration of the skilful medical adviser. These states will in truth, demand his anxious and sustained attention, for if it were only by inducing bodily languor and derangement, they lead to physical inability, and indirectly, in consequence of the want of capacity for sustained out of door effort, to pulmonary disease. Exercise is unwillingly taken if taken at all, and tubercle and death but too surely follow a protracted indoor existence! The food of young people should be varied, well-azotised, and copious. There should be fish, flesh, fowl, fruit, vegetables, and milk, à foison, in short in plenty, and even ales, ciders, wine. The bread should be the very best that can be made, of whole wheat, or whole rice, or whole barley, or whole rye, singly or mixed. Rice, or barley, or Indian-corn, or wheat or oatmeal porridge, are severally, or any of them, excellent. Whole wheat well steeped in hot water the night before, and well boiled for a couple or three hours next day, frumenty or furmenty, and eaten, cold or warm, with milk and sugar, or in any other way, at any meal, is not only good in itself, but a perfect antidote to constipation. Adequate, varied intellectual and moral culture, with a healthy, natural, unpampered appetite, fully satisfied at the proper intervals, must ever lead to desirable results.

Preparations of iron, the saccharine carbonate for example, made by mixing equal parts, say one ounce each of the carbonate of soda and the sulphate of iron in a pound of syrup or treacle or formed into boluses with mucilage of gum tragacanth, else the lactate and

tartrate of the same metal, metallic iron even duly comminuted, these or any of them, prove serviceable in persons of weakly, pallid habits, white lips and tongue, habits in short deficient in the blood-genesis of this important metal, a factor indeed, and a most important one, in and of healthy life. I do not here dwell on the bath or the other indispensable means and appliances of daily habitual purity of person and environment. My main and leading object has been to point out and establish the real sources, immediate and remote of tubercle, and the sequential means, the only means in short of remedying it when present, but above everything else, of preventing it altogether when not present, thus filling up I would fain believe, a hitherto lamentable hiatus in our knowledge of disease, and establishing a natural law, equally important in its character, range, and consequences, as any physiological natural law whatsoever. For pathology rightly understood, pathology human and comparative, is but the physiology of disease, disease but perverted life. I have desired to establish a habit and a law of health, instead of a habit and a law of disease, to substitute health for unhealth, and to supersede as quickly as may be, one of the most painful and disastrous of ignorance and neglect-engendered scourges, remediable in one man, and therefore, in virtue of the unity of the laws of life and organisation remediable in all men, and in all breathing creatures. And now, τῳ Βασιλει των αιωνων, αφθαρτῳ, αορατῳ, μονῳ σοφῳ Θεῳ τιμη και δοξα εις τους αιωνας των αιωνων!