FISKE FUND PRIZE ESSAYS.

THE EFFECTS OF CLIMATE ON TUBERCULOUS DISEASE.

BY

EDWIN LEE, M.R.C.S.,

LONDON.

BEING THE DISSERTATION TO WHICH THE FISKE FUND PRIZE WAS AWARDED JUNE 6, 1855.

THE INFLUENCE OF PREGNANCY ON THE DEVELOPMENT OF TUBERCLES.

BY

EDWARD WARREN, M.D.,

OF EDENTON, N. C.

BEING THE DISSERTATION TO WHICH THE FISKE FUND PRIZE WAS AWARDED JUNE 4, 1856.

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PUBLISHERS' NOTICE.

Dr. Caleb Fiske, who was President of the Rhode Island Medical Society in 1823 and 1824, at his death bequeathed to that Society a fund of two thousand dollars, directing the annual income to be expended in premiums for Essays on subjects selected for competition. The first premium of forty dollars was awarded June 27, 1836, since which time a large number of valuable dissertations have been laid before the profession through the instrumentality of Dr. Fiske's well-directed munificence. By the judicious management of the Trustees, the Fund has gradually increased, and they are now able to offer two annual prizes, of one hundred dollars each.

The Essays in the present volume are those to which the prizes of 1855 and 1856 were awarded. Connected by the topics discussed, and presenting a large amount of important information on one of the most interesting and difficult subjects of medical science, the Trustees have been desirous of presenting them in a more permanent form, and they have accordingly been reprinted in their present shape from the *American Journal of the Medical Sciences* for April and July, 1857, in which they originally appeared.

Philadelphia, July, 1857.

ON THE

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The Trustees of the Fiske Fund, at the annual meeting of the Rhode Island Medical Society, held at Providence, June 6, 1855, announced that they had awarded to the author of the dissertation bearing the motto—

"*In longis morbis solum mutare.*"—Hippocratis Aphorism.

"*In the cure of almost every disease the removal of the producing cause should be the primary object.*"—Abernethy's Physiological and Medical Essays.

The premium of one hundred dollars, by them offered for the best dissertation on the following subject, viz: "*The Effects of Climate on Tuberculous Diseases.*"

Upon breaking the seal of the accompanying packet, they ascertained the author to be Mr. Edwin Lee, Member of the Royal College of Surgeons, of London, &c. &c.

Joseph Mauran, M. D., Providence,
Ariel Ballou, M. D., Woonsocket,
Hiram Cleveland, M. D., North Providence,
Trustees.

J. Aug. Arnold, M. D., Providence,
Secretary of the Fiske Fund Trustees.

FISKE FUND PRIZE ESSAY.

ON THE EFFECTS OF CLIMATE

ON

TUBERCULOUS DISEASE.

I. PRELIMINARY REMARKS.

A SUBJECT of greater importance than that of the effect of climate on tuberculous disease could scarcely have been chosen from the whole range of medical science, for the consideration of competitors for the prize offered by the trustees of the Fiske Fund—both on account of the generally fatal termination of tuberculous diseases, when seated in a vital organ, and the inefficiency of medical treatment, as well as of the prevailing deficiency of knowledge among the profession respecting the action of climate, and of its capability, when employed with discrimination, and before disease has advanced too far, of frequently arresting its progress, and sometimes of effecting a cure. It is true we possess many valuable monographs of the climates of particular localities and districts, and of their effects upon diseased conditions of the system, but I am not aware that there exists any work, either in the English, French, or German languages, treating of the remedial action of climate in its more general bearings. I propose, therefore, upon the present occasion, to consider the mode in which climate acts most beneficially in preventing the occurrence of tuberculous disease in the lungs, and removing it where already existing; the observations which I have to offer upon this point being equally applicable to tuberculous affections of other parts. In order, however, to enable us to form a just estimate of the *modus operandi* of this remedial agent in cases of tubercles of the lungs, it will be necessary to take a brief survey of the opinions which have been expressed by various authors respecting the nature of the disease, and of the causes which most frequently produce it; for it is only by having correct ideas of its pathology, and by endeavouring to neutralize the influence of its predisposing and exciting causes, that we shall be likely to arrive at more satisfactory

results than have been hitherto attained, under a system of purely pharmaceutical and often empirical treatment—which, however useful in affording relief for a longer or shorter period, has tended but little, if at all, to diminish the amount of mortality occasioned by the prevalence of pulmonary consumption in most parts of the civilized world.

The curability of consumption can no longer be reasonably questioned; the fact having been verified in numerous instances of persons who, after having presented all the general and local indications of its existence in various stages of structural lesion, have recovered—living in the enjoyment of tolerable health until a more or less advanced age, when on their succumbing under some other disease, the examination, *post-mortem*, has revealed the traces of the former malady. Laennec remarked this occurrence on several occasions. MM. Ferrus and Cruveilhier state from the result of their observations upon the bodies of old men and women, who died at the large hospitals, Salpétrière and Bicêtre, that it is not uncommon to find excavations and other consequences of tuberculous disease which had existed at a former period. More recently, M. Beau stated that 157 out of 160 women who died in his wards in the Salpétrière had cicatrices in the summit of one or other of the lungs, which he considered to be the remains of tubercular disease; most frequently the summits of both lungs were affected. M. Prus likewise found, on examining the bodies of old people, in a large proportion of them traces of former tuberculization of the lungs; in some cases the tubercles had disappeared, leaving cavities lined with a membrane of new formation, and communicating with the bronchia; in other cases there were fibrous or cartilaginous cicatrices; in others, again, the tubercles sometimes encysted, at other times not, were infiltrated with a large amount of chalky, calcareous, or ossiform substance.[1]

More general observation has verified of late years the frequency of these cases; and if recoveries from pulmonary phthisis have not been so numerous as they might have been, it is because the right means of effecting cures have rarely been adopted. In Great Britain more especially, as also in the United States, practitioners, unlike those of most European countries, are accustomed to trust almost exclusively to pharmaceutical agents in the treatment of chronic diseases, but seldom endeavouring to rectify the anormal conditions of the system, upon which depend morbid local manifestations, by the employment of hygienic and medical means, which, by effecting favourable modifications in the constitution of patients, tend to procure permanent cures instead of a temporary alleviation of suffering or a transient amelioration of their state. "To occupy one's self in treating merely the manifestations of a diathesis," says a distinguished French physician, "is, generally, as if one were to run after the shadow, and leave the substance which it is desirable to obtain."[2] And the adoption of this mode of treatment in a disease which,

[1] Compendium de Médecine Pratique, art. Phthisis.

[2] M. Baumè's, Traité des Diatheses. Paris, 1853.

like consumption, so directly compromises the lives of the persons affected, is attended with the most pernicious consequences, because the precious time is lost, during which there would be the greatest probability of succeeding, by the employment of climate and other suitable measures, until the disease has arrived at a stage when the use of all remedial means would fail to arrest its progress. A serious obstacle, however, presents itself to the favourable termination of the disease, in many cases where a cure might be effected, viz., the difficulty which often exists in ascertaining the presence of tuberculous disease at its outset. A minute examination of the physical signs supplied by an abnormal state of the respiratory function, would, in many instances, lead to the discovery of tubercles in the lungs before their presence was indicated by clearly marked general symptoms; but the majority of practitioners are scarcely capable of making such an examination as would frequently suffice to detect pulmonary disease in its earliest stage, especially in England, and probably also in America, where exploration of the state of the organs contained in the thoracic cavity, by means of auscultation and percussion, forms no part of the education of medical students. It consequently follows that the weakness, and various other symptoms experienced by patients in the early stage of pulmonary tuberculization, are usually regarded as the indications of no very serious malady, or of a temporary indisposition; which opinion is often confirmed for a period, by the amelioration which takes place from time to time in chronic cases, and by the temporary cessation or alleviation of chest symptoms, produced under the influence of favourable circumstances, as the summer season; a residence in the country for some weeks or months; or of the remedies which may have been had recourse to. Hence patients, their friends, and frequently the medical practitioner, are misled as to the true nature of the disease, until, at the expiration of a longer or shorter period, either spontaneously or from the action of some exciting cause, the symptoms reappear with aggravated intensity, and auscultation, practised by an experienced physician, renders its existence apparent.

Consumptive patients of the United Kingdom of Great Britain and Ireland have sought, more than those of any other nation, the curative influence of climate; and British medical literature contains a vast accumulation of facts relating to the effects of the climates of our colonies, as well as of other places frequented on this account; but owing to the causes above mentioned, and the late period at which recourse is had to this remedial agent, the results have not been of a satisfactory nature, and we are still far from being able to estimate justly the amount of advantage which climate is calculated to afford in tuberculous disease, when employed under circumstances more favourable to its beneficial action than heretofore.

Abernethy, following in the steps of John Hunter, is the first pathologist who imparted a definite direction to the ideas of his countrymen, with respect to the constitutional origin and treatment of local diseases, in his celebrated work which bears this title; and the principles therein promulgated having

been put in practice, more especially as respects the treatmeut of surgical diseases, have powerfully contributed to raise the character of British surgery from a simple art to that of a science, and have rescued innumerable sufferers from local diseases, from painful mutilations, and premature death. But, even at the close of the last century, and several years before the publication of his work, Abernethy, referring particularly to pulmonary consumption, after having shown that the organ may be the seat of *the disease*, although its causes may be at a distance, insists upon the inutility—the organ being secondarily affected—of treating the disease as an integral thing.[1] His opinions on the origin of pulmonary phthisis are corroborated by the investigations of recent observers, and their exactness appears to be confirmed by the results of experience. The researches instituted of late years, in different parts of Europe, respecting the nature of consumption and the formation of tubercle, having greatly elucidated its pathology, and induced many practitioners to ascribe more importance to hygienic measures, and to seek to correct the morbid disposition by agencies which conduce to effect favourable modifications in the constitutions of patients, rather than to persist in following the system of pharmaceutic and palliative treatment generally adopted in these cases.

The investigations of M. Boudet are especially important, inasmuch as they demonstrate, by means of chemical analysis, that tuberculous matter contains several saline and other principles, which enter into the composition of the blood. According to this observer, "tubercle is not distinguishable from the parenchyma of the lungs by any special product, but merely by some difference in the proportions of the principles of which they are both composed, especially of the chloride of sodium, which abounds in tuberculous matter, of the phosphate of lime, which, on the contrary, is present only in a minute quantity, and of the cholesterine, which is accumulated in it to such an extent that its proportion is ten times as large as in the substance of the lung. Tuberculous matter treated by alcohol yields oleic, margaric, and free lactic acid, lactate of soda, and cholesterine, in the proportion of a 20th part of the whole mass. Chloride of sodium and phosphate of lime are found in the ashes of tubercle, which likewise yield a small quantity of carbonate of lime, sulphate and carbonate of soda, silex, oxide of iron, and lactic acid.[2]

The salts which are found in the largest quantity in the blood, are chloride of sodium, carbonate of soda, and phosphate of lime; and the variation in the proportions of these salts, as well as that of the iron contained in the blood, occasioned by various causes, must necessarily exercise a considerable influence in the production, and on the course of several chronic diseases. MM. Becquerel and Rodier remark that the diminution of the chloride of sodium is of constant occurrence under the influence of fasting; its proportion is likewise diminished in acute diseases; the quantity of phosphate of lime in the blood is, on the contrary, increased in most diseases. The proportion

[1] Surgical and Physiological Essays, 1799.

[2] Compendium de Médecine, art. cit.

of this substance being, in healthy blood, on an average, as 350, increases in cases of pulmonary tuberculization to 493.

The retention in the blood of the water, salts, acids, etc., which should be eliminated by the skin more particularly, by altering the composition of this fluid from its normal condition, gives rise to various chronic diseases, of which the origin is not generally suspected. According to the chemical authorities whom I have just quoted, in 100 parts of dried sweat there were found 22 of fixed salts, consisting of carbonate, sulphate, and phosphate of soda and potass, chloride of sodium, phosphate and carbonate of lime, with traces of oxide of iron.[1] M. Favre found (*Archives de Médecine*, July, 1853) that 14 *litres* (28 pints) of sweat yielded the following principles: 1. Parts soluble in water: Chloride of sodium, 22.305 grains; of potass, 2.437; alkaline sulphates, 0.9150. 2. Alkaline lactates, 3.171; alkaline sudorates, 14.623; urea, 0.428; fatty matter, 0.13; water, 9.955.

We have seen that some of these products have been found in the analysis of tuberculous matter; that the chloride of sodium, of which the amount in the blood is diminished in diseases of debility, is found to exist in abundance in tubercle, and that, on the other hand, the phosphate of lime, which exists, in a very minute proportion, in tuberculous matter, is found to be greatly increased from its normal proportion in the blood of tuberculous subjects.

It would be out of place to enter, on this occasion, further into details pertaining to the domain of animal chemistry; the few remarks which have been made sufficing to indicate the relation which exists between the morbid deposit, the blood and the cutaneous secretion, the practical bearings of which will become more apparent after we have entered more fully into the subject of the present inquiry.

II. ON THE NATURE OF PULMONARY TUBERCULIZATION.

Several distinguished pathologists have considered tubercle to be a product of inflammatory action. Foremost among these in recent times was Broussais, who said that he had never seen tubercles in the lungs without previously existing inflammation. M. Bouillaud, who, in most instances, adopted the opinions of Broussais, likewise considered that tubercle may arise from inflammation of the organs of respiration. More recently, Dr. Addison, of Guy's Hospital, London, expressed the opinion that scrofula and pulmonary tubercle are frequently occasioned by inflammatory action, and, that a great number of the excavations which have been generally considered as arising from the softening of tubercles, are, in fact, a consequence of pneumonia.[2] Reinhardt, of Berlin, in a late publication, considers tubercle to be a product of chronic inflamma-

[1] Chimie Pathologique. Paris, 1854.

[2] Guy's Hospital Reports.

tion frequently repeated.[1] Van der Kolk, of Utrecht, expresses an analogous opinion; which, however, is not adopted by the generality of pathologists and practitioners. Laennec remarked that the development of tubercle is owing to a generally disordered state of the system, which takes place independently of preliminary inflammation, and that where inflammation co-exists with tubercles, it is subsequent to them. Besides, the deposition of tubercles simultaneously in several parts of the body, directly disproves the doctrine of their inflammatory origin. Bayle said that tubercles were never an effect of inflammation, even in the chronic form. Louis believes that although inflammatory action may in some instances exercise an influence over the production of tubercles, yet that in others it seems to take no part in their formation.

Dr. Carswell remarks on this point: "An effect and its cause are always inseparable, and its conditions of an analogous nature. The products of inflammation are coagulable lymph and pus. When, therefore, other products than these present themselves in inflammation, the conclusion to be drawn from this circumstance is, that there exists some other morbid condition than inflammation, and that, to this condition alone should be ascribed the distinctive and essential character of these products.

"Where the tuberculous disposition exists, inflammation or any irritation may attract it to a particular organ; examples of this present themselves in the inflammation of the subcutaneous glands of the neck; a testicle, a kidney may become tuberculous from the same cause."[2]

In order to corroborate his observations, Dr. Carswell mentions the case of a young woman who was attacked by pneumonia and bronchitis, owing to the position in which she sat at her work in winter, viz: between a good fire and a door, and which, being continually opened, gave ingress to a current of cold air. The inflammation was restricted to the left side, which was always turned towards the door, and it was found, on *post-mortem* examination, that the lung of this side was in a state of tuberculous infiltration, the bronchial membrane of the same side being more or less inflamed up to the point of bifurcation of the trachea, where all traces of inflammation disappeared. The right lung was healthy, except at the summit of the upper lobe, where there were some tubercles in a crude state, serving to show the existence of tuberculization, preliminary to the occurrence of the inflammation which on the left side had occasioned the disease to assume an acute form owing to the exciting causes to which the patient was exposed.

Referring to the insufficiency of inflammation to give rise to tubercles in persons not thereto predisposed, M. Andral remarks: "We may readily conceive that a very slight bronchitis may suffice to produce tubercles in one individual, whereas others do not become consumptive notwithstanding the prolonged existence of pulmonary catarrh."[3] M. Fourcault mentions an in-

[1] On the identity of tuberculous products with the results of inflammation. (In German.)

[2] Cyclopedia of Practical Medicine, art. Tubercle.

[3] Cours de Pathologie Interne.

stance corroborative of the opinion that irritation existing in an organ attracts to it the tubercular deposit in preference to its ordinary seat. "In several patients," he remarks, "unhealthy or insufficient food was the most decided cause of the tuberculous cachexy; consequently, the intestinal tuberculization was much more advanced in its course than the pulmonary tuberculization; the tubercles were in a crude state, or the softening process had only commenced in the lungs, whereas large and deep tuberculous ulcerations were observed in the small intestine. This fact is explained by the principle, that when from the existence of tubercular cachexy, tuberculization has become imminent, it will fix itself on the viscera to which it is attracted by any irritation of sufficient degree and duration."[1]

Sir James Clark remarks on this subject, "Although I believe tubercular matter is never a product of inflammation in a healthy person, the inflammation may and often does act as a determining cause in a tuberculous constitution."

In the case of stone-masons, coal-heavers, flax-dressers, metal-grinders, and needle-pointers, who frequently become consumptive, it is not merely on account of the inhalation of metallic particles, stone, dust, &c., that tuberculization is induced, but as Sir James justly remarks: "The sufferers are exposed to causes fully adequate to the production of tuberculous cachexia; they pass most of their time in a confined, deteriorated atmosphere, often in a sedentary position, unfavourable to the action of the lungs; many of them are much exposed to the vicissitudes of the weather, and the majority of them are addicted to the use of ardent spirits." Dr. Alison states that "there is hardly an instance of a mason employed in hewing stones in the vicinity of Edinburgh, living free from phthisical symptoms to the age of 50. Nevertheless tubercles were not found in the lungs of those who were examined after death. In some there were condensed or indurated portions of lung; in others, parts of these organs were in a soft pulpy state, with effused serum, pleuritic adhesions, and much effusion into the bronchia. Few of the workmen in the quarries of St. Roch pass the age of 40; the disease is commonly called the '*Maladie de St. Roch.*' The symptoms are similar in all these cases to tubercular phthisis, and are often, no doubt, connected with it."[2]

We may, then, conclude that inflammation cannot, of itself, give rise to pulmonary phthisis; but that when a predisposition to the disease exists, inflammation, as also irritations of various kinds, when sufficiently powerful and long-continued, may occasion the development of tubercles in any organ which is the seat of them; and further, that it is with reason that pathologists, with some exceptions, have regarded tuberculization as a disease depending upon an alteration of the blood from its normal condition.

But, what is the nature of this alteration? This is a point which has not been determined up to the present time. Several years ago MM. Andra

[1] Recherches Cliniques sur l'Auscultation, &c., Paris.

[2] On Consumption.

and Gavarret showed that even at the outset of the disease there was a considerable diminution of the normal amount of globules, with an excess of fibrin in the more advanced stages. "The patients in whose lungs tuberculization is beginning," say these authors, "present the particular modification in the composition of their blood which belongs to weak constitutions; they are truly in a state of incipient anæmia, and their blood resembles that of persons who have been repeatedly bled. Thus, the condition of the blood which coincides with the beginning of consumption, and which most likely precedes it, is the same general condition which we find in all cases where from whatever cause the vital powers have lost their energy.

"Is it, however, to be inferred from this, that the impoverishment of the blood in globules is sufficient to produce phthisis? By no means; but it is to us a certain sign that this disease originates in a notable weakening of the constitution, and joined to those signs derived from clinical observation, this sign comes to enlighten us in the choice and direction of therapeutical means."[1]

That the morbid state of the blood which gives rise to tuberculous cachexy, may exist for a long period before the formation of tubercle in the lungs, has been demonstrated by the observations of Sir James Clark, Mr. Ancell, and other pathologists, and there can scarcely be a doubt that the more immediate cause of vitiated states of the blood, is in most instances to be ascribed to a diminution or suppression of the insensible perspiration from inactivity of the capillary circulation of the skin, by which the substances contained, as we have seen, in this secretion, are retained, instead of being eliminated from the system. "We have found," remarks a distinguished medical author, "in the changes which the blood may undergo in its composition, a fruitful source of alterations in the mode of its vitality. It would seem that it is only through this medium that we can act upon the nervous system to modify its action so as to change the constitution of individuals, on account of the extent to which this fluid may vary, and the apparent immutability of the nervous system in its form and structure."[2]

But it is not merely on account of the defective elimination of excrementitial substances from the blood, that inactivity of the functions of the skin may tend to produce tubercular cachexy. The close relationship which exists between the skin and the organs of respiration, and the part which it takes in the excretion of carbonic acid from the economy—and probably in the absorption of oxygen from the atmosphere—must lead us to consider it as a truly supplementary apparatus for the efficient accomplishment of the function of respiration, and that any material derangement of its functions must exercise a most pernicious influence on the organs contained within the thoracic cavity in many cases, even though the effects of this influence may not be immediately apparent.

At the close of the last century the respiratory action of the skin had

[1] Hématologie Pathologique.

[2] Dr. Edwards on the influence of physical agents on life.

already been noted by Messrs. Ingenhouze and Cruikshank; and the experiments made by Abernethy clearly showed that carbonic acid was excreted, and the oxygen of the atmosphere absorbed in variable proportions by this membrane. After keeping his hand alternately in two inverted vases containing respectively twenty-four ounces of oxygen and of azote, for a period of eight hours, Abernethy found that two-thirds of the oxygen had disappeared, whereas only a twentieth part of the azote had been absorbed. "After the hand," he says, "had continued nine hours (in the air of an inverted jar) more than an ounce of carbonic acid gas had been produced, and the remaining air contained one-fourth less of oxygen than before the experiment." Estimating the extent of the surface of the body at 2700 square inches, he remarks that, the increase of the action of the lungs consequent upon the repression of that of the surface of the body, must necessarily often produce diseases of these organs, especially in individuals whose thorax is but imperfectly developed. "If the perspiration of all parts were equal, 77 drachm measures of carbonic acid, and one-third of that quantity of nitrogenous gas, would be emitted from the body in the space of one hour. If we also suppose perspiration to be at all times equal, nearly three gallons of air would be thrown out of the body in the course of one day. About $2\frac{1}{2}$ pounds is the loss of water which the body maintains in one day; the absorption of air was equal to the perspiration in my experiments, in many it was more, if the air was salubrious to which the skin was exposed."

"I am inclined, on reflection," he adds, "to believe that a deficient performance of the functions of the skin is the principal cause of pulmonary consumption. This supposition explains why the inhabitants of this variable climate, especially those of weakly constitutions and malformed chests, are so peculiarly obnoxious to such complaints. This supposition also shows in what manner the preventing the effects of accidental colds by flannel garments, or by removal to a warmer climate, is so eminently beneficial. The fluids are invited by warmth to the surface, and the functions of the skin are encouraged; the lungs are relieved from oppression, and left free to the exertion of the restorative powers of the constitution."[1]

MM. Becquerel and Rodier demonstrated by experiment that an impenetrable coating of varnish applied to the bodies of dogs occasioned a rapid depression of temperature, followed by death in the course of a few hours; and an author, who of late years, has endeavoured to show the effects of suppressing the functions of the skin in inducing pulmonary consumption, after having made many experiments, remarks on this subject: "Apply a coating of tar or any impermeable substance either to the whole body, or to larger or smaller portions of it. The consequences will be manifested more or less rapidly and seriously according as the coating has been more or less complete. In all cases the health of the animal becomes strangely disordered, and life

[1] The Surgical and Physiological Essays.

is seriously compromised. Some have died at the expiration of one, two, or three days; some even after a few hours. Death appears to be the result of a positive asphyxia; the breathing of the animal becomes very difficult; they make deep inspiration in order to inhale a greater quantity of air than in their natural state; they die violently. On opening the bodies, there is found in the veins and in the right cavities of the heart, less frequently in the left cavities, and but seldom in the arteries, a black blood forming at times soft diffluent clots, coagulating with difficulty on exposure to the air. This dissolution of the blood favours ecchymoses and extravasations in the lungs and other organs; the capillary vessels are generally infected; it is evident that the alteration of the blood has been the true cause of the stoppage of the circulation in this order of vessels."

"In cases where the suppression of the perspiration is only partial, the alteration of the blood is less considerable than when it is more general; a reaction takes place; fever ensues, the affected textures present local lesions which have been ascribed to inflammation.

"The action of external agents determines, 1st. A deficiency of equilibrium between the cutaneous exhalation and the other secretions; 2dly. An alteration of the blood and fluids; 3dly. Local lesions, which are absorbed in acute as well as in chronic diseases. Observation, as well as experiment, proves that the morbid movement begins, in the majority of cases, in the capillary network.

"Lactic acid, water, salts of various kinds, fat, and perhaps albumen, some atoms of carbonic acid gas are constantly eliminated in the act of transpiration. When the perspiration is repressed by the impression of cold or humidity, supersecretions and extravasations ensue, and the excess in the blood, of salts, which should be excreted by the skin, incessantly tends to alter this fluid and those of which it is the source."

"The treatment of pulmonary phthisis is finished where it ought to begin; the air of the country is recommended to moribund persons; phthisical subjects are sent to Italy or the South of France at a time when all hope is lost. In this treatment all is inverted. Remedial means are directed towards the lungs instead of being directed to excite the functions of the skin."[1]

The preceding quotations may suffice to show that pulmonary consumption depends upon a vitiated state of the blood, principally caused by suppressed or diminished action of the functions of the skin, and a deficiency of red globules, and that consequently it should not be considered as a merely local disease, but requires to be treated with reference chiefly to the disordered condition of the blood, and to the causes which have been most instrumental in producing it, before it has arrived at so advanced a stage as to preclude all rational hopes of recovery.

[1] Causes Générales des Maladies Chroniques, par le Dr. Fourcault. Paris, 1844.

III. CAUSES OF PULMONARY CONSUMPTION.

Foremost in the rank of the predisposing causes of tubercular cachexy must be placed the action of humidity, especially of a cold and humid atmosphere upon the system, and consequently consumption is found to be most frequent in countries where this state of the atmosphere prevails most during the winter months, as Great Britain and Ireland, great part of France and Germany, and especially in Holland. It is likewise extremely prevalent among the natives in hot and moist climates, as the islands of the West Indies, from the debilitating and relaxing effects of the atmosphere. Thus, according to a statistical table in Sir J. Clark's work showing the relative mortality from consumption in different localities, it appears that the deaths from this cause among the whites (soldiers) are nearly as many as in London, whereas the proportion among the natives is more than twice as much.

The statement of the frequency of phthisis in these parts is confirmed by M. Levacher in his *Guide Médical aux Antilles.* A French writer in the *Gazette Médicale*, states that at Rio de Janeiro the number of consumptive patients in the hospital is nearly as great as in Paris. The Professor of medicine in that city considered that a sixth part of the mortality among the poorer classes in the Brazils was owing to this cause.

On the other hand, phthisis is comparatively infrequent in countries where the climate in winter is cold and dry—as in Sweden, Norway, Canada, great part of Russia. Mr. Philips remarks in his work on "Scrofula" that the inhabitants of cold countries are not particularly liable to be affected by the external forms of tuberculous disease. They are very rarely seen in Iceland, in Greenland, or at Spitzbergen. Colonel Tulloch, in his report to the war office, shows that the soldiers sent to cold and dry countries are less frequently affected by scrofula than those stationed in hot countries. In Nova Scotia and New Brunswick, where the winter temperature is very low, the disease is less frequent than in Jamaica and at Sierra Leone.

Dr. Forry, in his statistical researches in the medical department of the American army, remarks that in the whole southern region of the United States the proportion of soldiers annually attacked by consumption amounts to $10\frac{3}{10}$ per 1000; the total amount of deaths from consumption and hemoptysis amounts to 108; whereas in the northern region, the proportion of consumptive soldiers is but 7 (each year), per 1000, that of the deaths being 47; and, moreover, in that part of the northern region where the climate is the most severe, the proportion of phthisical patients is not more than 5 per 1000.

M. Edwards, in his work already quoted, records the results of a series of experiments which he instituted in order to determine upon animals the relative effects of air in different states of humidity and dryness, of repose and agitation. These results are highly important in a practical point of view,

with reference to the subject of our present inquiry, from the proof which they afford of the great influence exercised by the skin—considered as a supplementary organ to the lungs in the act of breathing, as well as of the part which should be ascribed to the diminished activity of its functions of elimination in the production of various diseases of the respiratory apparatus, especially of pulmonary consumption.

"An air saturated with humidity," says this *savant*, "does not altogether prevent transpiration, but it reduces it to a minimum.

"Within the same space of time (other circumstances being the same except the hygrometric state), transpiration in a dry air was five or six times as great as in one of extreme humidity. A dry air causes sweat to disappear by its property of absorbing humidity, a moist air by the opposite property allows it to accumulate on the surface of the body. In the former instance it might be supposed that the dry air lessened the amount of perspiration; in the latter, that the moist air increased it.

"The constant evaporation which takes place around the bodies of animals in an air which is not saturated with water, constitutes for them a peculiar atmosphere which is more humid than the rest of the air. Now, the currents renew the air which immediately surround the body, and replace it by a drier air. Thus the contact of an air relatively dry will increase transpiration, which will diminish, on the contrary, in a calm air, because the circumambient strata being more slowly renewed, will be more impregnated with humidity.

"Even when the atmosphere appears to us to be quite calm, it is in reality tolerably agitated, and acts sensibly upon evaporation by its motion. The differences of transpiration were very marked, even in an atmosphere which appeared calm. The animals (frogs) which were exposed at an open window lost at least double the amount by transpiration, and according to the intensity of the wind three and even four times the amount lost by those which were placed in the interior of the apartment.

"A slight agitation of the atmosphere, the hygrometrical state and temperature of which are suited to the economy, occasions such a feeling of well-being that the chest dilates in consequence, and admits a larger proportion of air. I have frequently had occasion to convince myself, that persons who have what is termed a delicate chest, owe in great measure the difficulty and oppression which they experience, to the smallness of their apartment; the difficulty of breathing diminishes or entirely disappears according as they are in a larger apartment, or in freer air. The degree in which the air is agitated exerts the most decided influence on the extent to which the chest dilates; the agreeable sensation which is experienced on breathing in the country is chiefly owing to this cause."

I have frequently had occasion to observe on consumptive patients the beneficial effects of an air moderately agitated, as well as the disadvantages of too alm an atmosphere. As respects, however, the question immediately under consideration, viz., the action of humidity in inducing tuberculous dis-

ease of the lungs, I will adduce two or three additional observations from an author whom I have already quoted, who visited several localities situated under different circumstances of humidity and dryness of the air, with a view to ascertain the degree of intensity with which this cause acts, as well as the conservative influence of exercise or of occupation out of doors in neutralizing its pernicious effects upon individuals who lead a sedentary life; in whom consequently the functions of the skin are inactive.

"It may readily be conceived," remarks Dr. Fourcault, "that vicissitudes of temperature will exert their chief influence on the cutaneous surface. Atmospheric perturbations produce but a slight effect on the organs contained in the thoracic cavity, the air penetrates into them only in small quantity through an apparatus of ventilation, being warmed in its passage along the bronchial tubes; the skin, on the other hand, being deprived of any similar apparatus, is liable at each moment to experience the action of atmospheric currents of a variable temperature, which naturally derange its functions. These circumstances have been verified by experimental physiology.

"The experiments of Edwards have been repeated with analogous results upon warm-blooded animals; a calm air saturated with humidity likewise reduces in them transpiration to its minimum. Thus the transpiration of mere living in damp valleys is reduced to its minimum; on the other hand, the skin is powerfully excited by the air of mountains, of elevated plains, and of the sea; the ventilation there carries off a considerable quantity of the elements of transpiration.

"The village of Fontinoz is composed of several hamlets; in the most elevated one, which is exposed to the south, there are but few consumptive or scrofulous subjects; but those which stand on a lower level—one of them being on an acclivity looking to the north, the other between two hills—are very damp and unhealthy. It is especially in these hamlets that scrofula, white swelling, consumptive and other chronic diseases, are multiplied.

"In the same valley, the inhabitants of the more elevated parts are often exposed to acute inflammatory disorders, while chronic diseases are very common in the lower parts; especially where the streets of the villages are narrow, where the water stagnates in them, and the houses are lofty and badly constructed. Individuals who live in cellars die in great numbers of scrofula or consumption.

"Two general causes predominate over all others: deficiency of muscular exercise and humidity give rise to most chronic disorders. These causes act principally upon the skin; they tend incessantly to repel within the torrent of the circulation superfluous or excrementitious elements which should be eliminated from the economy; they thus produce alterations of the blood and cachectic states of the system, of which the origin is unknown."

A writer in the *London Medical Gazette* (vol. xxx.) remarks, with reference to the influence of a moist atmosphere on the production of tuberculous diseases: "Supposing a climate having a mean temperature of 100° Fahr.,

saturated with humidity, and the blood circulating through the lungs at 100°, there would then be a complete arrest of the evaporation from the lungs: this suppression is one of the causes which tend to produce phthisis. In tropical countries, where the temperature is very high, and the atmosphere almost saturated with humidity, the disease is very frequent. On the other hand, where the climate is dry it is unfrequent. In Egypt, the atmosphere is hot, extremely dry, and tolerably agreeable. In Australia, the atmosphere is temperate and variable, but very dry. At the Cape of Good Hope, especially in the eastern department, the temperature is high, very variable, but very dry. In all these countries consumption is rare. In the West Indies, the temperature is high, but little liable to variation, and the air is moist. At Bermuda the temperature is moderate and very variable; the air is very dense, but it is subject to considerable variations, and the amount of aqueous vapours disseminated through it is great. In these countries, phthisis is very common."

Rainy weather and a humid condition of the atmosphere act also indirectly upon the economy in an unfavourable manner, by keeping persons within doors and by preventing exercise in the open air, which, from its promoting the action of the lungs and the capillary circulation of the surface of the body, is perhaps the most effectual means of combating the predisposition to tubercular cachexy, and of remedying it when already existing. The comparative exemption from consumption which the inhabitants of cold and dry countries enjoy, is attributable, in great measure, to their greater activity, in order to guard themselves against the effects of cold. Dr. Foissac, in his recent work on meteorology, quotes the remark of Admiral Wrangele, that "Diseases are of rare occurrence in Siberia, and old people preserve their vigour until a very advanced period. The exercise which they take in the open air, whether travelling on sledges or skating over the ice, is the chief cause of their good health."

M. Fourcault has well shown by facts the conservative influence of exercise in the open air, even in counteracting the prejudicial effects of humidity, as also the pernicious consequences of seclusion and of sedentary occupations in predisposing to consumption.

"In the small towns of France," he says, "where the population is composed of agriculturists, of artisans, and of a middle class (bourgeoise), the proportion of mortality from phthisis does not exceed one in 40 or 50, where these towns are situated on the declivity of mountains, on elevated plateaus, in dry valleys to which the winds have free access, or in fertile plains. But under these conditions the disease does not develop itself with the same degree of frequency in the various classes of the population. It is very rare among the agriculturists or artisans, who exercise their limbs actively; it attacks, on the contrary, almost exclusively sedentary persons who are habitually within doors, who only exercise their hands or their fingers; who do not expose themselves to the action of the air, and consequently to atmospheric

vicissitudes. Hence consumption, and tuberculous diseases in general, prevail almost exclusively among sempstresses, turners, &c. Pulmonary consumption is especially frequent among young persons, or females of the middle class, who lead an inactive life; whereas butchers, carters, drovers, &c., as also women who expose themselves to the vicissitudes of the atmosphere in country localities, and to the severity of the seasons, are generally exempt. In climates or particular localities, where the fatal influence of humidity is not exerted, this law is general, and the exceptions only confirm the rule.

"Yet further; those individuals who are exposed to the action of humidity only while at work, scarcely ever become consumptive or scrofulous, when they employ actively their physical powers, as tanners, wool-washers in manufactories, dyers, &c. The expansive and sudorific influence of muscular exercise suffices to preserve them from consumption, though they are often liable to rheumatic pains, indicating the decided action of humidity upon the skin. I have observed this fact at Rouen among the dyers, who work in great numbers upon the little river Robec, at Lyons, at Vienne (Rhone), and in all the manufacturing towns which I have explored in the course of my travels. In the agricultural villages of France, where there are no sedentary occupations, and all the inhabitants are engaged in field-work, the proportion of deaths from consumption is not greater than one in 80 or 100 of the whole mortality.

"In seminaries and convents consumption exerts its ravages, which are evidently owing to a deficiency of exercise and of ventilation. Under these circumstances, the inmates become etiolated, their constitution becomes lymphatic, the bones soften and yield, congestions occur, and at a later period consumption supervenes.

"The sedentary occupations usually pursued in Holland concur with the action of humidity in increasing the amount of pulmonary consumption. That which most disposes women to the attacks of this disease is their lymphatic constitution and sedentary life; for, the women who live in the healthy villages of France, Belgium, and Italy, and who are engaged, like the men, in agricultural pursuits, are like them exempt from phthisis. But in the damp climates of Holland and England, the conditions are no longer the same; the humidity exerts a general influence which muscular exercise cannot always counterpoise; and it often happens that, by exciting sweat, exercise supplies a greater hold to the weakening and concentric influence of cold and damp.[1]

Mr. Ancell, in his work on "Tuberculosis," remarks with reference to deficiency of exercise as a cause of consumption and scrofula: "Observation sanctions the opinion that sedentary habits have a most important influence in the production of tuberculosis. Infants often become scrofulous from want of those nursing exercises by which the circulating and respiratory functions are promoted, and a healthful hematosis is secured. The same remarks may be correctly made of young children. Habits of listlessness, not to say of

[1] Fourcault, op cit.

indolence, are often the precursors of tuberculosis in young persons about the age of puberty. Dr. Guy found in the close workshops of a printing establishment that the compositors, whose employment is sedentary, fell victims to phthisis in the proportion of 74 per cent., to 31 per cent. in the pressmen, who, though breathing the same air, and in every respect subject to the same habits of life, differ only in the active bodily exercise of the press; and among the same class of operatives the deaths from the same cause did not exceed 25 per cent. in those who took exercise in the open air. From the same authority, it appears that in single females leading a sedentary life—as book and envelope-folders, bonnet-cleaners, sempstresses, &c.—the cases of pulmonary consumption, compared with all other diseases, were three times as numerous as among those engaged in non-sedentary domestic occupations, as servants, housekeepers, and shopwomen. In females generally, the smallest proportion of cases were in those employed out of doors. In men following indoor occupations, the ratio is highest where there is least exertion, and lowest in employments requiring strong exertion."

M. Lombard found in Paris, Geneva, Vienna, and Hamburg, a greater number of persons leading sedentary lives affected with phthisis than those leading active lives, in the proportion of 141 to 89. In those cities phthisis is twice as frequent in those working indoors as in those who work in the open air. In the hospital for consumption at Brompton, the relative liability was found to be 63 per cent. of indoor males, to 30 per cent. in outdoor, and all the consumptive females followed indoor occupations.

Sir James Clark likewise observes on this point: "The effect of sedentary habits is most pernicious, and there is perhaps no cause (not excepting hereditary predisposition) which exerts such a decided influence in the production of consumption as the privation of fresh air and free exercise. These operate as the principal causes of its greater frequency among females of the higher classes."

Other causes are, however, operative to a certain extent in inducing consumption more frequently in females than in the opposite sex. Their blood contains a greater quantity of water and a smaller proportion of globules than that of males, and consequently becomes more speedily deteriorated when exposed to influences of a noxious nature.[1] The heart, arteries, and lungs are smaller, and have less structural density in women than in men generally, hence their circulation is more feeble at the periphery of the body and on the surface. It is a matter of common observation that females of the upper and middle classes are generally chilly in cold weather, and that a large number of them are subject to cold feet and chilblains. The greater susceptibility of their system renders them, moreover, more liable to be affected by the divers causes of super-excitation, and by the depressing mental influences which are inseparable from an artificial mode of life and a high state of civilization.

[1] According to the estimate of M. Le Canu, the proportion of globules in the same quantity of blood in both sexes is as 99 to 132.

As connected with the effect of the impression of cold or damp upon the surface in inducing tuberculous disease, I may observe that too light clothing, and the exposure of parts of the body, as the neck, chest, arms, legs, and feet of delicate females, or of children who possess but little reactive power, must be enumerated among the most common causes of the disease, and of promoting its development where the predisposition exists.

The action of cold upon the skin under these circumstances, not only represses its exhalant functions and tends to occasion a congestive state of the thoracic and abdominal viscera—and, as a consequence, acute or chronic inflammations of these organs, or of their serous and mucous membranes—but also, by depressing the vital energies, favours the supervention of cachectic states of the system. Habit will, it is true, frequently enable persons to bear the impression of these and other deleterious agencies without experiencing any immediate bad effects, though their action may be gradually undermining the health, and often gives rise to unpleasant sensations and indispositions, of which the cause is unknown to the patient and his friends, and very commonly to the practitioner, who vainly seeks to remedy them by medicines.

Adverting to the gradual detrimental action of cold upon children and young persons of the upper classes, who are frequently too lightly clothed, a well-known author, whom I have already quoted, observes: "They do not feel the cold, but they experience an uneasiness and an indisposition which arises from it; their constitutions become deteriorated by passing through the alternations of health and disease, and they sink under the action of an unknown cause. It is the more likely to be unknown, because the injurious effects of cold do not always manifest themselves during or immediately after its application, and the constitution is altered without the cause being suspected. The use of warm clothing is often declined, even though the want of it may be actually felt, from the wish to reserve it for an advanced age. But it frequently happens that this very precaution is the cause of preventing that age from being attained."[1]

The effect of depressing passions and emotions has been too little considered by medical practitioners as strongly tending to produce tubercular cachexy; and yet the influence of this cause is perhaps more generally exerted than that of any other, both in deteriorating the blood and in lowering the nervous energies, by which the system is rendered less capable of reacting against deleterious external agencies. This cause likewise acts by impairing digestion and assimilation by disinclining persons to exertion and to muscular exercise, and consequently by impeding the capillary circulation and checking the action of the skin; whence arise, as we have seen, a congestive state of internal organs and the retention of excrementitial matters in the blood.

Laennec, referring to the great part which should be ascribed to moral

[1] Edwards, op. cit.

causes in inducing phthisis, even went so far as to say, that almost all persons who became consumptive without being thereto constitutionally predisposed, appeared to owe to themselves the origin of their disease. In fact, the destroyed illusions, the deceived hopes of the realization of expectations too often exaggerated by vicious systems of education, the difficulties and anxieties which so commonly beset the path of life, &c., may well be regarded as mainly instrumental in the production of organic disease, and especially of pulmonary consumption.

"When the equilibrium of the moral acts is destroyed," remarked a late medical writer—no less distinguished on account of his learning than for the elegance of his style—"we may be sure that that of the vital actions will speedily be so. The physician Elie maintained that four-fifths of men die from grief; an assertion much less paradoxical than might be supposed; for truly, there are few diseases which, in the actual state of our civilization, are not the reflex action of some strong moral affection. It is the certain result within a given time, which must be measured according to the violence of the attack and the individual disposition. Aneurism, liver enlargement, scirrhus, softening of the brain, most nervous diseases proceed more or less directly from some misfortune, experienced, it may be, long before, but of which the weight, the remembrance have at once broken down, or gradually weakened the springs of life. No one, therefore, dies of grief, of despair, nor of lost illusions; it is gastritis, pericarditis, apoplexy, which take the place, by their evident effect, of the real and active, though hidden principle of so many evils. Acute and profound moral suffering is, then, the point of departure of the greater number of organic alterations."[1]

If the inferior classes of the population are less frequently affected by causes exclusively of a moral nature than their superiors in station, the same result is often produced by excess of labour, deficiency of suitable food and habitations, and by other anti-hygienic circumstances to which this class is particularly exposed.

M. Lombard estimated that phthisis is twice as frequent among the bulk of the population as in that part of it which lives in easy circumstances. From a statistical account, published by M. D'Espine, in the *Annales d'Hygiène Publique* (1847), the mortality from consumption amounted to 155 per 1000 of the general population; among those in rich and easy circumstances, only 68 deaths in 1000 were attributable to this cause; whereas, among the poor, the proportion amounted to 233 per 1000. It must, however, be observed that this statement has reference more especially to Geneva, where the upper classes lead regular lives, abstaining from dissipation, and are consequently comparatively little exposed to the superexcitation, and to the various depressing moral and physical causes, to which is subjected a large proportion of persons of the upper classes of other countries, especially

[1] Reveillé-Parise. Etudes de l'homme dans l'etat de santé et de maladie.

in large capitals, as London or Paris, and which contribute greatly to increase the number of deaths from phthisis, particularly among those who are predisposed or of weakly constitutions, of whom many succumb in early youth.

The consideration of the part which is to be ascribed to hereditary tendency in the production of phthisis is foreign to the subject which I have undertaken to treat. Whether the predisposition to the disease be hereditary or acquired, the principles of prophylactic and curative treatment by climate and other means of rectifying the morbid disposition of the system, would be about the same in both cases. The only other cause to which I need refer, as having been considered mainly instrumental in inducing tubercular disease, is a disordered condition of the digestive apparatus. Dr. Wilson Philip described, many years ago, a form of dyspeptic phthisis, "of which the principal characteristic, as revealed by autopsic examination, was the disorganization of the liver."[1] More recently, Dr. Todd has described a "strumous dyspepsia," which he considers to be the almost constant precursor of the development of tubercles in children. Many children, however, become consumptive without being either scrofulous or dyspeptic, and in many of those patients who have passed the period of puberty, the function of digestion is well performed, or is subject only to slight derangements up to an advanced stage of the disease. On the other hand, but few dyspeptic patients become consumptive, unless predisposed to the disease, or exposed to any of its more active causes. In persons predisposed, or of a delicate constitution, derangement of the digestion (which often ensues from the operation of moral causes) may become an active cause of tubercular cachexy, on account of the impediment which it presents to a due assimilation of the food, and consequently by giving rise to an impoverished state of the blood, lessening the vigour of the circulation, and diminishing the cutaneous and other secretions; but in general such derangement cannot be considered in the light of a primary cause. The original lesions which are not within the digestive organs, are consecutive, with the exception of tuberculization, which may precede or coexist with tubercles in the lungs or the bronchial glands, but which is likewise frequently consecutive to the pulmonary tuberculization.

In scrofulous children the deposition of tubercle mostly occurs in the first place in the abdomen, especially in the mesenteric glands, and then a strumous dyspepsia precedes the manifestation of pulmonary phthisis, which it

[1] On examination, M. Louis found that of 127 subjects who died of consumption, 47 had the fatty state of the liver, which is also frequently met with in scrofulous subjects, but almost always there exist at the same time tubercles in the lungs. M. Andral considers that this degeneration arises from a defective nutrition, deducing his opinion from a law of the economy, viz., that whenever an organ becomes atrophied, fatty matter is secreted around it, and even in the place of its molecules. M. Mérat considers that it depends upon the vitiated state of the blood, which, when respiration is impeded, becomes more carbonated and oily, as does also the bile.

may likewise do in some cases where there is no abdominal tuberculization. The fatty state of the liver, which Wilson Philip regarded as a cause, is also a consequence of pulmonary disease.

IV. THE EFFECT OF CLIMATE ON TUBERCULAR CONSUMPTION.

In estimating the effects which climate is calculated to produce upon those predisposed to, or labouring under tuberculous disease, our attention should be directed in the first place to the general condition and circumstances of patients, and to the more or less advanced state of the disease; and subsequently to the various accessaries to the action of climate which powerfully conduce to a restoration or an amelioration of the health, but of which the absence often neutralizes the beneficial influence of this medical agent. Many individuals predisposed to or affected by consumption, must necessarily be debarred from profiting by the advantages offered by change of climate, either on account of family or other reasons which prevent them from travelling, of their poverty, by which they are deprived of the means, or from the acute nature and rapid progress of the disease, as when it supervenes on some other complaint.

In those cases which present little hope of permanent amelioration, the practitioner is restricted to his endeavours to afford relief in palliating the urgent symptoms resulting from the local lesion, which requires all his attention; but in the more chronic forms of the disorder, which are the most frequent, and commonly met with among the richer classes, the case is different. Here the disease pursues a course of several months or years, being usually preceded by a manifestly deranged condition of the general health; the tubercular deposit instead of being disseminated throughout the whole pulmonary structure, is restricted within more or less circumscribed limits; more time is consequently allowed for the adoption of suitable means of relief, and if the disorder be of recent date (especially if there be merely a cachectic state, without indication of organic lesion), we may reasonably hope that in many cases, by attempting to improve the patient's general condition, and to remedy the abnormal alteration of the blood, by means of climate and other hygienic and medicinal agencies, we shall succeed in obtaining permanent cures; for, the chief thing to be apprehended is, not the existence of some tubercles in a circumscribed portion of the lungs—since experience has proved that these bodies may remain in a crude state for a long period without very serious disturbance of the health, and even without their existence being suspected, that they may be absorbed, may undergo the cretaceous transformation, or be expelled after the process of softening—but rather the persistence of the tuberculous diathesis, which gives rise to successive depositions of the morbid product. It is, therefore, against the diathesis, or the cachectic state of the system, and

not against its local manifestations, that our remedies should be principally directed, and it is by placing patients under favourable circumstances of locality, climate, &c., which remove them beyond the sphere of action of the most common causes of tuberculous cachexy, and which tend to neutralize the influence of these causes after their pernicious effects have become apparent, that our efforts to cure would be most likely to be crowned with success, provided the deterioration of the constitution, or the organic lesion had not proceeded too far.

The predisposing causes of tuberculous disease are all directly or indirectly of a debilitating nature, and, although the symptoms arising from vascular congestion, inflammation, or irritation of the afflicted organs, often require the adoption of antiphlogistic or revulsive means, the principal indication in the treatment of the majority of cases, in an early stage of the disease, and before it has manifested itself by urgent symptoms, is to subject the patient to a generally strengthening regimen, adapted to the circumstances of individual cases. From the view which we have been led to take of the nature of pulmonary phthisis, it must be evident that our attention should be directed, in the first place, to improving the functions of the skin, which are always more or less deranged in cases of phthisis or of tubercular cachexy, from defective or irregular action. The sweats to which patients are liable in the more advanced period of the disease are no contradiction to this position, as they consist of partial or general transudations arising from debility, increased arterial action, and a want of tone of the secreting organ. Now, when the vascular system is deficient in vigour, it is in the capillary circulation of the surface and periphery of the body that the effects are most apparent, the insensible perspiration being consequently more or less suppressed. Those measures, therefore, which tend to raise the tone of the system and to increase without too greatly exciting the vigour of the circulation, may be considered as acting the most favourably in remedying the tubercular diathesis, and the best if not the principal means of producing this result are a residence in an appropriate climate, change of air, and of mental impressions by travelling in an interesting country. Independently of its other effects upon the economy, the action of a warm and dry atmosphere in winter, promotes perspiration, which, as we have seen, is directly repressed by the influence of a cold and humid, or even of a warm and humid atmosphere. "In hot and damp weather," says an author, who has recently treated of climate, "the cutaneous perspiration is performed with difficulty; a feeling of languor and of depression is experienced, which makes the heat appear stifling, and renders all exertion insupportable. Thus, while extreme dryness of the air exhausts the body, gives rise to inflammations, and irritates the nervous system, excessive humidity engenders scrofula, rheumatism, &c., accelerates decomposition, produces atony of the system, and even stupidity. On the other hand, a moderate degree of dryness increases the activity of the functions without exciting or exhausting the sensibility; occasions a salutary derivation upon the whole

cutaneous surface, and concurs, though indirectly, to maintain a desirable equilibrium of the mind and passions, in a word, to preserve the health."[1]

It has been shown that a cold and dry air has a preservative effect against the attacks of consumption and scrofula, but it would be wrong to infer, that because in Sweden, for instance, the ratio of mortality from these diseases is smaller than elsewhere, it would be advantageous to send thither patients labouring under or predisposed to phthisis, whose vital powers are greatly weakened. It is true that we now and then meet with or hear of a delicate person who appeared to present the signs of a phthisical predisposition, acquiring robust health, by emigrating for a longer or shorter period, to countries where the winters are excessively cold, and at the same time dry (as Canada); but these are exceptional cases, and when change of climate becomes a question for the medical practitioner to consider, it is almost always that he has to recommend patients to choose one of a higher temperature than that in which they have been accustomed to live. This recommendation is, however, too frequently given in an abstract manner, without sufficient regard being paid to the difference of patients' constitutions, their actual condition, and their greater or less power of resisting cold, or what is the same thing, of producing heat. A climate which might be considered mild, and be well suited to one patient, would often, as respects others, be cold and prejudicial; for, if there exist great differences between healthy persons with regard to their power of reacting against deleterious external influences, the difference is still greater in those who are sick and weakened by any cause. An individual whose power of producing heat is diminished, will often bear with advantage a moderate degree of cold for a certain time; but if he be subjected to its influence for a prolonged period, his constitution being no longer able to react against the accumulated action, he would not fail to experience its prejudicial effects upon his health.

After adverting to the results of some experiments upon frogs, made with a view to determine their power of generating heat, M. Edwards proceeds to observe: "Where, therefore, the exposure to cold is prolonged, the effects of each portion of the time of the exposure are added to those portions which follow it. Hence, individuals of this class experience a progressive diminution of their faculty of producing heat from the longer duration of the same degree of cold.

"It follows from the facts which we have stated, that when a person undergoes a change of constitution, which lessens his production of heat, or his consumption of air, he cannot support the same degree of cold, which previously would have been salutary to him, without the rhythm of his respiratory movements being sooner or later altered; hence arises the necessity, when these two functions have undergone this alteration—as in cases of organic affection of the heart and lungs—to place the patient in relation with a milder

[1] Foissac, de la Meteorologie.

temperature, either artificially produced, or by causing him to change his climate."

A warm and equable climate, even though it be moist, has a beneficial action upon the majority of persons labouring under diseases of the respiratory apparatus, who come from colder regions; but a prolonged residence in such a climate would frequently not be advantageous to them, on account of the relaxation of the constitution which it generally produces, and which renders them less able to resist the temporary or accidental impression of a fresher air, or the action of a colder atmosphere, on quitting the places of their sojourn. On this account, the natives of tropical climates, when brought to colder latitudes, as also Europeans who have long resided in those countries, on returning home, so frequently become consumptive.

We have seen from the evidence of a resident physician at Rio de Janeiro, that a large proportion of the natives of the Brazils die from pulmonary consumption. A writer in the *Gazette Médicale de Paris* (M. Dujat), remarked, some years ago, with reference to the same locality: "At Rio, phthisis is infrequent among the Europeans. M. Levacher says that the progress of the disease in Europeans is retarded in the West Indies; they seemed to acquire a new existence, and lived several years without experiencing any symptoms of their disease; several were able to leave, presenting all the characteristics of an apparent cure." "But," adds this writer, "the patients treated in the military hospital at Chatham, furnish proofs that a prolonged sojourn in hot countries and the diseases of those countries, give rise to tubercular cachexy."

Sir James Clark remarks, on the same subject: "A long residence in a very equable climate is not favourable to health, even with all the advantages of exercise in the open air. A moderate range of temperature, and of atmospheric variation, seems to be necessary for the preservation of health; whence it follows that many patients who derive great advantage from a temporary sojourn in a mild, sheltered position, do not bear a long residence in a similar atmosphere without injury. Dr. Combe, during his stay at Madeira, remarked that the invalids always felt themselves better when the temperature was less steady and the atmosphere more variable, than when the season was unusually mild and agreeable. I have observed the same effects resulting from a long residence in some of the more favoured spots in our own island. Such situations form excellent residences for a time; but afterwards the patients cease to improve, and lose rather than gain in strength. A prolonged sojourn in very mild, sheltered positions, I consider to be unsuitable to young persons disposed to tubercular disease."[1]

"Air in motion," says M. Edwards, "acts only upon exposed surfaces, as the integuments of the body; those of the lungs are sheltered, and notwithstanding their communication with the atmosphere, the agitation of the air has but a slight share in the quantity of vapour which they furnish. This

[1] On climate.

consideration will serve to determine the choice of suitable places for the residence of delicate persons. Those to whom the increase of evaporation from the lungs is injurious, ought to prefer an atmosphere less dry, but slightly agitated when it is important to obtain an agreeable freshness."

An eminent London physician likewise observes: "We must be very cautious not to carry our anxiety too far; for it is an undoubted fact that, within the limits of moderate hardihood, exposure to the open air and the vicissitudes of the atmosphere is the best safeguard against the attacks of phthisis in those who are predisposed. It is to the effects produced upon the skin that great part of the benefit produced by residence in a mild climate is probably attributable. Atmospheric exposure is another very important point; in our variable climate it is inadmissible."

"It is at this period (the early stage of the disease) that sea voyages, and residence in a milder climate, are to be recommended. If we leave them to a much later period, the sacrifice of domestic comfort and the expense of toil and travelling are undertaken with scarcely a chance of any adequate benefit; whereas, at this time, if the patient be so placed, that for a winter or two he is able to pursue his exercise in the open air, without breathing an atmosphere which at every inhalation irritates the bronchial tubes, and without exposing the surface of his body to be chilled, and the perspiration to be checked at every hour of the day, a great deal of benefit may result, and the cure which is begun may be accomplished, or at all events the progress of the disease be greatly retarded."[1]

Mr. Ancell likewise remarks on this point: "If the blood, either by the resources of nature alone, or by that of nature assisted by art, resume its normal constitution and its healthy vitality, the local affection, if no vital organ be extensively diseased, will get well spontaneously. Our curative principle is peremptorily to prescribe air, and to endeavour to select such a locality, and such a climate, that the patient may be out of doors at all hours of the day, and all the days of the year. One great desideratum is uniformity as respects pressure, moisture, and temperature, and another, freedom from pernicious winds. A rarefied, light, and comparatively dry and agreeable atmosphere is to be preferred."[2]

These quotations from the works of practitioners who have had considerable opportunities of treating pulmonary consumption, and of appreciating the effects of climate on its progress, may suffice to show that in most cases, where the object sought to be attained is a cure or permanent amelioration, by improving the quality of the blood, a very agreeable climate is not the most desirable. In the course of my residences at various places frequented on account of their climate, I have had many opportunities of convincing myself of the advantage which patients with chronic disease of the respiratory

[1] Bright and Addison's Practice of Physic.

[2] Treatise on Tuberculosis.

organs derive from breathing an atmosphere moderately agitated, as also of the enervating influence produced by a calm state of the air, and a very warm and equable climate, too long continued.

The air of Rome, for instance, is very calm, being rarely agitated by strong winds; and although a residence there, during the whole of the winter, suits some patients, many others, on the contrary, to whom a few weeks' sojourn is advantageous, are disagreeably affected, and their general health suffers, not unfrequently being accompanied by an aggravation of chest symptoms, when their stay is prolonged for five or six months. So, also, a change would very often be desirable, after a time, for patients who go to winter in the climates of Madeira or Malaga, especially on the approach of spring, which there sets in early, and when the heat is not unfrequently inconveniently felt during the greater part of the day; but as these places are distant from any others frequented on account of health, a voyage could not be undertaken without considerable risk. Thus, in cases where a very equable climate is not specially indicated, and where there is reason to believe that a change would be advisable in the course of the winter, the Italian places of resort, notwithstanding their atmospherical vicissitudes, present several advantages, especially as respects the facilities of communication existing between them. The character of the climate of certain localities likewise varies materially, in the course of the six months of winter and spring, on which account a change of place is indicated for patients sojourning there who labour under pulmonary disease, though it is not always had recourse to. It is from these various circumstances having been too little considered that a great number of patients do not derive the advantage they otherwise might from the beneficial influence of climate. We find their condition rather worse than bettered by its injudicious employment.

Again, in several cases of predisposition, or of incipient disease, a certain amount of stimulation of the system produced by a warm and exciting climate would be advantageous, if not of too long duration. A locality likewise, which might be desirable as respects its advantages of climate, might be unsuited to many patients from its want of resources for occupation and recreation. Cases of phthisis not unfrequently owe their origin, as we have seen, to painful moral impressions which act by undermining the general health; and as respects the majority of patients, mental recreations which afford them the means of occupation in the evenings, or when they are detained within doors; cheerful society, the aspect of a pleasing country, a variety of walks and rides by which monotony of impressions is prevented, conduce materially to promote a cure or to procure an alleviation of their disease. The consideration, as to whether places to which patients with pulmonary disease are recommended, possess resources for mental occupation or diversion, is therefore a very important one, and yet it is overlooked by most writers on climate, who seem only desirous to specify the meteorological details of the places of which they treat. Thus, M. Carrière in his work on the "Climate

of Italy," infers from the equability of climate said to be enjoyed by some places altogether destitute of resources, as Mola di Gaeta, Puzzuoli near Naples, some towns in the Tuscan Maremma, &c., that these would be favourable situations for consumptive patients; but what invalid would think of remaining for any time in similar localities, or what physician would counsel such a course? The same writer mentions Venice as a favourable winter climate, but although it may be better than that of other parts of northern Italy, Venice is open to the influence of the winds from the north and northeast, which though not frequently severely felt are at times inconvenient. But although a three or four weeks' sojourn there in the autumn or spring might be advisable, yet I consider that Venice would be a very unsuitable winter abode for the great majority of invalids. There is no place for riding or driving; the only places for walking exercise are St. Mark's Square, and a circumscribed public garden; there is no society for visitors—most of whom after having seen the objects of interest which the city contains, find no inducement to prolong their stay.

We have seen that the causes which are most instrumental in inducing tubercular cachexy by suppressing or lessening the excretory and absorbent functions of the skin, and in vitiating the blood, are humidity, a sedentary mode of life, and the depressing passions. Now, the principal advantage of a mild, dry and sunny climate in winter, is, that it places patients in the most favourable conditions for counteracting the influence of these causes, enabling them to take daily exercise in the open air, by which the musular, respiratory, digestive and cutaneous systems are maintained in healthy activity; whereas, in a cold and damp climate, such persons must necessarily pass many days within doors, breathing the close atmosphere of warmed rooms, and must moreover be deprived of the mental diversion which is afforded by the variety of objects met with in walking or riding. Thus in any such climate the quality of the blood becomes improved, and the tendency to the formation of tubercle is diminished. The nervous and muscular systems experience the beneficial effect of this amelioration, which is manifested by an increase of tone and vigour. The *moral* is likewise agreeably impressed by the contrast which sunshine in winter presents to the cloudy and rainy skies of which a lively recollection is retained. "Is it not true," asks M. Foissac, in referring to the effects of light on the disposition of the mind, that in bad weather the mind is more disposed to melancholy? Is not British spleen occasioned, or at least kept up by the thick fogs which constitute for the inhabitants of Great Britain an atmosphere of dulness and ennui? Are not petulancy and vivacity excited by the aspect of clear skies and sunshine? That they are so is proved by the animated gestures, and the expressive play of features of the natives of southern climes."

A residence in a suitable climate has not only a directly beneficial effect in improving the condition of patients, but it is likewise indirectly advantageous by placing them under the most favourable circumstances for deriving

the full amount of benefit from such remedies as are more particularly indicated; and it is doubtless on account of patients being in unfavourable hygienic conditions that remedies which have been found to be highly serviceable by some practitioners, have so often failed to produce good effects in the hands of others who have tried them on hospital patients, or others exposed to the anti-hygienic influences of large cities. A tonic plan of medication, for instance, is not unfrequently beneficial in incipient phthisis, even under disadvantageous circumstances of locality, mode of life, &c. Iron is the remedy of this class which has been the most highly spoken of, and I have employed it in several cases of pulmonary disease with good effects. M. Dupasquier, a French provincial physician, experimented largely with the proto-ioduret of iron in cases of consumption, and speaks highly in its favour, even when employed at an advanced period of the disease, when its use would generally be considered to be counter-indicated. "The cough, the sweats," he remarks, "subsided, or were allayed, the circulation became slower, the fever was lessened, the strength and appetite improved even in an advanced stage." (*Gazette Médicale*, 1842.)

On the other hand, some of the most distinguished physicians of Paris, as MM. Louis and Andral, state that they employed this remedy without any good resulting from it; and that in some cases the symptoms were greatly aggravated, as indeed must always be the case where remedies are tried experimentally, with but little regard to the circumstances in which the patients are placed. The same may be said of revulsive agents—as issues, setons, &c. —the use of which is often attended with marked benefit when the hygienic condition of patients is favourable, but which often fails to afford relief under circumstances of an opposite nature.

All the physicians practising at places frequented by patients labouring under pulmonary disease, ascribe the want of success, and the disappointment frequently experienced by patients and their friends, of their expectations of the advantage to be derived from climate, to the circumstance either that patients arrive in too advanced a state of disease to be materially benefited, or to their want of precaution in guarding against atmospheric transitions, and to the neglect of hygienic rules, the observance of which is rendered imperative by their condition. I have frequently had occasion to witness the bad effects resulting from those causes. Patients on seeing from their residences or from sheltered gardens the sun brightly shining, are apt to go out on foot, on horseback, or in a carriage, too lightly clad, and unprovided with extra garments to put on when passing through a colder temperature, to the action of which their previous exposure to the sun will have rendered them more susceptible. They likewise frequently remain out later in the evening than they should do; attend parties, and on leaving heated rooms expose themselves to the night air, commit errors with respect to diet, &c., whence they seldom fail to experience evil consequences, which are too often laid to the account of the climate.

Sir James Clark justly remarks on this point: "Among the numerous circumstances which require attention in recommending a change of climate, one of much importance is often entirely lost sight of, both by the physician and his patient. We mean that necessity of perseverance in the regimen and mode of life which the peculiar nature of the disease demands. This must be urged upon the invalid as the condition on which alone he can expect to derive benefit from the proposed measure. We are satisfied from ample observation, that change of climate has not been productive hitherto of all the benefits which it is calculated to effect; nay, that it has often done positive mischief, chiefly on account of the inconsiderate and injudicious manner in which it has too generally been prescribed and carried into effect."[1]

Mr. Ancell remarks on the same subject: "I have known several tuberculous individuals who have been to Madeira, and returned with their health completely restored, but on questioning them I find that they have lived twice or thrice as much in the open air as they were accustomed to do at the corresponding seasons of the year at home. They have also taken infinitely more exercise, and that of a gentle and salutary kind; they have been relieved of many of the harassing cares of life, and followed out judicious directions as to their diet and habits. I have been informed of others who have gone out under equally promising circumstances, but have fallen into irregularities and dissipations; have adopted the converse of these hygienic customs, and have not only received no benefit, but their disease has progressed even more rapidly than it would have done had they remained at home.

When, therefore, we seek to estimate the degree of influence which climate in general, and the climate of particular localities, is calculated to exert in cases of tubercular disease, we must take into consideration all the circumstances which are likely to promote or hinder its beneficial action, as well as the particular conditions of patients; both as regards their general health, and the state of the affected organs. When tubercles have been found to exist in the lungs, the practitioner who contemplates recommending a change of climate, will endeavour to ascertain the extent of the lesion; whether or not the disease be simple, or complicated with disease of other organs; and when such complication exists, he will have to consider whether it be such as to counter-indicate the recommendation of the kind of climate which otherwise might seem to be most suitable. In a large proportion of cases phthisis in an early stage exists without any very notable complication. In some cases the complications met with are consequences of the tuberculous deposit, or are accidental, as when there is bronchitis, which, as we have seen, will not of itself suffice to produce pulmonary phthisis.

In general terms it may be said that in the majority of cases of the disease in an early stage, when the patient's strength is not materially lowered,

[1] Cyclopedia of Practical Medicine; art. Climate.

and when there does not exist any undue susceptibility of the respiratory apparatus, the beneficial influence of a change would be likely to be so much the more apparent in proportion as the places whose climate appears to be suitable, combine the most inducements to be much out of doors, with resources for indoor occupation at other times. A mild, dry, and somewhat exciting climate, where the air is moderately agitated, without too great or sudden variations, would be best calculated to procure the removal of tubercular cachexy, and to prevent any further formation of tubercle, by improving the deranged functions of the skin, of digestion and assimilation, when these are defective, and consequently the state of the blood. On the other hand, where the disease occurs in subjects of an excitable or nervous temperament, and where from this cause or from the more advanced state of the disorder the circulation is accelerated—if the breathing be difficult, with much cough, and especially where hæmoptysis has repeatedly ensued—the most urgent indication will be to allay the morbid excitability of the system, which would be best effected by a climate of an opposite character to the preceding, viz., a warm, calm, and somewhat moist atmosphere, which would favour the repose of the organs of respiration and circulation. In a climate of this kind, however, though patients would often feel themselves relieved, and might continue to live in comparative comfort for a lengthened period, there would be less likelihood of the blood regaining its normal condition, than if they were in such a state as would enable them to bear, without inconvenience, the action of a more bracing atmosphere; and on leaving a climate of this kind, they would frequently be liable to experience a recurrence of the symptoms which had subsided under its sedative influence, on being exposed to the greater atmospheric variations which they would have to encounter elsewhere.

The length of time that patients should remain in a climate which the state of their case seems to indicate, necessarily varies according to circumstances. Most places which would be suitable for a winter's residence, would be unsuitable in the summer season. For many patients affected with tuberculous disease in a slight degree, one, two, or three winters passed in appropriate localities, aided by such other means as their state may require, would not unfrequently suffice to re-establish their health. Several would often derive more advantage from changing the place of their abode, than from returning successive winters to the same locality, and sometimes even from not remaining the whole of the winter in the same place. It is, however, only after careful examination of the circumstances of each case individually, and of the changes which may have taken place in patients at various times, that the practitioner would be able to judge of the locality and kind of climate which would be best adapted to answer the indications, as well as of the period during which it would be necessary for them to have recourse to the remedial agency of climate.

A marine climate has often been found advantageous in the earlier stages of tubercular disease, and it is so, doubtless, more on account of the moderate

agitation of the air in the sheltered positions on the coast which are usually chosen, than from its impregnation with saline particles. As respects the Mediterranean, it has been demonstrated by experiment, that the air on the coast as well as on vessels, does not contain any saline matter when the sea is calm.

On the coasts of the Atlantic and North Sea, where there are tides, and where the sea is continually in a state of agitation, the air is impregnated in a certain degree, but it is questionable whether this impregnation has much share in the invigorating effects which patients not unfrequently derive from a residence on the coast, and from sea voyages. These effects are rather to be ascribed to the constant renovation of a pure air, which acts in promoting the free performance of the functions of the lungs, of the skin, and of the digestive apparatus. A residence near salt works, and the inhalation of the air impregnated with the vapour from the boiling pans, have likewise been regarded as a preservative against consumption, and also as a curative means, from the circumstance that the men employed in these works are very seldom attacked by the disease; but the same exemption is met with among other classes of men who pursue out-of-door occupations. M. Lebert, who lived several years at Bex, near the Lake of Geneva, where there are extensive salt works, remarks, that he never knew a labourer employed in these works who became consumptive.

"It must, however, he observed," he adds, "that only strong men are received as workmen; they only work eight hours a day; they are well paid, are almost all cultivators of land, and they live in a healthy and prosperous country. But, admitting the conservative influence of a residence near salt works, are we justified in inferring from this, their curative action? I think not, and subjected several consumptive patients of the neighbourhood to the habit of walking around the evaporating houses, and of breathing the warm air from the boiler during the coction of the salt; but I have not seen result from this practice any other effects than those which might reasonably be ascribed to the favourable hygienic conditions under which the patients were placed; the mild and sheltered air, a fine country, milk of excellent quality, and good food."[1]

Sea-voyages have been recommended from the earliest periods as a means of curing consumption; and their influence in strengthening a delicate constitution, and in frequently preventing the formation of tubercle in persons thereto predisposed, has probably not been overestimated.

Some writers mention cases of phthisis apparently in an advanced stage, said to have been cured by this means. A modern author (M. Brichetcau) in his work on the diseases of the organs of respiration, speaks favourably of voyages, and considers that the benefit derived is attributable to the sea-sickness which they produce. His favourite mode of treating consumption is by

[1] Des Maladies Tuberculeuses. Paris, 1852.

emetics, which have likewise been highly praised by some British practitioners, though their employment has not been followed by favourable results in the hands of others.

When emetics render service in this disease, it is, I conceive, chiefly because they give rise to active perspiration; and sea-sickness may likewise occasionally be of use in this manner; but in long voyages, it seldom lasts more than the first few days, and, when of longer duration, would produce great exhaustion in persons already weakened by disease. It has, moreover, the disadvantage of confirming patients to the close air of their cabins, whereas in order to derive advantage from sea-voyages, they should be much on deck, and able to take exercise, in order that by the constant renovation of the air, the functions of circulation, respiration, and digestion may be more perfectly performed, and the insensible perspiration promoted. It is therefore essential that patients who are recommended to try the effect of sea-voyages should have a certain amount of strength, and that they should like the sea, and that the disease should not have made much progress.

In the more advanced stages where the aid of medicine is continually needed, as also when the patients are in a weak state, or when from want of resources they would be likely to experience disgust and ennui from the monotonous mode of life pursued at sea, long voyages would generally be prejudicial. Short voyages of a few days' duration, as when patients are going to or returning from places of winter sojourn, would be in general beneficial, where the effects of sea-sickness are not apprehended. It is, therefore, only to a small number of patients (chiefly of the male sex) that sea-voyages would be suited as a remedial means.

On the other hand, land journeys, in a carriage, on horseback (or even on foot, when patients are sufficiently strong), through an agreeable country, would mostly be attended with good results, provided they be not counter-indicated by the patient's weakness, or by the excitement to which the act of travelling gives rise.

In land journeys, as in sea-voyages, the air being constantly renewed, produces greater activity of the functions of organic life; there is less susceptibility to cold, and the stomach is less liable to be prejudicially affected by articles of diet which at other times would disagree.

Travelling by land has, moreover, the great advantage over voyages, that the patient's mind is occupied and diverted by the incidents of the route, and by the variety of objects which continually prevent his attention from dwelling on sombre thoughts, which his state of health is so calculated to inspire; this circumstance materially conduces to remedy a cachectic condition of the system, and to prevent the extension of existing local lesion.

In cases where the lungs are diseased, or are disposed to become so, and where there exists at the same time considerable debility of the assimilative powers, emigation to a warm winter climate is especially imperative. A greater quantity of oxygen is inspired by the lungs in cold than in warm countries,

consequently, a greater quantity of food is required in order to obviate the inconvenience which the admission into the system of a superabundance of oxygen is calculated to produce in debilitated persons, the activity of whose capillary circulation and cutaneous functions is lessened.

When, therefore, the stomach is not in a state to digest the amount of food necessary to neutralize the effects of an excess of oxygen upon the lungs, it becomes essential to reduce the quantity of gas which is received into them; this object is best effected by patients residing in a warm climate, where their skin acts more freely with but little exertion on their part.

The necessity of the amount of food being regulated according to that of the oxygen received into the pulmonary system, and of the carbonic acid expelled from it in the act of travelling, as well as the influence exercised by an active state of the functions of the skin upon the digestive apparatus, have been well shown by Professor Liebig. "We expire," he observes, "more carbonic acid in a low temperature, and under a strong pressure, than in a high temperature. We must consequently consume by food, a proportion of carbon which bears a relation to this quantity. Thus, in Sweden, more food is required than in Sicily; in our temperate regions, at least an eighth more in winter than in summer. In winter, when we are in a cold air, where consequently the amount of oxygen is greater, we feel increase in proportion, the want of carbonated and hydrogenated food. When this want is satisfied the body can resist the most intense cold. Thus the quantity of food consumed is regulated by the number of inspirations, the temperature of the air inhaled, and by the quantity of heat generated in the body."

Persons whose digestive organs are weak, whose stomach consequently cannot place the food in the requisite state for combination with oxygen, cannot support the severe climate of England. Their health requires, therefore, to be improved in Italy, and in southern countries generally, for they there inhale a comparatively smaller proportion of oxygen, and their organs will still have sufficient vigour to digest a smaller quantity of food. If, however, these patients remain in a cold country, their respiratory organs are ultimately destroyed by the action of the oxygen.[1]

From the preceding remarks may perhaps be deduced some general principles by which the beneficial action of climate in tuberculous disease should be regulated. As respects the climates of particular localities, frequented by patients labouring under pulmonary disease, there exists a considerable variety, a knowledge of the peculiarities of which would best enable the practitioner to determine as to the one most likely to meet the indications in any given case. It is foreign to my purpose to give a detailed account of the places most commonly resorted to on account of their climates; but the following brief notices may serve to convey a general idea of the leading features by which some of these climates are distinguished from each other. Climates

[1] Chimie Organique, Paris.

may be divided into two opposite kinds, between the extremes of which there exist several intermediate gradations, viz., the warm, dry, exciting climates, and the warm, moist, and sedative climates. Egypt, the southeast coast of Spain, Nice, and Naples may be mentioned as specimens of the former, though greatly varying from each other, with respect to the degree of warmth, equability, amount of rain, &c. The West Indies, the island of Cuba, and in Europe, Pau, Pisa, Rome, certain localities of the south and southeast coast of England, and the Isle of Wight, may be regarded as types of the second, and would, as has been already observed, be applicable to a class of cases to which the former might be unsuited. It must, however be borne in mind, that many patients would derive advantage from one or the other of these kinds of climates taken indiscriminately, solely on account of their passage from a cold and humid atmosphere to one warm and drier, but it by no means follows from this, that a greater amount of benefit would not be obtained from the one than the other, when after an investigation into the circumstances of any given case, due discrimination is made in the choice of a winter residence. Thus a patient might be benefited by a residence for a period in Rome or in Palermo, though the climates of these two places differ materially in their nature, and yet in his case the climate of the one might be more particularly indicated than that of the other. Again, as I have already had occasion to remark, a change to a climate of a somewhat different character, may be advisable, in the course of a single winter, either on account of the climates of places undergoing considerable changes in the course of these six winter months of the year, or on account of the prejudicial effects which result in some cases from a too prolonged stay in the same kind of climate, even though it may have at first proved favourable.

Although winter is the season of the year when attention to climate is more imperatively required, on the part of invalids labouring under pulmonary disease, yet the choice of summer places of abode is highly important, though too often but little considered; most patients, instead of seeking an appropriate locality where they might probably be making progress towards recovery, being satisfied with remaining stationary at this season. It is true, that as far as mere temperature is concerned, provided the heat be not so great as to relax the system, many places in which a residence would be prejudicial in the cold season (as the patient's own home), might suit very well in the summer; but in general patients would derive advantage from passing at least some weeks at places which contain mineral springs of a character suited to their cases, where the air is generally pure, and where they would meet with mental recreation.

Mineral waters taken internally, and used in the form of baths, vapour, &c.—when there exists no positive counter-indication—powerfully conduce to improve the mass of blood—when vitiated from any cause—not only by means of the derivation produced towards the skin, but likewise from the absorption of their constitutional principles; and their action upon the system brings pa-

tients under the most favourable conditions for deriving permanent advantage from the influence of climate, at a later period of the year.

"Mineral waters," says M. Baumès, "can alone produce in the economy general effects which profoundly modify morbid diathesic states. In fact, the excitation usually induced by those waters, the increased activity of the exhalant and secreting functions of certain textures or organs which are more especially charged with relieving the economy of the mineralizing principles which they introduce into it; the interstitial absorption which is likewise rendered more active in textures, and is brought into due relation with the increase of the exhalations and secretions; these are powerful modifications imparted to the nature of different morbid states. This, added to suitable exercise in the open air, which is generally pure, and to a regimen which is often altogether different from that which the patient had been pursuing at home, are hygienic circumstances which cannot but ameliorate the composition of the blood, and profoundly modify the vicious tendencies of vegetative life—on the one hand destroying or diminishing the habit of fluxionary movements inherent in the diathesis; on the other, preventing these movements from assuming a fatal form. If to the internal use of mineral waters, be added their external employment in the form of bath, vapour bath, &c., we shall obtain, independently of the effect of their absorption by the skin, the last powerful modification which these agents are calculated to produce on the cutaneous functions, viz., increase of the insensible perspiration and sweat, which are true depuratory discharges. The tendency to internal flexionary movement is destroyed by their being directed to the skin in the increased activity imparted to a normal function." "Climates," likewise observes this author, "exert upon the appearance, development, progress, and termination of the diatheses, a well-known influence. The transition from one climate to another singularly modifies the course of diatheses. It is generally in an unfavourable sense that this modification takes place on passing from a warm to a cold, and especially to a cold and damp climate, and favourable on passing from the latter to the former.

"Many diatheses are remedied by the action of a warm climate, because the organism naturally tends to release itself from the germs of disease which oppress it; to impart a more favourable direction to noxious vital concentrations and to fluxionary movements established in internal organs, especially when it is placed under the most favourable conditions for promoting the activity of the vital actions of exhalation and secretion, which are effected by the skin."[1]

Except in as far as they are connected with climate, it is foreign to my purpose to enter upon the consideration of the action of mineral waters in pulmonary consumption, to which, in an advanced stage, they are but little applicable; but at an early period of the disease, when the object sought to be attained is a cure by improving the condition of the blood, this may be best

[1] Baumès, Traité des Diatheses.

effected, in some cases, by gaseous chalybeate waters, when tonics are not contra-indicated—in others by alkaline thermal, or by sulphurous thermal waters. Of the continental alkaline springs, which enjoy a considerable reputation in diseases of the lungs and air-passages, may be particularly mentioned those of Ems, which are more especially indicated in cases where a sedative action is required; to this effect the climate of the valley in which the village is situated conduces, being in summer warm, and somewhat relaxing. The saline waters of Mont d'Or, in France, have likewise for a long period enjoyed much reputation in consumptive complaints. These springs rise in a mountainous district, at a considerable elevation above the sea, and as respects climate, the place is altogether under opposite conditions to those of Ems, the air being cool, and even at times cold in summer, and subject to great variations of temperature. Rain likewise frequently falls at this season. The principal part of the treatment consists in effecting a powerful derivation on the skin; copious sweat being produced after each bath. The physician inspector in his report speaks highly of the results of this treatment in cases of chronic bronchitis, and in the early stage of pulmonary phthisis, and I experience no difficulty in crediting his assertions, the principles of the treatment being in accordance with those which I have advocated as being most calculated to procure the removal of tubercular cachexy.

Several of the sulphurous springs which rise in the French Pyrences have likewise been a good deal used in cases of consumption in its different stages. Sulphur taken internally, and absorbed by the skin, constitutes one of the best remedies for diseases depending upon an abnormal condition of the blood, which it tends to purify by directly inducing beneficial changes in its composition, as also by increasing the activity of the capillary circulation and of the cutaneous secretions. Among the most celebrated of these waters, are Bagnères-de-Luchon, Cauterets, and the Eaux Bonnes; of these, the latter are most frequented by patients labouring under pulmonary disease. This bath is situate in the mountains, at an elevation of 2,300 feet above the sea's level; the air is pure, though but little agitated by winds, on account of the lofty mountains by which it is almost entirely surrounded. "The climate," says Dr. Taylor, of Pau, "is more sedative than that of other *sulphurous* baths of the Pyrenees, which circumstance, joined to the unirritating quality of the waters, constitutes an efficient remedy, even when the lungs are diseased, by allaying pulmonary irritation. The Eaux Bonnes may be taken, notwithstanding the presence of urgent chest symptoms, in cases where under similar circumstances we would not dare to prescribe the waters of Cauterets."[1]

That many patients affected with phthisis derive great advantage from their sojourn at the Eaux Bonnes in the summer season, cannot reasonably be doubted. I have known some, with considerable disease of the lungs, who have been greatly benefited; but these waters are the least sulphurous of all

[1] On the climate of Pau, &c., London.

those of the Central and Western Pyrenees; they are not used in the form of bath, and the doses which the inspector prescribes rarely exceed three or four glasses daily. Under these circumstances, I have no doubt that too much has been ascribed to the action of the waters, without sufficient account having been taken of the effects which must necessarily be produced upon the system in general, and upon the state of the blood in particular, by patients living in a pure and rarefied air, at a considerable elevation, and in a sheltered position, during several weeks of the most favourable season of the year.

At Cauterets, baths and half baths are frequently combined with the internal use of the water, in cases of pulmonary disease. By these means a revulsive action is produced upon the surface and upon the lower half of the body, to which much of the benefit derived from these waters is ascribed. Cauterets lies 3,000 feet above the sea's level. Its atmosphere is more invigorating than that of the Eaux Bonnes, and is consequently well calculated to remedy a state of tubercular cachexy when not too far advanced.

Bagnères-de-Bigorre occupies a delightful situation in the plain at the foot of the mountains, not far from the other Pyrenean baths. Its climate is of a sedative nature, and, though often producing a depressing effect upon persons in health, it is well suited to many consumptive patients in whom there exists a state of general or local excitation. In this respect, Bagnères presents a contrast to Capbern, which is situate a few miles distant, on elevated ground, and where the air, without being sharp, as is the case with the baths placed on a higher level, is yet pure and bracing. The waters of these two baths are slightly saline, and are not calculated to be of material service in cases of pulmonary disease.

Many delicate persons, as also several of those in whom there exists a predisposition to phthisis, but who do not experience inconvenience from slight atmospheric variations, would find the coasts of the North Sea or of the Atlantic not unsuited for a summer residence—as Biarritz, Dieppe, or Boulogne, in France, Brighton, and other places of resort on the shores of England.[1] In some cases, where there is a sufficient amount of strength, for invalids to undertake excursions, on foot or horseback, in a mountainous and diversified country (as Switzerland or Scotland), would be attended with advantage.

[1] A young clergyman, with a slight degree of tuberculization of the lungs, whom I recommended, last summer, to use one of the sulphurous waters of the Pyrenees, and to pass the winter in Italy, became so much worse at Pau, that he was pronounced by two physicians to be in an advanced stage of phthisis. On arriving at the Eaux Bonnes, he had great weakness, incessant cough, bloody expectoration, fever, and sweat, every evening. He got somewhat better in the course of a fortnight, when his relatives removed him to Biarritz. On passing through Pau, he again suffered from the depressing effects of its atmosphere, but, after a short sojourn at Biarritz, he improved so greatly as scarcely to be considered an invalid, and, except on very boisterous days, was able to take daily exercise out of doors, at the end of November.

V. CONCLUSIONS.

It appears to me, from what has preceded, that we are authorized to adopt the following conclusions :—

1. Tubereulous disease of the lungs is curable in an indefinite proportion of eases, which proportion would doubtless be greatly increased by the more general employment of climate, and other hygienie and remedial means, to which recourse has been had up to the present time, only in exceptional eases, frequently when the disease has arrived at too advanced a stage to derive permanent amelioration from the use of any means. Even when a eure is not practicable, the progress of the organic lesion may often be arrested or retarded by the suitable employment of these agents.

2. The formation of tubercle depends, most probably, upon an impoverishment of the blood, characterized more especially by a diminution of the normal amount of its globules, together with an alteration in its composition; occasioned chiefly by deficient activity of the skin—considered as an excrementitial organ—whence substances are retained in the blood which ought to be eliminated from it, some of which, chemical analysis has detected the existence in tubereulous matter—and also as a supplementary organ to the lungs in the function of respiration.

3. Statistical documents, as well as the investigations of impartial observers, have shown that pulmonary consumption occurs, much more frequently than elsewhere, in countries and localities where a humid state of the atmosphere predominates, and also that it prevails chiefly among those classes of the population who are most exposed to this and other influences which tend to depress the vital powers—particularly the activity of the capillary circulation —and, consequently, to vitiate the blood by suppressing the cutaneous transpiration (sedentary mode of life, prolonged anxiety, grief, and other depressing emotions, &c.).

4. On the other hand, tubereulous diseases are of comparatively rare occurrence in cold and dry climates where the energy of the circulation, and of the cutaneous functions, is maintained by the substantial food, and by the active mode of life, of the inhabitants, which suffices to preserve them, in great measure (as respects pulmonary consumption), from the pernicious effects of the inclemency and variations of the weather to which they are continually exposed. Consumption is likewise rare in warm and dry countries where the inhabitants live a good deal in the open air, and where the insensible perspiration is kept up, without muscular effort, by the influence of the climate. On the other hand, it is frequent among the natives of several countries where the climate is hot and moist (the West Indies, &c.), on account of the relaxation of the system, and of the repression of the insensible perspiration, produced by the combined agency of heat and moisture.

5. In some localities favoured in point of climate, though tubercular

phthisis is seldom met with among the inhabitants in general, it may nevertheless be tolerably frequent among those of the lower orders who are exposed to the influence of the anti-hygienic causes which mostly tend to induce tubercular cachexy in all countries. Many individuals, in such localities, as well as soldiers serving at stations where the mortality from consumption is small among the general population, nevertheless die from diseases of the organ of respiration simulating phthisis, which are often erroneously considered as such.

6. The chief indications in the treatment of pulmonary tuberculization by means of climate, are, first, to remedy as far as possible the morbid condition of the blood, which constitutes the cachectic state, and, by this means, to prevent or to arrest the formation of the morbid product; and secondly, to allay the general and local excitation occasioned by the organic lesion. These indications are not unfrequently opposed the one to the other, and in many cases the practitioner is obliged to restrict himself to endeavouring to fulfil the second, and to palliate the symptoms by pharmaceutical remedies.

7. Change of air, and a residence, more or less prolonged, in warm countries during the winter—the selection being determined by the particular circumstances of individual cases—ought to be considered as the means best calculated to fulfil the first indication, and should be recommended in all chronic cases as early as possible.

8. The beneficial influence of climate in arresting the progress of pulmonary tuberculization, would be so much the more marked in proportion as the disease is recent, and as the patient could be the more speedily removed from the influence of the causes which may have contributed to produce it.

9. The localities which would generally be best suited for the winter residence of patients labouring under pulmonary phthisis, in the early stage, are those which, together with a suitable climate, possess resources for mental occupation and diversion, which would induce them to pass a great portion of their time in the open air, avoiding, however, occasions of fatigue.

10. A prolonged residence in any place where the temperature is very equable and the atmosphere calm, is not advantageous to patients when it is a question to procure the restoration of the blood to its normal state. On the contrary, a moderate agitation of the atmosphere is favourable to them by exciting the insensible perspiration, and by making them, so to speak, breathe by the skin as well as by the lungs.[1]

11. The choice of a climate should be determined by the patient's temperament, the condition of the system, and the more or less advanced state of the disease. In general, warm and dry localities best suit persons of a lym-

[1] An attaché to the British legation, at Turin, presenting all the signs of tubercular cachexy, was remarkable, at Nice, four years ago, for the hardihood with which he exposed himself, with his neck almost bare, to the vicissitudes of the atmosphere. Last year, I saw him at Frankfort, to which place he had been transferred, and where, notwithstanding the severity of the winters, he enjoyed good health.

phatic or scrofulous constitution where the circulation is languid; these are, on the other hand, often too exciting for individuals of a sanguinary or nervous temperament, in whom there is irritability of the air-passages, a disposition to inflammation or to hæmoptysis, with acceleration of the circulation. Such patients would more frequently find themselves better where the atmosphere is somewhat moist, not liable to great transitions, and of which the action is consequently sedative.[1] A similar climate is likewise better adapted to patients in the more advanced stages of the disease, when it is deemed advisable to recommend them a change of climate.

12. Most persons with pulmonary consumption, who are natives of northern countries, would be benefited by a residence, during a part or the whole of winter, in a warm climate, even though it were humid—provided the disease were not too much advanced—from the mere passage from a cold to a milder temperature. Many patients, in whom there exists a state of general or local excitation which requires the employment of sedative remedies, would derive permanent advantage from the action of a warm and moist atmosphere, which would tend to allay irritation and diminish the amount of bronchial exhalations; but the too prolonged influence of such an atmosphere, by relaxing the system, would render most patients liable to an aggravation of the disease, if, on changing the place of their abode, they exposed themselves to the action of a climate having a different character, or of any of the accidental causes of the disease.

13. In many cases of incipient tuberculization, in order to derive all possible advantage from the influence of climate, we should, so to speak, regulate the doses either of stimulation or of sedation. As the sedative action of an equable temperature and a moist atmosphere would, in many cases, be advantageous up to a certain point, and afterwards prejudicial; so, in like manner, that of a dry and exciting climate, which may at first have been favourable, when too much prolonged, not unfrequently causes an aggravation of the symptoms, and sometimes a state of general irritability, which, notwithstanding the use of remedies, persists or increases, unless the patient be transferred to a climate more suited to his actual state; which, however, is frequently not practicable.

[1] A young officer of nervous temperament became consumptive, in consequence of fatigue and exposure to damp, while at the camp at Chobham. He was sent to Malaga, where I saw him. He had the characteristic pallor of the diseased condition of the blood, hectic fever, and night-sweats. The pulse was quick, and the cough almost constant. Auscultation indicated the presence of tubercles disseminated throughout the lungs, rather than agglomerated in a limited portion of them. The disease made rapid progress, and he died in the course of a few weeks. On the other hand, a young lady of lymphatic temperament, having tubercles in a quiescent state, in the summit of both lungs, derived great advantage from the climate of Malaga, and was able to pass the last winter in England, being, according to the latest accounts, greatly better in health.

14. Among the climates most in repute for their efficacy in retarding the progress of pulmonary consumption, there exists a considerable variety with respect to equability of temperature, the state of dryness or moisture of the atmosphere, the degree of warmth, etc. The climates of Upper Egypt, the southeastern coast of Spain, are the most remarkable for their warmth and equability in winter, as well as for the dryness of their atmosphere. To these climates, Hyères, Nice, Menton, Malta, and Naples, approximate nearest as respects dryness, though differing materially in other respects. The West India Islands and Cuba may be mentioned as a type of hot and moist climates. Among the intermediate climates characterized by variable degrees of warmth, equability, and humidity, are Madeira, Algiers, Pau, Pisa, Rome. The three latter have a sedative action, often depressing the vital powers of persons in health, as well as of many invalids.

15. The atmosphere of marsby localities, where endemic intermittent fevers prevail, is neither preservative nor curative of pulmonary consumption, as has been supposed by some physicians, this disease being tolerably frequent in many of these localities.

16. A residence in the places whose climates are best suited to the particular cases, exerts not only a directly advantageous influence in arresting or retarding the progress of the disease, but likewise, inasmuch as patients are thereby placed under the most favourable hygienic conditions, for promoting the efficiency of remedies which would otherwise be inefficacious.

17. Sea-voyages are often beneficial in the early stage of pulmonary tuberculization, when patients do not labour under urgent symptoms; when the strength is not much diminished; when they have a taste for voyages, and are not likely to be prejudicially affected by the monotonous mode of life usually led at sea, and provided there be no grounds for apprehending the exhaustion frequently produced by sea-sickness in long voyages.

18. The advantage which patients sometimes derive from sea-voyages mainly depends upon the continued renovation of a pure air, which acts as a tonic, promotes the insensible perspiration, and the activity of the other functions of organic life. The saline impregnation of the sea air may possibly somewhat conduce to its strengthening effects, though it has not been demonstrated that a residence near salt-works, and the inhalation of an air strongly impregnated with saline vapour, has been followed by special beneficial effects in cases of consumption.

19. Land travelling through an agreeable country is better suited to consumptive patients in general than are sea-voyages, because, in addition to the effects produced by renovation of the air, it acts in a favourable manner on the *morale* of those invalids in whom it does not occasion too much fatigue; it can be undertaken in the society of parents or friends; those who travel by land can stop where they please, and they have within reach the medical assistance which their cases may require. It is only, however, when land

travelling is undertaken in suitable weather, and by easy stages, that it can be expected to be attended with benefit, and with comparatively little risk.

20. The climate of several places possessing mineral springs is very favourable to many patients affected with tubercular disease, in the summer season. The operation of appropriate mineral waters—when these agents are not contraindicated—powerfully tends to improve the quality of the blood when vitiated, and to increase the activity of the various secretions, especially those of the skin. It imparts a salutary impulsion to the movements of the economy, and prepares patients for deriving the greatest possible advantage from the influence of a suitable winter climate.

APPENDIX.

NOTICES OF SOME OF THE PLACES MOST FREQUENTED ON ACCOUNT OF THEIR CLIMATES, IN THE SOUTH OF FRANCE, ITALY, ETC.

THE following brief notices of the leading peculiarities by which several places of resort are characterized, are derived in great measure from my own observation, and from the information acquired from local authorities and other available sources during the periods of my residence there. They may perhaps suffice to indicate in a general way, and in the absence of more detailed accounts, the localities suitable to many patients labouring under tuberculous disease.

PAU.

Pau presents many advantages as a winter residence for several invalids, being situate near the mineral springs of the Pyrenees, where there are always in the summer a great many persons whose state of health requires later in the season the beneficial influence of a mild climate. It is easy of access from the more northern parts of France by means of railroad communication with Paris—brought within a six hours' drive. Occupying part of an elevated plateau, which overlooks a picturesque valley fertilized by the *Gave* or mountain river of the same name. Pau consists principally of a long street terminating near the old castle—celebrated for its historical associations—of short divergent streets, and two Places, of which the one (Henri IV.) is very large, the houses being built on colonnades; the other (Royale) has only houses on three sides, the fourth forming a terrace facing the south, whence a rich and varied panorama is displayed to the view, encased towards the south by the chain of the lofty Pyrenees, and on the southwest by the verdant slopes of Carançon. The town is lighted with gas; it possesses a public library, a *cercle* where the principal French and English papers are received, libraries for the loan of books, and a theatre. There is an agreeable, though not *bruyante* society in the winter season. The population amounts to about 14,000 souls. A park wall, sheltered by lofty trees, extends from the chateau to the distance of half a league parallel with the valley, and at a considerable elevation above it. The environs are extremely

interesting, and the roads are maintained in a good state. Riding is very general among the visitors.

A prolonged sojourn at Pau would, however, not unfrequently have a depressing effect upon persons out of health and unable to take part in the pleasures of society, as, except the salons of the *cercle*, there is no place of *reunion* in the evening, or for exercise in bad weather, and it rains a great deal at Pau; so that persons in health, and more especially invalids, are often deprived of the source of outdoor exercise, and are obliged to confine themselves to their apartments.

The climate of Pau is relatively mild, less warm than that of Provence, but also less liable to great variations of temperature. It is milder, and, at the same time, on account of its elevated position and the absorbent nature of its soil, less humid than the other towns in that part of the country.

It is sheltered on the north by the Landes of Pont Long, which gradually ascends in that direction to a distance of five or six leagues.

High winds seldom occur, and are but of short duration. A principal characteristic of the climate is the calmness of its atmosphere. Sir James Clark, in his work on climate, states the mean annual temperature to be only four and a half degrees higher than that of London, and five lower than Marseilles, Nice, and Rome. In winter, it is two degrees warmer than London, six colder than Nice and Rome, and eighteen (Fahrenheit) colder than Madeira; but, in spring, Pau is six degrees warmer than London, and only two and a half colder than Marseilles and Rome. The daily range of temperature at Pau is seven and a half degrees, at Rome eleven. Schouw, in his meteorological tables, states 135 as the mean of rainy days in the year; and Dr. Taylor, in his work on the climate of Pau, admits that the amount of rain is as great, if not greater, than in London. Rain seldom, however, continues for more than two days at a time, the ground dries rapidly, and the atmosphere generally is but little laden with moisture. The west wind blowing directly from the Atlantic is accompanied by rain. The wind from the northwest, and from this point to the northeast, brings dry cold weather; while that from the northeast to the south is usually attended with clear mild weather. The south and southwest winds are warm and oppressive. The westerly, or Atlantic, are the most prevalent winds. The north wind is not frequent, and blows feebly. Dr. Taylor contrasts the climate of Pau with that of Nice as being of a directly opposite nature. "It has the effect of diminishing the nervous energies, and of inducing nervous congestion in internal organs. Strangers in health complain of languor and indisposition to exertion, a feeling of fulness in the head, and oppression at the epigastrium. Hence, in all diseases of an atonic character, in a depressed and relaxed state of the nervous system, and in congestive diseases, the climate is injurious." It is, on the other hand, beneficial in many chronic affections of the larynx, trachea, and bronchia, of an erethetic character. As respects patients labouring under tubercular disease of the lungs, though the climate of Pau may be

less calculated than one of a different nature to fulfil the indication of ameliorating the abnormal condition of the blood, it would be well suited to allay irritability in patients of a sanguineous or nervous temperament, with marked acceleration of the circulation, to whom a prolonged residence in warmer or drier climates would be too exciting or enervating, and who do not require in the place of their abode much variety of resources for occupation or recreation.

HYÈRES.

The aspect of the greater part of Provence is rather dreary and monotonous from the comparative deficiency of trees (except the olive) and of vegetation, consequent upon the dryness of the climate. The heat in summer is almost unbearable; the roads are thick laid with dust, which, during the prevalence of winds, is raised in clouds. Though the temperature in winter as marked by the thermometer, is not low, the air is sharp and often cold, the strong northwest wind (*mistral*) is not unfrequently painfully experienced, especially in January, February, and March. In spring the sun acquires great power, and its influence alternating with the occasional cold winds produces frequent and rapid changes of temperature, very trying even to those in health. The rains fall at irregular periods, last during several days or weeks, leaving a long interval of fine weather, during which the sky is bright and clear. The best seasons for residing in this part of France are from April to the middle of June, and from September to the end of November.

Hyères presents an exemption from some of the disadvantages of the general climate of Provence. It is about an hour's drive from Toulon. On approaching through olive plantations and vineyards, the attention is attracted by the extensive ruins of its ancient castle and walls, crowning the hill at the base of which the town lies, and by which it is sheltered from the north. Passing in front of the large hotel Iles d'Or, the chief street being the high road to St. Troper, is traversed. About the centre is a terrace, with five magnificent palm-trees, commanding a delightful view of the plain, with its rich and varied vegetation of olives, oranges, palms, cypresses, &c., extending to the sea, which is four or five miles distant. The islands of Hyères, about two leagues from the Roie, add to the beauty of the scene. Opposite the terrace is a small library, but indifferently provided with books, and adjacent are the two other principal hotels, De L'Europe and Des Ambassadeurs. In the former is a saloon appropriated to the *cercle*, where the leading French journals are received. At the extremity of the street is a Place of very ordinary appearance. The divergent streets are narrow and badly paved. The resident population amounts to 10,000 souls.

The lodgings and general accommodations are inferior to those found in most places of resort, and the sheltered space for outdoor exercise is but limited. Though protected from the north winds, which are severely felt in the neighbouring districts, Hyères is a good deal exposed to the *mistral*,

which prevails more especially during the latter part of the winter and in early spring.

The only medical accounts published of late years is that of M. Honorates, who admits that the town is exposed to the northwest, and says, moreover, that it is not sufficiently sheltered from the east. The orange and lemon-trees are smaller than at Nice. Rain in autumn and fogs are not unfrequent. In winter there is a long succession of fine weather. The temperature is not subject to so much variation, and there is less difference between the sun and shade than at Nice. The number of rainy days is said to be not more than forty in the year.

The climate of Hyères is well adapted to many cases of pulmonary consumption, on account of the purity and dryness of the air, which is less agitated by winds than that of places directly lying upon the sea slope. The want of promenades and of resources, as well as the inferiority of the accommodation, will, however, be sufficient inducements for those persons to whom this kind of climate is applicable, to prefer Nice. Those who seek repose, and who purpose wintering at Hyères, would be less exposed to wind if lodging near the terrace, and eastward than at the entrance of the town.

The small town of Cannes, on the opposite side of the Estrelles (part of the maritime Alps) has been a good deal frequented of late years by those desirous of a quiet winter residence in a mild climate. It is sheltered from the *mistral*, though somewhat exposed to the east. It lies on the high road to Italy, and has a population of 4000 souls. The environs are agreeable, though having only lately come into notice, Cannes is very deficient in accommodation.

NICE.

Nice, in the Piedmontese territory, occupies a picturesque position on the sea-shore, about a league distant from the French frontier; it possesses a population of 40,000 souls, independently of a large garrison. The greater part of the town is separated from the port by a rocky hill, rising precipitously from the sea, and surmounted by the ruins of a fort. A parapeted road, cut round the rock, at some elevation above the sea, forms the principal means of communication between the two ports. The Place Victor, a spacious square, and some new streets, lie to the north of the port; the old town and the new streets, inhabited by visitors, to the west. The streets of the old town are lined with shops, and, with one or two exceptions, are not wide enough to allow the passage of a carriage. The Corso, a public promenade parallel with the sea and planted with trees, and the adjacent streets, contain some good houses, which are let to visitors. A long range of low buildings, consisting of shops and cafés, separates the Corso from the beach. Their flat roofs form spacious terraces, extending from the Castle Hill to the Boulevard du Midi, which is the usual afternoon promenade. A river, or rather the dry bed of a river (the Paglion) forms the limits of the town on

the west. The houses on the opposite quay are (next to those on the Boulevard du Midi) most sought after; here are the principal hotels. Beyond this quarter is the suburb of the Croix de Marbre, which extends a considerable distance westward along the high road to France, and contains several large houses, to which orange gardens leading down to the shore are attached. A promenade (Chemin des Anglais) is continued along the beach close to the garden wall.

The environs of Nice are delightful; the soil is extremely rich in vegetable productions; various kinds of flowers, the olive, pomegranate, lemon, orange, almond, and fig, grow luxuriantly. Upon the top of the Castle Hill a charming prospect is presented of Nice, with its numerous villas, gardens, orange plantations and olive-clad hills, its beautiful bay, and the lofty mountains which shelter it from the north, and to which it owes its advantages of climate, while immediately beneath, the houses of the old town, thickly clustered together, contrast pleasingly with the beauties of the scenery by which they are surrounded.

Nice presents a good many resources for occupation and amusement. There is a *cercle* with a good library and reading rooms (the principal French, English, and Italian papers being received), rooms for cards, &c., and concerts; two good libraries, with reading rooms, Visconte's establishment, a tolerable theatre where Italian operas and French dramas are represented. The Church of England service is performed by a resident clergyman, before a tolerably numerous congregation. Excursions are frequently made on donkey or horseback among the hills and valleys of the neighbourhood, and to more distant points, among which may be particularly specified, Villefranche, which is separated from Nice by a steep hill. The little town is almost surrounded by olive-covered hills, and being sheltered from all cold winds, its climate is warm and equable. It possesses a spacious harbour which can admit the largest vessels; but there is no accommodation for visitors.

Nice has long been resorted to by invalids, for the sake of its winter climate, which differs materially from that of Provence, inasmuch as it is less dry, and is sheltered from the north winds and from the *mistral* by the maritime Alps, and the Estrelles, which terminate at the sea westward; but still it is at times, especially in spring, liable to cold winds, and to the transitions which, without great precautions, render a residence in the south of Europe not unattended with danger to invalids. Hence much discrimination is required in the selection of cases likely to be benefited by its climate, as also in the choice of a residence, and as respects the proper period of remaining there. The season at which the greatest amount of rain falls (autumn) is generally over when strangers begin to arrive; and the months of November, December, and January are usully fine and warm, the temperature being seldom lower than 45 degrees in the daytime, and sometimes as high as 60 in the shade. The sky is mostly cloudless, of a deep blue, and the sun is often powerful in the middle of the day. The general character of the air is light,

dry, and exciting, and the climate is consequently suited to most persons of a torpid or relaxed habit. Cold winds occasionally occur in these months, but are most felt in the spring, when they occasionally blow sharply over the mountains, at that period still covered with snow, while, at the same time, the sun acquires great power, rendering the climate extremely trying to invalids labouring under disease of the lungs and air-passages.

The mean temperature may be estimated as follows: winter, 7.7; spring, 14.4; summer, 18.6; autumn, 10.3; that of the year being 12.7 (Reaumur). In winter there is a difference of from 12 to 24 degrees between the temperature of places exposed to the south and the north, between those in the shade and in the sun, and especially between those sheltered spots and those which are freely exposed to the air, or in the shade.

The most frequent winds at Nice are the southeast, the north, the east, and northeast; the rarest are the west, the north, northwest, west-southwest, south-southeast, and south-southwest.

"The greatest quantity of rain," says the local writer from whom the above statement is taken, "may be estimated at 43 inches in the year; the smallest at 16, the mean quantity at 26. The maximum and minimum of rain which falls in the four seasons is usually in the following proportions: winter, from 4 to 7 inches; spring, 4 to 8 inches; summer, 2 to 7, and in autumn, from 6 to 10. It is by no means a rare occurrence to see fall at certain periods of the year, especially at the equinox, great and continued rains, producing five cubic inches of water in less than twenty-four hours. The mean of rainy days in the year is 30."[1]

From the general remarks on the effect of climate it may be inferred that the winter climate of Nice, or of its environs contrasting forcibly with that of the countries in which tubercular cachexy is most frequent, would tend to accomplish in many cases of incipient consumption, or of a predisposition to the disease, the objects chiefly sought to be attained by means of this remedial agent in favourably modifying the abnormal condition of the system. The sunshiny days, the purity and relative dryness of the air, the variety of the scenery in the environs, the cheerful society met with, presenting many inducements to invalids to be much out of doors, cannot fail to produce a beneficial influence upon their physical state and mental disposition.

The climate is more especially indicated in cases where the patients are of a lymphatic or torpid habit, or where a scrofulous constitution is connected with tubercular disease, who are not very susceptible to be affected by atmospherical variations within a moderate range. To patients of an excitable temperament, or where there exists much irritability of the respiratory organs, with a tendency to recurring hæmoptysis, it would generally be prejudicial, though to many patients with whom a residence in the town or suburb near

[1] Roubandi. Nice et ses Environs.

the sea would disagree, the more sheltered and equable climate of the villas under the hills of Cimiez or Carahaeel would not be unsuited.

It is advisable for most invalids with pulmonary disease, not to remain at Nice throughout the spring, hut to proceed further into Italy, or to some more suitahle climate, or if remaining, to reside in one of the more sheltered localities of the environs.

MENTON.

Ahout five hours' drive from Nice on the Genoa road is Menton, which is remarkahle for the mildness and equability of its climate. It consists principally of a street along the shore through which the road passes, inhahited by shopkeepers and artisans. Possessing no resources for occupation, notwithstanding the beauty of its site, Menton is only occasionally visited hy invalids.

Foderé, in his *Voyage aux Alpes Maritimes*, said of it: "The country is beautiful, the climate mild, the inhahitants well-mannered, yet after having seen the little there is to see, one feels a strong desire to go further on."

Though having a southern aspect, and being exposed to the sun's influence during the greater part of the day, there are but few houses where strangers could be accommodated.

Several patients after wintering at Nice, and desirous of seclusion, might pass with advantage a few weeks in the spring at Menton, in one of the hotels, where the accommodation is tolerahle. The climate would be best suited to persons suffering from pulmonary disease in an early stage, accompanied with great susceptihility of the air-passages to atmospherical variations; though to some of these patients where the circulation is accelerated, and the cough and dyspnœa are urgent, a more humid atmosphere would be better adapted. In many cases, on the other hand, the warmth of Menton, and the comparative deficiency of free ventilation, would be attended with enervating effects, as may he inferred from the general appearance of the natives, who are for the most part of an indolent or lymphatic temperament, with a tendency to *embonpoint*, and of placid disposition.

PISA.

Ahout five leagues distant from Leghorn—fifteen from Florence (with which cities it is connected by rail)—and two from the sea, Pisa lies, in an extensive, plain, which after heavy rains is partially covered with water, on which account intermitting fevers were formerly prevalent; of late years, however, drainage has improved the saluhrity of the district.

The town is of considerahle extent, being inclosed by high walls, and is divided into two unequal parts hy the Arno, which flows through it with a semicircular bend. The quays are handsome, the streets wide, clean, and,

as in most towns of Tuscany, are paved with flag-stones. When formerly the capital of a republic, the population amounted to 150,000 souls; it does not, however, now exceed 20,000, which circumstance imparts to the town a melancholy and deserted aspect. Three stone bridges cross the river. The principal movement is along the northern quay (Lung' Arno), which has a southern exposition, and is the only part where invalids reside. Pisa possesses an Academy of Arts, a university, a large public library, subscription reading room, and a handsome theatre where operas are given. It is, however, but indifferently provided with promenades, with the exception of the *Cascina*, an extensive park two miles distant, with fine avenues of oak and poplar-trees.

Pisa is in great measure sheltered from the north and east winds, by a range of mountains which rise some miles off to an elevation of 3000 feet. The winter climate is considered, next to that of Rome, the mildest and most equable in Italy. The plain being fully exposed to the southern winds blowing from the Mediterranean, and over marshes, the siroceo is at times unpleasantly felt. Rain is more frequent than in most towns in Italy. The quantity has been estimated at nearly as much as falls in the rainy county of Cornwall. It must, however, be borne in mind, that as the rain falls in large quantities at a time (great part in autumn), the weather is less variable than in England, and longer intervals of fine weather occur. Rain falls on an average on 160 days in the year. The concave bend of the Lung'Arno, concentrating the sun's rays, includes a climate peculiarly warm, differing by many degrees from that of other parts of the town, where cold winds are often severely experienced, especially in the early part of spring. The mean winter temperature is 7.82 (centigrade scale), spring 14.82, autumn 17.31. The general temperature of Rome is somewhat higher in winter than that of Pisa, but much lower than that of the Lung'Arno. In spring Pisa is better sheltered from cold winds than Rome; the winds most prevalent at Pisa being the west, south, and southwest, which last is usually charged with moisture. This kind of climate agrees well with many patients suffering from pulmonary disease, having the character of excitability, and is therefore opposed to that of Naples or Nice, which is better suited to the chronic forms of disease where there is but little irritability of the air-passages. Invalids would, however, often come depressed in spirits from a prolonged sojourn in Pisa, on account of the dulness of its aspect, and the few resources which it presents. A few weeks in the spring are not unfrequently advantageously passed at Pisa, by persons who have been remaining great part of the winter at Nice, and who thus partly avoid the cold winds which prevail at that place without being sufficiently long in Pisa to be affected by the more relaxing influence of its atmosphere. For those who, together with a mild climate, require recreation and amusement, Rome is preferable, though many find Pisa agree better with them for a prolonged sojourn than the calmer air of Rome.

ROME.

The valley of the Tiber is inclosed by two ranges of diverging hills. The mounts Pincian, Quirinal, and Viminal, constitute the eastern limit of Rome; the mount Mario, and the Vatican, which is almost continuous with the Janiculum, forms the limit on the west; whilst on the south are the Aventine, the Capitol, and the Esquiline. The river makes a considerable bend, of which the concavity is directed towards the Pincian and Quirinal hills; its banks being rather low, the adjacent grounds are not unfrequently inundated after heavy rains; the inundation sometimes extending into the city.

Rome is surrounded by high and massive walls; the streets are for the most part narrow, and are often dirty, except in the neighbourhood of the Piazza di Spagnu, the quarter in which strangers almost exclusively reside. The fixed population amounts to 170,000 inhabitants.

Apartments having a southern aspect are more difficult to be obtained in the circumscribed strangers' quarter, than in other towns in Italy frequented in winter, which, like Nice and Naples, are built along the shore, or like Pisa, where the visitors' quarter on the quay of the Arno, is fully exposed to the solar rays.

It is scarcely necessary to observe that Rome possesses more resources for occupation and recreation than any other place of winter resort. These are, however, not unfrequently detrimental to invalids, who are often induced to do more in the way of sight-seeing than they are able to accomplish without risk, and who are likewise negligent in guarding against the variations of temperature experienced at different times of the day, in cold picture or statue galleries, &c.

The environs afford ample scope for horse exercise, and the principal roads for carriage driving are maintained in tolerably good order.

The climate of Rome is milder, and the winter shorter than in most other parts of Italy. The air is soft, comparatively seldom agitated by sharp winds, and is at times oppressive, especially during the prevalence of the sirocco, which, however, agrees very well with many pulmonary invalids. The *tramontane*, or cold north wind, sometimes blows strongly in the winter and spring, usually lasting three days; the neighbouring hills are not sufficiently high to protect the city, and cold winds are the more sensibly felt on account of the general softness and the relaxing qualities of the air, which may be considered humid, as compared with that of the other places of resort in Italy. The most common causes of the moisture of the atmosphere are its state of comparative stagnation; the occasional fogs from the Tiber, and the exhalations from the earth after sunset, which are sometimes so great as to wet the pavement. Within the short space of half an hour at this time of the day, there is a marked difference in the temperature, on which account strangers, and especially invalids, should, when out of doors, be provided with an extra garment.

The mean temperature of the different seasons (by the centigrade thermometer) is as follows: Winter, 8.1; spring, 14.20; summer, 22.96; autumn, 16.40. Sir James Clark (whose tables are computed by the scale of Fahrenheit) states the mean winter temperature to be ten degrees higher than London, seven higher than Pau, and one higher than Nice. More recent observation has, however, shown that the difference between London and Rome is not so great, and that Nice has a winter temperature higher than Rome of more than a degree. In spring the temperature of Rome is five degrees above London, three above Pau, four below Nice, four below Madeira, and about the same as Naples. With respect of steadiness of temperature from day to day, Rome precedes Naples and Pau, but comes after Nice and Pisa. "The inconstancy of the atmospheric conditions," observes M. Carriere, "and a degree of humidity which varies according to the season and the predominance of certain winds, constitute the leading features of the climate. This inconstancy is especially remarkable during the first weeks of winter. At this period the northern winds are in conflict with the southern. Clear alternates with a cloudy sky, and sun with rain. After December, the northern influences predominate. Cold and dry winds are experienced with a certain continuity, but they do not cause much agitation of the atmosphere, and soon give place to antagonistic or collateral winds. The air is tolerably calm, and the sun shines on most days at the beginning of February. The spring is mild, and the weather settled. October is the favourite month of the Romans; abundant rains water the earth, and reanimate vegetation; the sun shining between the intervals of rain imparts the appearance of a second spring. November retains some analogy with October, being characterized by the alternation of rains with sharp cold."[1]

According to Colandrelli, the southeast, south, south-southwest, and the west, the warm and cool winds of Italy preponderate in the proportion of 62 to 100. This preponderance of warm winds is, however, far from having an absolute regularity. The southwest wind from Africa (passing over the sea and Albano) is next in frequency to the south, which meets but little obstacle to its passage. Next in frequency is the north-northeast, which enters by the valley of the Tiber; then the southeast, or sirocco wind, which is less felt at Rome than on the Mediterranean shore. The northwest (mistral) which is powerfully experienced in Provence, and in the bay of Naples, presents the weakest proportion at Rome. The east-southeast and south winds favour most the fall of rain.[2]

The average number of rainy days (from observations made during 37 years) is 114. In this respect Rome may be considered intermediate between the Vale of Arno and Genoa on the one hand, and Nice and Provence on the other. A third more rain falls at Rome than at Nice, somewhat more than

[1] Sur le Climat de l'Italie.

[2] Arinali dell' Osservatorio astronomico.

at Florence, but much less than at Pisa. It appears also that more rain falls in Rome than in London, where the number of days on which rain falls is on an average 178 in the year; the mean quantity of rain being 31 inches, whereas at Rome it is 29 inches. It must, however, be remembered with reference to the number of rainy days, that small quantities at a time, or showers, are very common in England, whereas at Rome, the rain falls more violently, and in larger quantities, in particular seasons, leaving longer periods of fine weather.

On the whole, Rome may be considered the best winter residence in Italy for those patients labouring under pulmonary consumption in the early stages, who are of an excitable temperament, with a disposition to inflammatory action, and much irritability of the air-passages. To those of a lymphatic or scrofulous constitution it is less suited than a drier and a more agitated atmosphere.

Many patients, likewise, who would derive advantage from a two or three months' sojourn at Rome, would be prejudicially affected by the continued influence of its relaxing climate for five or six months. "The moist air of Rome," observes M. Carriere, "diminishes and allays pulmonary irritation, but when there is decided exhaustion, it adds to the weakness, and the powers rapidly decline. A residence in Rome is serviceable only in the beginning of the complaint. From the close of winter to the spring is the most preferable period."

In some cases, as has been already observed, Pisa agrees better than Rome with patients who require a somewhat moist climate. This, however, frequently cannot be known beforehand, until the trial be made. When bronchial or laryngeal inflammation complicates pulmonary tuberculization, the climate of Rome will often conduce to its removal, and be productive of permanently good effects.

NAPLES.

Naples has a southwestern aspect. The city is seen to great advantage from the sea; its white houses extending for three or four miles along the shore, and rising on the acclivity of the hill whose summit is crowned by the castle of St. Elmo. The prospect, comprising the island of Capri, Ischia, and Procida in the bay, with Cape Misenum, on the one side, Vesuvius, and the coast of Sorrento, on the other, is generally acknowledged to be the finest in Europe. Most of the houses are lofty, and the streets in the interior of the town are narrow, of which the inhabitants experience the advantage in hot weather from the exclusion of the sun, though the deficieney of ventilation, and the dirt which is allowed to accumulate, are productive of much disease.

With the exception of the Largo del Castello, there are few spacious places or squares; strangers reside almost exclusively in the parts fronting the bay, viz., Santa Lucia, Chiatamone, Chiaja, and Strada Vittoria. The public garden of the Villa Reale extends along the Chiaja, between the houses and the sea,

and is prettily laid out, with shrubs, and parterres of flowers. Except this garden there is a great deficiency of shady walks at Naples, which, though possessing the resources of a metropolis, and usually delighting visitors on their first arrival, is nevertheless not in general a favourite place of abode for a protracted period. After its interesting environs have been visited, the city is not found to possess the attractions of Rome, whose neighborhood abounds in walks and drives, in which respect Naples is deficient. The usual drive is along the shore, and the continual view of the bay is not unfrequently, after a time, considered to be monotonous. Neither is the vicinity so agreeable as at Rome, which is also better suited to many invalids, and to persons of a retired or contemplative disposition, than the bustle and animation of that of Naples.

The climate of Naples is drier and more exciting than that of the other towns of Italy; it is likewise more than any other (Florence perhaps excepted) liable to great and sudden variations of temperature, especially at the close of winter and in spring, which produce effects so much the more serious on account of the greater impressionability of the system occasioned by the heat of the sun. The mountains near the town are not sufficiently elevated to protect the city from the influence of winds on the land side, whilst from the sea quarter, great part of it is exposed to the northwest (*mistral*), rendered moist by its passage across the Mediterranean. The thermometer in winter often descends lower than the freezing point, and snow on the summit of Vesuvius is not unfrequent. "The two sections of the shore," remarks M. Carriere, "represent two semicircles, backed by the central parts, and consequently do not partake of the same exposition. Thus the one, that which forms the border of the mountainous region, presents its concavity to the west-northwest; the other more particularly to the southwest. The former is exposed to the mistral, which insinuates itself by the ridges of the northern shore of the gulf, and blows violently upon Pausilippo, the quays of the Mergelline, into the limit of this region. It expires at the detour of the quay of St. Lucia, and at the entrance of the Strada Toledo, it is no longer felt; the long ridge of Pausilippo forms a defence against the north wind, the northeast passes through the passages between Capo di Monte, and Capo di China. The east finds an obstacle in the Somma. The southeast and the south pass over the sea-shore of Vesuvius, or traverse the gulf over the mountains of Costellamare and Torrento. The scale of the preponderating influence of the various winds may be thus stated: The southwest, which predominates at Naples, being represented as 5, the south is as 3.5. Compared with the northern zone of Naples, the opposite zone is almost beneficial; the agitation of the atmosphere does not abruptly check by its violence the functions of the skin; it respects the impressionability of the nervous system, and does not affect the thoracic organs."

According to Professor De Renzi, autumn is the season for rain, which falls in the greatest quantity in November and October. In December, north winds preponderate, generally with little rain, the sky being clear. January is even drier than December, but the driest months are July and August, at

which times storms are not unfrequent. The southwest wind brings rain; the south and southeast (*ostro e sirocco*) produce very analogous effects upon the body, penetrating it with a warm and invisible vapour, which depresses the muscular energies and the mental powers. The northwest is strongly felt in the Quarter of Sta. Lucea; its force is somewhat moderated on arriving at the Villa Reale, and in the Mergelline.

The frequent variations from dryness to moisture, and from warmth to coldness, promote the disengagement of electricity.

The mean annual temperature of the city is 16.5; the winter mean, 9.8; spring, 15.2; autumn, 16.8 (centigrade). The west winds modify the local influence in such a manner that notwithstanding the sudden changes in the condition of the atmosphere, the thermometer seldom rises very high, or descends very low.[1]

M. Carriere recommends patients labouring under pulmonary disease to reside in the tolerably wide and airy streets opposite the palace, and the neighbouring squares, which are separated from the sea by some rows of houses; and also in "the quarters with wide streets, between the country which terminates at Capo di China, and the upper end of the Strada Toledo, where the force of the western winds is weakened, and where the air is renewed under the influence of the southeast wind. Few invalids who might be induced to choose Naples for a winter's residence, would, however, be disposed to isolate themselves in these quarters, which are distant from the part inhabited by visitors, devoid of reading-rooms or other resources, and where they would be deprived of the advantage of being able to walk at all times in the public garden without going far from their residences.

A prolonged sojourn at Naples in winter is not generally advisable for patients affected with tubercular disease, though several would derive advantage from staying there for a couple of months at the end of the year, after the cessation of the autumnal rains, or even during great part of January, especially those of a lymphatic temperament, in whom there exists a general torpor of the organic functions. It is scarcely necessary to say that in temperaments of an opposite kind, and where there exists a state of vascular or nervous erethism, the exciting climate of Naples would generally be prejudicial. The constant communication kept up between Naples, Rome, Palermo, Malta, and the East, renders a change of locality comparatively easy to patients without subjecting them to great risk, when such is deemed advisable.

PALERMO.

This city is built on the shore of a vast bay, at the southern extremity of a plain of considerable extent, surrounded on the land side by verdant hills, partially sheltered from the east by the Monte Catalfano, and from

[1] Topographia Medica della Citta di Napoli.

the north by Monte Pellegrino; the hills and environs being embellished with numerous villas. The public garden, the Foro Borbonico (a spacious square), and the botanical garden, are the principal places of resort. The city possesses, however, but few resources for the recreation of visitors, and there is but little society.

Palermo is not much frequented by strangers, the greater number of whom lodge in a large hotel; a few live in smaller hotels, or take apartments, though eligible furnished ones are scarce. The mean winter temperature is higher than that of Naples (11.4); the north winds nevertheless frequently render the atmosphere cold, and are more particularly experienced in February and March. The air is less dry and exciting than that of Naples, and the transitions of temperature are less frequent and sudden.

From the beauty of its situation, its rides and drives, and the greater equability of its climate, Palermo is not an unsuitable place of abode for many patients with tuberculous disease, in whose cases a warm dry air is indicated, during the first months of winter. It would, however, not be advisable for them to remain during the spring, on account of the frequency of cold winds, from which the town is not sufficiently protected, while at the same time the sun's heat renders the system more liable to be prejudicially affected by their influence. The annual amount of rain is stated to be only 21 inches, falling mostly in autumn and winter. If, therefore, the air of Palermo be not so dry as that of Naples, the circumstance must be ascribed to its insular situation.

MALTA.

This island is about sixty leagues in circumference, eighteen in length, and twelve at its greatest breadth. There are no mountains, the highest point not being more than 600 feet above the sea's level, on which account it is exposed to the influence of all the winds which blow upon the Mediterranean. Valetta, the capital, strongly fortified by nature and art, occupies a peninsula between the two natural harbours, the Grande, and the Marso-Muscetto. It is intersected by twenty-one streets (ten lengthways and eleven transverse) crossing each other at right angles; several of them are spacious and handsome, having foot pavements. The principal street runs through the centre of the town from the Porta Reale to the Piazza, in which stands the Government Palace, whence it is prolonged to the Fort St. Elmo. Many of the streets are not carriageable; in some the ascent from the fort is so steep that flights of steps are cut. The palace is connected with the public library, which contains 40,000 volumes, and several antiquities found in the island. Valetta likewise contains a university, a theatre, a union club, &c.

The mean winter temperature of Malta is 13 (somewhat lower than that of Madeira), that of spring is 17, and autumn 19. At certain periods of the year, chiefly from the middle of September to the middle of October, as also

in spring, the rain falls with almost tropical violence, mostly in the night. The sirocco coming directly from Africa is extremely oppressive and relaxing; it prevails more especially in August and September, when the ground is parched up for want of rain. There is, moreover, in and about Valetta a great deficiency of shaded promenades, which renders it disagreeable as a residence for invalids. The climate in winter is tolerably equable; south winds sometimes prevail at this season for several successive days. The predominating wind, however, is the northwest, which, being deprived of its sharpness by its passage over so considerable an extent of sea, is rather agreeable than otherwise. The air is generally pure and clear, and except during the occasional prevalence of the northeast wind, the weather from the end of October to the middle of January is frequently delightful. After this, it becomes unsettled, and in the two following months, is often tempestuous and rainy.

The accommodation is good, the houses excellent, villas with orange gardens may also be hired in the environs of the town. The best parts for a winter residence are those having a southern and eastern aspect near the Baraccas. Casal Lia, three miles distant, is a well sheltered residence adopted for pulmonary invalids, and close to the public garden St. Antonio.

Dr. Liddell states the climate of Malta to be more especially suited to cases of chronic bronchitis, asthma, scrofula, dyspepsia, hypochondriasis, and a generally disordered state of health.

Dr. Davy, in his work on "Malta and the Ionian Islands" (1842), remarks that, though the troops are subject to tuberculous disease—owing to irregularities of living, and the frequent vicissitudes of temperature to which they are exposed when on sentinel duty, in hot barracks and guard-rooms—the natives are comparatively exempt, as are also the English residents. A recent writer observes with reference to Valetta as a residence for pulmonary invalids:—

"In November I found the heat so oppressive in the daytime, and the chills in the evening so severe, that I was glad to make my escape. The extreme humidity of the atmosphere of the island, notwithstanding its high temperature, renders it an unfit resort for bronchial patients, and the greatness of the diurnal range of the thermometer, at least in winter, makes it questionable how far it is an eligible residence for consumptive patients. It is believed that an inquiry into the results will not tend to give a favourable idea of its sanative influence in that class of complaints."[1]

I consider that in general, Valetta is not a very recommendable place of winter sojourn for consumptive patients, who from the absence of shade would be often debarred from taking sufficient out of door exercise in the daytime, when they are liable to have the insensible perspiration, which is promoted by the heat, checked by the action of the winds, from some of which the city and its environs are not sufficiently protected.

[1] On the Climate of Egypt, by the Rev. Thomas Barclay.

Some individuals, however, of lymphatic constitution, predisposed to be slightly affected with tuberculous disease, to whom the action of a moderately agitated atmosphere would be rather favourable than the reverse, by taking proper precautions against the transitions of temperature, would find the climate of Malta suited to them during November, December, and part of January, after which they might proceed to Egypt (a four days' voyage), to Rome (three days), or elsewhere, according to the kinds of climate indicated in particular cases, and with a view to avoid the cold winds which in January, February, and March not unfrequently prevail in the Mediterranean and along its shores.

London, *March*, 1855.

THE

INFLUENCE OF PREGNANCY

ON THE

DEVELOPMENT OF TUBERCLES.

BY

EDWARD WARREN, M. D.,
OF EDENTON, N. C.

The Trustees of the Fiske Fund, at the annual meeting of the Rhode Island Medical Society, held at Providence, June 4, 1856, announced that they had awarded to the author of the dissertation bearing the motto—

"*Qui fugit molam, farinam non invenit,*"

The premium of one hundred dollars, by them offered for the best dissertation on the following subject, viz: "*Does Pregnancy accelerate or retard the Development of Tubercles of the Lungs in persons predisposed to this Disease?*"

Upon breaking the seal of the accompanying packet, they ascertained its author to be Edward Warren, M. D., of Edenton, North Carolina.

Ariel Ballou, M. D., Woonsocket,
Hiram Cleveland, M. D., North Providence,
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Trustees.

J. Aug. Arnold, M. D., Providence,
Secretary of the Fiske Fund Trustees.

FISKE FUND PRIZE ESSAY.

INFLUENCE OF PREGNANCY

ON THE

DEVELOPMENT OF TUBERCLES.

CHAPTER I.

Article 1.

"Similia, similibus curantur," is the maxim of Hahnemann and his followers. "Contraria contrariis curantur" is the doctrine of Hippocrates and of those who recognize him as their leader. According to the teachings of one, two affections of a like nature cannot exist at the same time in the organism; and the most effectual method of destroying a *spontaneous* morbid condition, is to superinduce an *artificial* state of a similar character. The other affirms, that dissimilar conditions only are incompatible, and that disease is relieved most completely and certainly by developing in the system a state opposite and antagonistic to that already existing. Homœopathy bases its theories upon the doctrine of "similitudes:" Allopathy finds the "fons et origo" of its principles in the great law of "antagonism" which is impressed on all morbid phenomena.

If the utter falsity of this doctrine of "similitudes" were not acknowledged by a vast majority of scientific men, whose daily experience but confirms their logical deductions respecting its real character, it might be important, in this connection, to adduce the testimony of the ablest advocates of Homœopathy in proof of the impracticability of the system, and to demonstrate the contradictions and inconsistencies of its fundamental principles.

But these false doctrines have already reached the climax of their glory; the world begins to realize that it has been deluded long enough by the maxims of this mistaken philosophy; the period for discussion has gone by, and it is only necessary to make a plain statement of the whole matter, and then to leave it to the common sense of mankind, in order to secure the complete overthrow of this pernicious system.

At Leipsic, which has been the head-quarters of Homœopathy, the only

hospital devoted to that system contains but six beds, and all of these are not usually occupied. In Paris, M. Andral put it to the test of experience in one of the general hospitals, and the result was a total failure. He treated one hundred and forty patients in the presence of the homœopathists themselves, adopting every requisite care and precaution, and yet in not one instance was he successful. In Russia, the Grand Duke Michael invested a German homœopathist with full powers to test its merits, and in two months the experiment was pronounced unsatisfactory by the government, and discontinued. In Naples, a trial was made by the royal order, by which it was established, not only that homœopathic treatment produced no effect on disease, but that it was positively injurious—for the reason, that it prevented the employment of remedies by which the patients might have been cured. In London, there are, at present, but two homœopathic hospitals, one of which is about closing for want of funds, and the other is in a declining state. Thus has the system of Hahnemann proved a failure when tested practically, and is now everywhere on the decline.

Theoretically, it has not been more successful, as must be admitted by every unprejudiced mind. The homœopathists have failed to demonstrate either that medicinal powers do produce an artificial malady, similar to the natural affection; that the organism only remains under the influence of the medicinal disease; that the artificial disease is of short duration, or that all the effects can only be produced by selecting an agent which produces results similar to the symptoms; and hence, their doctrines have not only been impugned by Rau, Shroen, and Griesselich, but repudiated as illogical and visionary by the most intelligent observers throughout the world.

The doctrine of Hippocrates has its foundation in reason—embodies the plain, practical, and logical view of the subject, and is sustained by the experience of a vast majority of the most scientific men in every country. Upon it has been reared the superstructure of modern medicine; and to it belongs the glory of nearly all the triumphs which have marked the progress of the healing art from the days of its founder, down to the present time. The principle, that "like causes produce like effects," and the proposition which stands in correlation to it, are recognized in every department of science, and by all classes of observers. So universal is the acceptation of the truths thus imbodied, that they have become axioms in themselves, and the tests whereby the merits of any system may be determined. Homœopathy rejects these propositions—repudiates the principles involved in them, and assumes that Nature, in her therapeutical operations, acts upon another and an entirely contradictory plan. Their explanations of the great processes now under consideration, would lead them, if strictly adhered to in the practice of medicine, to increase the congestion of the brain in apoplexy; to accelerate the circulation in fever; to restrain hepatic action in torpor of the liver; and to induce a condition of debility, stagnation, and impoverishment in the systems of those predisposed to phthisis—which would be as reasonable as for the

sailor to attempt to lighten his ship by adding to her cargo, or for the engineer to relieve the strain upon the boiler of his engine, by the constant generation of steam. This system, to be true, must make the axioms alluded to, false; and as the idea of falsity is utterly precluded by the *very definition of the term*, it follows that homœopathy is illogical in its fundamental principles. Disease can be nothing more than a manifestation of certain phenomena, which depend upon the existence of some principle, different in its essence and operation from that agency by which the organism is maintained in its normal state. It consists in the presence of a series of effects, which are the results of the action of a particular cause. This *cause* operates, and these *effects* are produced in consequence of some alteration of the natural condition of the system, whereby a state is developed favorable to the action of the one, and the manifestation of the other. Hence, we have three elements essential to disease:—

1. An *altered condition*, resulting from the operation of some *general influence* or *cause*, unlike the *normal* or *healthy condition* and favorable to the action of a *particular cause*.

2. A cause distinct alike in its intrinsic character, and in its ultimate effects, and operating in a peculiar manner.

3. Effects, or symptoms, which take their character from the peculiar agent which has called them into existence, and from the manner of its action.

In some affections, as those which are contagious and infectious, this *general* and this *immediate cause* are combined, or so intimately associated, that they cannot be distinguished; whilst in the remainder, such as typhoid fever, phthisis, &c., they are not only separated, but easily recognized and cognizable. Now, it is manifest that the first step towards recovery, consists in an alteration of that original morbid condition, by which the *particular cause* has been enabled to operate in the production of its legitimate effects or symptoms, and hence it becomes a matter of the greatest importance to effect that change promptly and effectually. The continued action of this *particular cause*, or a similar one, implies a continuance of the same *original condition*—whilst the operation of a dissimilar agent, demands the existence of a different state, and demonstrates that it has been superinduced. But effects or symptoms are the only means whereby causes make themselves known, and consequently, it is only when these phenomena are unlike those which presented themselves in the first instance that any positive evidence is afforded of the commencement of the curative process. Thus it becomes evident, not only that the doctrines of Hahnemann are intrinsically false, but that the principles of Hippocrates are logically correct and entirely consistent with the laws of Nature.

Whatever *cause*, then, has a tendency to the production of a certain set of phenomena, is opposed, resisted, or restrained by that agent which produces dissimilar results, and hence the manifestation of these opposite effects or

symptoms, is an evidence that an antagonism has been produced and that the curative process is in operation.

Having thus considered the nature of the law of antagonism as enunciated by the oracle of Cos, and demonstrated its logical truth and practical applicability, I shall proceed to examine into the nature of phthisis, for the purpose of showing that pregnancy develops in the system a condition directly antagonistic to that state which favours and accelerates the deposition of tubercles.

This investigation necessarily divides itself into three heads, thus:—

1. A consideration of the tubercular diathesis.
2. An inquiry into the nature of tubercle.
3. An application of the rules respecting disease already established.

Whatever differences of opinion may exist in regard to the real nature of tubercle, all, at the present day, agree that it is preceded by a general morbid condition of a peculiar character. This condition has been denominated "tubercular cachexia," by which is implied the existence of certain abnormal symptoms, indicative of an unhealthy state of the economy, and a predisposition to the deposition of tubercles in the lungs. This diathesis connects itself both with the general system and the organ in which the deposit is made, and hence it is important to examine it in its twofold relations.

1. *As regards the System at Large.*[1]—The ultimate construction of tissues consists in minute cell-formations and cell-germs, which are capable of reproduction so long as they are supplied by the blood with certain organizable materials. In the normal state there is a constant disintegration and reproduction of these cells, and an equable and reciprocal balance between the processes by which they are performed, which constitutes health in the economy. When the supply of pabulum is diminished in quantity or altered in quality, this natural equilibrium is destroyed, and disease results as a necessary and natural consequence. The plasma of the blood is the organizable pabulum which plays this important part in the economy, and hence the circulating fluid becomes the source of formative supply or deficiency to the cell-germs and the means whereby structural degeneration or healthy action is secured. When blood possesses its natural elements in their normal ratio and proper character, the conditions essential to health are complied with, and all morbid action is necessarily precluded. On the other hand, when changes have taken place in the blood, by which its various constituents are reduced below the normal standard, either completely, partially, or in quality, then the function of assimilation is interrupted, and a condition of disease develops itself in the system. The blood is supplied to the body through the agency of nutrition, and when that function is properly performed, the circulating fluid is rich in formative

[1] See Valentin, Berlin, 1834; also, Wagner, Leipsic, 1839; Shwann, Berlin, 1839; Schleiden, Paget, Meckel, Gairdner, and others.

material, the tissues receive their due supply of organizable pabulum, and the normal state of the organism is maintained intact. But if this process is interfered with, the sanguiferous constituents are not produced in their equable and natural relation, the fibrinous plasma ceases to be properly elaborated, the red globules decrease in quantity, the albuminous element becomes excessive, and a condition of disease is developed throughout the economy.

To understand the manner in which the function of nutrition is interfered with, it is necessary to refer to the successive changes which characterize that process under ordinary circumstances. They are the following:—

1. The receipt of organic matter in the stomach.[1]
2. The transformation of this matter into albuminous and oily compounds.
3. The absorption of these by the mucous membrane, and their union into elementary nuclei and cells.
4. The transformation of these, first, into chyle corpuscles, and secondly, into blood.
5. The abstraction of the tissues of these materials which are essential to their nutrition.

Now, it is evident that as all these successive steps are essential to a proper performance of the function of nutrition, an interruption of either will interfere with all those changes which succeed it, and thus derange the whole process. In order to ascertain where the interruption has commenced, when any derangement exists, it is necessary to begin with the last effect produced, and to trace the morbid action through each successive step, until that one has been reached wherein the primary departure from the normal standard originated. In this tubercular diathesis the blood is so altered in quality that it fails to present to the tissues the organizable element which is their pabulum, and hence enervation, emaciation, and derangement of function are the symptoms which characterize this peculiar cachexia. Of all the tissues of the body, that which is composed of fat-globules, and known as the adipose, suffers most, and disappears with the greatest rapidity. This fact accounts for the extreme meagreness of phthisical patients, and clearly indicates such a derangement of the function by which fatty elements are produced, as really amounts to its complete suspension. We are thus carried back to that step in the process of nutrition by which chyle is formed, and therein discover certain abnormal changes, which, whether they depend upon any alteration or defect in the chemical and physical actions by which they are preceded, or on some other cause, are amply sufficient in themselves to account for the deterioration of the circulating fluid, and to explain all the phenomena which accompany and distinguish the tubercular cachexia. The experiments of Tiedeman and Magendie, as well as the chemical deductions of Prout and Liebig, clearly demonstrate that a proper admixture of albuminous and oleaginous elements is essential to

[1] Dr. Archison, Berlin.

healthy nutrition; and if healthy chyle be examined, these two principles—fat and albumen—will be found to constitute its essential elements; so that any influence which prevents the existence of either, or the proper admixture of both, impoverishes that fluid itself, and, as a consequence, produces a deterioration of the blood which is formed from it. As the globules of fat cannot enter into the system without being altered, and as an examination of the liquid found in the lacteals discloses the fact that the oleaginous elements have been reduced to a state of infinite division, it becomes evident that this alteration in their character is essential to healthy nutrition, and that there is some organ whose normal function it is to bring fatty materials into this state of emulsion. To M. Bernard belongs the credit of having discovered the manner and means of this transformation. He forced a rabbit to eat nothing but meat, and then, having opened the abdomen, he discovered that the absorbent vessels of the small intestines contained a limpid fluid for the distance of twelve inches below the pylorus, and that from that point they were white, and contained the same fluid as that which is found in the lacteals of the human subject, and in the dog throughout the whole extent of the duodenum. From this fact, and the additional reasons that in man the ducts of the liver and pancreas enter the duodenum together, near the inferior extremity of the stomach, and that in the dog one of the ducts of the latter organ empties with the duct coming from the former, M. Bernard concluded that it was the secretion from the pancreas that made the milky fluid which presented itself in the lacteals, and which depended upon the reduction of fat-globules to a state of emulsion for its peculiar appearance. As a means of testing the truth of this inference, he mixed pure pancreatic juice with oil, butter, tallow, and many different varieties of fat, and ascertained that it formed an emulsion with them all, resembling in every respect the chyle extracted from the mesenteric lacteals, and capable of *retaining its peculiar character for an indefinite period.* He then tried bile, saliva, gastric juice, serum, and the cephalo-rachidian fluid, without producing any other effect upon oleaginous matter than the formation of a mechanical mixture, *which returned to its original state* in a few moments. In addition to these external experiments, he made others upon the internal organs, by which his first conclusions are positively substantiated. They are thus described by Dr. Donaldson:[1]—

"After keeping a rabbit fasting for some time, he gave it a full dose of twenty grammes of fat, and, allowing sufficient time for it to be pushed down in the intestine, he killed the animal in three hours, and found the absorbents nearly empty to the point of insertion of the pancreatic duct, whereas below that they were distended with white chyle. In the intestinal canal, above the duct of the pancreas, there was some melted fat which was unaltered in colour, but below it was seen white emulsion, corresponding to that contained in the lacteals. His next essay was in tying the pancreatic duct of another animal of the same species before giving the oil, and, on opening the abdomen after the same lapse of

[1] American Journal of the Medical Sciences, 1851.

time, he found the lacteals free from chyle, and the oily matters undigested in the intestinal tube passing down to be thrown off in the excrement. On putting a ligature around both the pancreatic ducts of a dog, he had the same result."

From the facts thus clearly established, he drew the inevitable conclusion that "the *digestion* of fatty matters was the peculiar office of the pancreas." This deduction has also been substantiated by the observations of Barreswil, Colin, Lassaigne, Dumas, and others, and is now generally received and admitted by the medical profession.

In tubercular cachexia, this digestion of fatty matter is prevented, and hence, the demand upon the tissues for the oleaginous materials deposited in them, and the general emaciation which immediately results to the patient. An interference with that process by which fat is emulsionized and made assimilable, must depend upon some alteration in the pancreatic fluid, or derangement of the organs by which it is secreted. Bennett believes that this result is due to some vitiation of the fluid, and explains the phenomenon in the following manner: "The peculiarity of phthisis however, is, that an excess of *acidity* exists in the alimentary canal, whereby the albuminous constituents of the food are rendered easily soluble, whilst the *alkaline* secretions of the saliva and pancreatic juice are more than neutralized and rendered incapable either of transforming the carbonaceous constituents of vegetable food into oil, or of so preparing fatty matters introduced into the system as will render them easily assimilable." That this *acidity*[1] exists can be easily established, either by appealing to authorities or referring to the experience of every practitioner of medicine, and that it increases the solubility of the albuminous constituents, is perfectly evident; but its effect upon the pancreatic fluid is involved in much doubt and difficulty.

If this development of acid were the first link in the chain of morbid phenomena, nothing would be easier than to counteract it by the employment of appropriate neutralizing remedies. By the use of proper alkaline agents, this condition of acidity—by which the function of the pancreas and the process of healthy nutrition are arrested—could be easily destroyed, and the tubercular diathesis removed without difficulty or delay. It is well known, however, that no morbid state is more obstinate or persistent, than that which is characterized by a disposition to the formation of tubercles in the pulmonary parenchyma, and that the only treatment from which a successful result may be anticipated in this cachexia, consists in the constant employment of appropriate tonics in connection with certain general remedies. This is an important fact, as will be demonstrated in another part of this paper, because it indicates that the source of the disorder can be traced to the nerves, and associated with the vital forces of the economy.

Again—if the improper digestion of oleaginous elements depends upon the alteration effected in the pancreatic fluid, in consequence of the develop-

[1] Clark, Williams, Wood, and others.

ment of this excessive acidity, then the employment of substances rich in acidulous constituents, would predispose to this particular diathesis. An indication would thus present itself in the treatment of phthisical predisposition, which would demand the constant abstinence from those alimentary elements which contain acids, and the avoidance of acids as remedies under every circumstance which connects itself with this particular cachexia. This would involve us in the absurdity of attempting to prevent the invasion of phthisis by the development of the circumstances most favourable to the existence of scorbutus, and the rejection of remedies standing pre-eminently forth in the list of *tonics*, which are universally admitted to be most useful agents in the management of the tubercular diathesis. If the above explanation be correct, it would follow as a matter of course, that with those persons who habitually use a large quantity of food, rich in acidulous elements, phthisis would present itself most frequently; and hence, in the tropics, where fruits are constantly ingested, cases of this affection would be most numerous—whilst the very opposite of this is true, as is universally admitted. Emaciation does not necessarily ensue where there is excessive acidity, for Trousseau has long since reported and explained many cases of dyspepsia in which this feature was particularly prominent, whilst the fatty tissues remained intact, and a plethoric condition of the system was maintained. It is well known also that many persons suffer habitually from an inordinate development of acidity, without being materially affected in their general health, and manifesting any waste of tissue or diminution of rotundity.

The idea of the necessity for the preservation of alkalinity in the pancreatic fluid, is not original with Bennett. M. Mialhe[1] maintained that alkalies are the great solvents in the animal system, and that their presence in the secretion of the pancreas, is the cause of the formation of that emulsion, whereby fatty matters are made digestible. M. Bernard, however, has conclusively demonstrated that the explanation is utterly false, and the question of its paternity is consequently rendered an unimportant one. In the first place, he showed that the natural acidity of the mucus would be sufficient to change the reaction of the juice as it issues from the pancreatic duct; and in the second, he proved that the *fluid acts even in the acid mixture*, which of course settles the question immediately and definitely. It follows, then, from these considerations, that the improper digestion of the oleaginous elements of the food does not depend upon an alteration in the pancreatic fluid, after it has been secreted, and that Bennett is entirely mistaken in his explanation of the phenomena. If the fluid be not in fault in this manner, then the pancreas must be the source (intestinal) from whence originate these influences, which so materially interfere with and modify the digestive process. They must either *produce* an altered and unhealthy fluid or secrete the natural one in a diminished and insufficient quantity. Either supposi-

[1] Mémoire sur la Digestion et l'Assimilation des matières albuminoides, &c., 1847.

tion will account for the condition of things which results in the intestine, and to the system at large, and it is unnecessary in this connection to attempt to determine which explanation is the correct one. It is manifest that there is some defect in the secreting powers of the organ, by which a proper performance of its functions is prevented, and from which all the morbid phenomena originate. This organic difficulty must depend, either upon some local cause, as inflammation, congestion of its substance, or some general one connecting itself with that nervous influence distributed to it, by which its normal actions are directed or controlled. The symptoms which distinguish the operation of the first series of causes, are described by all writers on pathology, and can be easily distinguished by every observer. As these do not exist, and as post-mortem examinations fail to discover those organic lesions which are indicative of inflammation, congestion, &c., it follows necessarily that the derangement in question results from the action of the general cause alluded to above.

The influence of the nervous system on the secreting powers of the various organs, has long been maintained by pathologists, but it was reserved for the learned and laborious Bernard to explain and demonstrate it fully. By a series of most ingenious and convincing experiments, he has eliminated the nature of the offices imposed on the various classes of nerves, and showed conclusively, that the trophic system controls and presides over secretion. He traced out the particular nerve distributed to different organs, and succeeded in promoting and arresting the production of the fluids appertaining to each gland, by alternately increasing and diminishing the amount of nervous force with which it is supplied. From these experiments, and on account of the reasons mentioned above, it is fair to conclude, that the improper digestion of oleaginous elements, upon which emaciation depends in the tubercular cachexy, results from the fact, that the normal amount of nervous force is not conveyed to the pancreas; and hence, it is evident that the primary lesion connected with phthisis, is to be found, not in the digestive apparatus itself, but in the nervous system which presides over it. This view of the subject is not only the one which best explains the phenomena characteristic of the tubercular cachexy, but is sustained alike by an examination of the causes which induce this particular diathesis, and a reference to the remedies essential to its relief.

The causes of phthisis may properly be divided into two classes: (1.) General Causes. (2.) Special Causes.

(1.) *General Causes.*—Among the most prominent of these is hereditary predisposition. Since Hippocrates declared "Ex tabido tabidus," all writers, with two exceptions, have repeated, that consumption is hereditary. Louis contends that phthisis is not ordinarily inherited, and Piorry affirms in his second work, that it is only so in one case out of ten. It is no longer believed that the disease transmits itself by means of a particular virus, as was once supposed, but its reproduction is attributed to the develop-

ment in the child of the same qualities, mental and physical, as those which distinguished its parents. It is evident that a predisposition which depends upon the existence of a *mental quality*, must connect itself with some abnormal condition of the nervous system; since it is only through the medium of the nervous mass, that mind manifests itself in its varied and multitudinous relations. The very fact that phthisis is an hereditary affection, is *prima facie* evidence, that its origin can be traced to the nerves; for it is notorious that those diseases which are caused by interruptions in the transmission of nervous force, or an improper development in the great generating centres, are more generally inherited than those involving other tissues of the body, or resulting from the operation of different influences in the economy. Thus, insanity descends from sire to son through many generations—whilst convulsions, epilepsy, hysteria, chorea, and various other affections of the nervous system are the fatal heirlooms in many families.

The constant use of improper aliments also occupies a conspicuous place in the catalogue of causes whereby consumption is produced. Now it is evident, if, when they are originally taken in the stomach, a condition of health exists which secures their proper digestion and assimilation, the amount of nutritious matter contained in them would be appropriated by the tissues, and, although emaciation and enervation would result, they could only indicate the fact that assimilable elements had not been ingested in sufficient quantity. Until a specific derangement in the digestive process is effected, the tubercular cachexia cannot exist, and it is only because of the induction of a distinct morbid alteration in the system that this peculiar diathesis is developed. The various tissues of the body require the constant supply of an organizable material of a certain quality in a definite quantity, and without this supply, a change is effected in their organic character, and an alteration occurs in their manner of executing the particular function for which they are designed. Nervous tissue is distinguished not only by its intrinsic delicacy of structure and excessive sensibility, but also for the importance of its functions and the variety of its relations; and when the material habitually consumed is bad in quality, and diminished in quantity, it, as a matter of necessity, first feels and manifests the operation of this debilitating and morbific influence. In a word, the tubercular cachexia is developed thus:—

There is improper material taken in the stomach; enervation and emaciation ensue; the nervous system feels most sensibly the withdrawal of appropriate pabulum; a proper supply of nervous force does not reach the organs of secretion connected with the digestive apparatus; torpor is produced; a positive interruption of the process results, and a condition of disease is developed.

M. Foureault and Dr. Beddoes think that the skin is primarily affected, and in such a manner that its functions are interfered with, whilst the lungs become secondarily involved, either through sympathy, or in an effort to eliminate the elements which should have been excreted on the surface. It

is certain that impure air, &c., do produce a powerful impression on the skin, and that, in many instances, its offices are entirely suspended; but it is equally true, that the effect on the skin is one of sedation and depression—one affecting the nerves which are there distributed—and that the cause which produces an impression on a tissue whose connection with the nerves is so intimate and extended, must in that way create no inconsiderable disturbance throughout the whole nervous mass. If sedation be produced on the nerves at their extremities, the same impression will be made at their internal terminations, and of the other nerves connected with them—those which most resemble them in function, or which are more susceptible to the influence of any depressing agent, will most readily take on the same action or condition, and thus reproduce in the organs to which they are distributed, a state similar to that which exists on the surface. Thus it becomes plain, how and why an impression made on the skin can develop the tubercular cachexia in the human economy.

The last series of morbific agents to which I will refer, are those which connect themselves with the emotions. It is universally admitted, that the gratification of lust, indulgence in onanism, depression of spirits, violent grief, and, indeed, all passion whereby immediate depression or subsequent reaction is induced, tend materially to the development of the tubercular diathesis. Thus it has been established by the investigation of M. Lombard, of Geneva, that twice as many die of consumption among the destitute as among the rich and contented; and Morton[1] declares that he knows of "no cause more certain in the development of phthisis than grief, especially when it is long indulged;" and "that nearly *every case* of the disease which had come under his observation, was occasioned by mental suffering of a protracted duration." Laeunec tells of a community of nuns, which, in consequence of having to submit to certain moral influences of a most terrible nature, was so victimized by consumption, that it had to renew itself three times in ten years. Hippocrates himself affirms, that "the abuse of youth by inordinate indulgence in the pleasures of love, has the most unhappy influence upon the development of consumption." Dupay[2] tells of the terrible ravages made by phthisis among the French soldiers detained at Chatham, in consequence of their distress at being confined in prison, and desire to return to their native land. Amistoy expresses himself thus: "La misère, á coup sûr, est un grande cause de débilité, et par conséquent de phthisie; mais il-y a une autre cause qui ruine encore plus promptement et plus profondement l'organisme; ce sont les passions tristes et concentrées."[3]

Wood says, that exhausting indulgences, grief, anxiety, disappointment, whether of the affections or in business, are among the predisposing causes of phthisis.

Williams enumerates among the most common causes of the constitutional

[1] Treatise on Consumption. [2] Thèse de 1847. [3] Thèse, 1853.

origin of consumption, "depressing passions, such as disappointed love, anxiety, or distress from reverses of fortune, or other severe calamity, and venereal excesses."

I have thus been particular in bringing forward the statements of these writers, not because there can be any doubt respecting the fact to which they testify, but as a sure means of making it conspicuous and comprehensible. My object is to impress it fully on the minds of my readers, so that I may the better illustrate the truth of the conclusion which is deducible from it. Now let me ask: How do these causes operate in the production of their results? Is it through the instrumentality of the nerves, or not? Do not mental states directly influence the nervous system? Cannot the wear and tear of the mind be detected by the destruction it occasions to the nervous tissue, and the presence of that *débris* in the excretions? These questions require an affirmative answer, or the reciprocal relations of mind and nerve is an idle fancy, the connection between cause and effect a chimera, the laws of nature uncertain in their operation, and the long established opinions of the most learned physiologists visionary and unreliable. Here, then, we have a certain effect associated with a particular cause, which, from its intrinsic nature, is exclusive in its operation, and it follows that the relation between the two is necessary and invariable. A protracted state of mental depression produces nervous sedation and debility as a matter of course, and hence they may be assumed as synonymous as far as they relate to the system at large. This is the *cause* to which I have referred above. A tubercular diathesis implies the existence of a certain impairment of the digestive process, which manifests itself by a faulty transformation of the oleaginous elements into chyle, an insufficient formation of fibrin, &c., and it is fair to consider them (that is, the internal derangement and external manifestation) as identical also. These constitute the *effects* of which I have previously spoken. A certain abnormal state of the nervous mass produces, then, that condition of the digestive apparatus which prevents the formation of a proper emulsion out of the fatty matters ingested, and in this manner it becomes apparent that the cause of consumption *must* originate in the nervous system. It is evident, that an impression made on the nerves can only affect the process of digestion, by increasing or diminishing the amount of nervous force distributed to the organs by which it is affected. If the amount be augmented, as shown by Bernard, the organs will secrete a greater quantity of the fluid appertaining to them, and the process will be more active than under ordinary circumstances; and, on the other hand, when there is a deficiency in the supply, torpor ensues, a smaller amount of fluid is poured out, and digestion is impaired. It is manifest in the tubercular cachexia, that, so far from there being activity in the process, the most unmistakable impairment and derangement exist, and the conclusion is inevitable, that the peculiar morbid phenomena to which I have alluded result from an improper supply of nervous force to the pancreas and other organs connected with the digestive apparatus.

(2.) *Special Causes.*—It is not important, in this connexion, to investigate the nature and operation of those influences which tend to develop phthisis, and for that reason I will limit myself simply to an enumeration of them. These causes may be divided into two classes also—Mediate and Immediate. (*a*) Mediate causes. These do not exercise any direct influence upon the lungs, but affect them secondarily. Thus—the constant confinement of the body to the same attitude; sedentary habits; improper clothing; suppression of habitual discharges, and all those agents which *indirectly* produce congestion of the pulmonary membrane or tissues. (*b*) Immediate causes. By these are meant all causes which directly affect the lungs, producing irritation, congestion, or inflammation in them. To this class belong those professions in which the lungs are constantly affected by the contact of irritating substances, as stone-cutting, scissor-grinding, &c.; pneumonia, bronchitis, emphysema; and everything which directs the circulating fluid immediately upon the pulmonary tissue. It will be seen, however, that this distinction is merely a nominal one, and that both classes of causes require the development of a certain amount of irritation, congestion, or inflammation of the lungs, as an essential condition to their successful operation.

In another part of this paper I mentioned the fact that tonics exercise a most beneficial influence upon this disease. I propose now to consider the nature of the action of this class of medicines, for the purpose of demonstrating still more conclusively, that the development of the tubercular diathesis depends upon some lesion of the nervous system.

It cannot be denied that tonics act directly on the nervous mass, and that their beneficial influence is owing to the effect which they produce on that particular tissue. They stimulate gently, but effectually, the nervous centres, so that an increased amount of nervous force is generated and transmitted to the various organs, and in that manner conduce to the health and harmony of the whole system. This explanation of the action of these remedies is universally admitted, and it is unnecessary to inquire further into its truth. It is well known that the mistaken opinions of Sydenham, Portal, Morton, Rush, and others,[1] respecting the essential nature of phthisis, which led to the employment of the lancet and other antiphlogistic remedies, have given place to sounder views on the subject, and that a more rational and successful treatment of the affection is pursued at the present day. Without considering it a chronic pneumonia, as taught by Broussais, or a perverted secretion, as supposed by Andral, Carswell, Forbes, and Clark, the Profession, with a singular but most fortunate unanimity, has adopted that explanation of its phenomena which attributes them to the operation of some cause that depresses the nervous system, and in that manner prevents the proper performance of the digestive functions. Constant exercise in the open air, together with the use of tonic remedies, is now recommended everywhere, as the most effectual

[1] Stokes still urges the antiphlogistic plan.

means of relieving the peculiar morbid condition known as tubercular diathesis. Now, as no remedy can be more of a *tonic* in its influence on the system than exercise, and as the medicines selected belong to *that class* exclusively, it follows that the necessity which exists for this course of treatment, demonstrates that a condition of debility and torpor has been induced in the economy, causing the generation of a deficient supply of nervous force, and its improper conduction to the various organs.

I have thus examined at length into the circumstances which attend an improper digestion of the fatty elements of the food, as it appears in connection with the tubercular cachexia, and have demonstrated that no emulsion is formed, and no assimilation takes place because of some defect in the pancreatic juice, dependent upon an improper supply of nervous force to the organ by which it is secreted. The explanations given seem to be more reasonable than those of Bennett, and I trust they will prove satisfactory to my readers.

M. Bernard has shown, by many interesting and conclusive experiments, that the liver has three most important functions—Depuration, Sanguification, and Equilibrium.

(1.) *Depuration.*—It has long been admitted that the liver, by secreting bile, assists the lungs in the elimination of carbon from the economy. This fact is substantiated by comparative anatomy, which demonstrates the antagonism of the two organs, at the different ages and the several degrees in the animal scale. Some suppose that the liver separates the bile from the blood, so that its carbonaceous elements may be burned off in the lungs; but this opinion has not stood the test of experience. Under ordinary circumstances, there are more of the carbo-hydrogenous elements formed than the lungs can burn off, as is shown by the deposition of adipose in the various tissues; and hence the existence in the economy of another organ by which this excess can be disposed of. If they were reabsorbed after being eliminated, the liver would be called upon to perform an unnecessary office in secreting them originally, and instead of being a depurative organ, it would possess features of an entirely opposite character. One of the functions of the liver evidently is, to eliminate from the system that surplus of carbon and hydrogen which is not required by the tissues or the lungs.

(2.) *Sanguification.*—In addition to this function of depuration, which has been recognized by all observers, Bernard contends that the liver has other offices. He has shown by positive experiment that this organ is instrumental in the formation both of fat and fibrin. Besides the appropriation of olcaginous material from the chyle, there is another source of fatty supply to the system. Magendie established by experiments, that whatever might be the amount of fatty material taken in the stomach, only a fixed and limited amount was acted on by the intestines, and a still smaller quantity assimilated by the various tissues. Boussingault fed ducks and pigeons exclusively on fat, and found but little more oily matter in their blood, than in that of a number of

the same birds to which all food had been denied. Pusay found, in fattening geese, that the oleaginous matter formed in their bodies was more than double the amount that could be extracted from the corn consumed. These facts necessarily indicate the existence of some other means whereby fat is produced in the economy; and hence the investigation of Bernard, by which was discovered the manner of its formation. Beginning by refuting the theories by which Liebig and Chambers had attempted to account for the results of the above experiments, he demonstrated that the blood which *enters* the liver has no fat in it, whilst that in the hepatic veins *coming from* it contains oleaginous material in abundance, whether the aliment taken in the stomach possesses the fatty element or not; that "the blood in the arteries coming from the lungs through the heart, contains nearly as much fatty matter as the pulmonary arteries, and that such is the case throughout the arterial circulation; while, on the contrary, in ordinary venous blood, there can scarcely be discovered a trace of it;" and that a section of the pneumogastric nerve, or a violent impression made on the nervous system, materially interferes with the production of this material.

By a course of reasoning, and experiments precisely similar, he arrived at the same result respecting the formation of fibrin. He found that "the blood which enters the liver, contains in large quantity the digested azotised matter, and but little fibrin, even when the animal has been fed on meat. Whereas, the blood of the hepatic veins contains much fibrin and but little of the albumen: and further, that this difference is only observed during digestion." From these facts he concluded that it is the function of the liver to produce fibrin for the blood.

(3.) *Equilibrium.*—There is a constant demand on the circulating fluid both for fat and fibrin; and hence the necessity for the continuous development of these materials. The liver thus becomes the instrument by which this equilibrium is maintained in the blood and health secured to the economy.

Now, it is evident that the performance of these various functions is essential to the health of the economy, whilst an interruption of them must produce a succession of morbid phenomena of a definite character. If depuration be not effected, the burden of combustion and elimination must be thrown upon the lungs, and a disposition to disease in that organ will manifest itself. If fat be not formed, there will be a demand made upon the tissues in which oleaginous elements have been deposited, for carbon and hydrogen, and emaciation will ensue. If fibrin be not properly generated, the tissues will not be renewed, a cachectic condition of the system will be developed, a depression of the vital powers will result, and the exudations of plasma will lose their plastic and organic character. In a word, that condition of things will present itself which is recognized as the tubercular diathesis.

In a previous article it was demonstrated, that an impression made upon the nervous system by which its generating or conducting powers are inter-

rupted, operates in such a manner on the organs concerned in secretion, as to interfere with their normal action and to restrain or alter their natural fluids. If, then, it can be shown that the functions of an organ are interfered with, without the interposition of a local and palpable influence, it follows, necessarily, that some morbid impression has been made upon the nervous system which has operated as *the cause* in the production of these particular morbid effects. But the functions of the liver have been materially interfered[1] with, as is evinced by the symptoms which characterize the tubercular cachexia, and hence it follows that the primary lesion in phthisis consists in the existence of a condition of debility and inactivity in the nervous system. We have, then,

(1.) A condition of nervous debility.

(2.) A withdrawal of the proper nervous supply to the pancreas and liver, producing torpor in them.

(3.) An interference with the natural functions of these organs.

(4.) Emaciation, enervation, pulmonary irritability, unnatural products, and the whole train of symptoms which distinguish the consumptive diathesis.

The most important changes effected in the economy are those to which the blood is subjected, though they follow naturally from the explanations already given respecting the essential nature of this particular diathesis. As a matter of course the red globules and fibrin are diminished, whilst a relative increase takes place in the albumen.

(I.) *Organic Impression.*—When the tubercular diathesis has been developed, a morbid impression is produced upon the lungs, which renders them particularly liable to congestion and irritation. The blood no longer abounds in rich supplies of organizable elements; the cell-germs which were once conveyed to the remote tissues, and deposited as the nucleus of a plastic structure, have been replaced by a degraded element, which inclines to exudation and is susceptible of no higher development than that which characterizes the aplastic deposit. The evil produced by the presence of such elements in the blood demands their withdrawal, and that organ in which a proclivity to irritation has been developed, and whose function is most essential to vitality and health, becomes at once the instrument by which this elimination is attempted, and the receptacle of morbid products. The lungs are susceptible to the action of the morbific agent, both from causes which are original or intrinsic, and those which are acquired—the distinguishing feature of each consisting in the fact, that it promotes either congestion or irritation of their membrane or tissue.

(1.) *Original Causes.*—The lungs are susceptible to morbific impressions for the following reasons: because of the great amount of blood circulating in

[1] Clark, Abernethy, Philip, Ayre, and Todd.

them; they are constantly the seat of vital action and organic change; their lining membrane is exceedingly delicate; secretions are prone to collect in them instead of being removed.

(2.) *Acquired Causes.*[1]—In phthisis we have—1st, an interruption of the function of the skin, which throws the burden of exhalation on the lungs; 2d, a general debility, by which every tissue is weakened; 3d, excessive action in the lungs because of the improper performance of depuration elsewhere, and the manner in which combustion takes place in the other structures, &c. In this diathesis, these causes combine, and render the lung so irritable and inflammatory, that it becomes necessarily the centre of sanguineous determination and exudation. As the plasma thus poured out is deficient in healthy fibrin, and as the tissues with which it is brought in contact do not possess their normal amount of formative power, proper organization is impossible, and hence, a low, retrograde, aplastic product is developed.

Article 2.

I shall devote this article to a brief consideration of the views entertained at different periods respecting Phthisis, and an examination of the nature of the tubercular deposition in the Pulmonary Parenchyma. In regard to the nature of the disease, a variety of conflicting opinions have been expressed by various writers.

Hippocrates evidently knew very little about this affection, for he considered phthisis "an ulceration of the lungs, having for its essential character an abscess which produces *pus*." Galen was no better informed, for he agreed with Hippocrates in regard to the disease and its product.

Morton says, that "in consequence of some essential depravity in the blood, there is separated from it a material of an unhealthy and unnatural character, which is *secreted* in the tissue of the lungs, and diffuses itself into the other organs."

Portal thinks, that "indurations which are the product of inflammatory action, really constitute the basis of phthisis." Baumes and Bayle describe simply a pulmonary ulceration as phthisis, and confound pus with tubercle. Langlois makes tubercle an engorgement of the lymphatic ganglions. Van Swieten and Fournet believe that they originate in extravasated blood. Laennec considers tubercle an organized body having a special existence and a peculiar character. Billings regards these products as a strumous disease of the small lymphatics of the lung, growing by the addition of lymph, and assuming various grades of organization according to the condition of the circulating fluid. Gulliver and Vogel agree in saying, that "it is organized and contains cells, and that it spreads by its own inherent power of development." Broussais teaches that inflammation of the lung is the essential cause

[1] See Fourcault, Williams, Beddoes, and others.

of the whole morbid series; whilst Hufeland and Piorry think, that though this may be the proximate cause, there is a previous condition of debility necessary to its operation. Boerhaave says, "consumption is developed with most facility where the air is damp and unfavourable to free perspiration; causing the particles which should be thrown off by that operation to collect in the system."

The most popular theories, however, are those which have been proposed by Andral, Carswell, and Williams. Andral says: "Tubercle is nothing else than the *secretion* of a matter, which seems to be produced indifferently either in the last bronchi, in the vesicles which succeed them, or in the interlobular cellular tissue. This matter, which seems to be primarily liquid, becomes solidified at a period more or less remote from that at which it was secreted, and becomes tubercle."

Carswell[1] believes "tuberculous matter to be a secretion *sui generis* as totally destitute of organization, as effete matter continuously separated from blood when that fluid is in an unhealthy state, and thrown out on the surface of mucous membranes, and producing bad consequences only in proportion as it accumulates in organs, impedes their functions, and acts on them as foreign matter."

Williams[2] refers tubercle "to a degraded condition of the nutritive material from which old textures are removed and new ones formed; and differing from plasma not so much in kind, as in degree of vitality and capacity of organization."

It is manifest, from the investigations already attempted in this paper, that the last explanation approaches nearest the correct one, for the reason that it is based upon proper views of the pathological condition characteristic of the tubercular diathesis, and is susceptible of demonstration, both by *à priori* arguments and *à posteriori* deductions. It is plain, that a peculiar irritability of the lungs must occasion inflammation in them, and that, as the plasma is deficient in healthy fibrin, and the tissues wanting in their normal formative power, the materials which should have been appropriated fail to be organized and degenerate into tuberculous matter.

Nature of Tubercle.—Bennett draws the following conclusions respecting the nature of this product:—

(1.) Tubercle consists of an animal matter mixed with certain earthy salts.

(2.) The relative proportion of these varies in different specimens.

(3.) The animal matter certainly contains a *large amount* of albumen, whilst fibrin and fat exist in very small quantity.

(4.) The earthy salts are principally of the insoluble phosphate and carbonate of lime.

(5.) Very little difference exists between the matter of tubercle and other compounds of protein.

[1] Williams and Clymer on Respiratory Organs. [2] Principles of Medicine.

These conclusions, especially that which refers to the animal matter contained in tubercle, follow necessarily from the explanations given of the changes which occur in tubercular cachexia, and hence, they become most convincing and unanswerable proofs of their logical truth and pathological accuracy. If the normal amount and quality of fibrin were generated, the products of exudation would not only contain that substance, but would present distinct evidences of its power of organization, whether they were appropriated or not; and, on the other hand, if it were replaced by albumen[1] there would be neither appropriation nor organization, and the matter deposited would contain that principle (albumen) in excess. Tubercle contains but little fibrin, and does not organize. Its principal constituent is albumen, as shown by positive analysis; hence, the conclusion is irresistible that the blood is deficient in the one and rich in the other. If fibrin be not produced, then, the organ which generates it naturally does not act properly. But that organ, the liver, *will* perform its functions unless it be prevented by the interposition of some local cause, as congestion, irritation, &c., or the withdrawal of its normal supply of nervous force. Examinations made before and after death, conclusively demonstrate that this local impediment does not primarily exist, and it follows, both from this exclusive argument and from actual experiment on the pneumogastric nerve,[2] that the cause of the interruption is to be found in some altered condition of the nervous system. If this alteration were upwards, that is, in the direction of excitation, the organ would act more promptly and effectually; whilst if it were in the opposite direction, towards depression, torpor would result. It is evident, then, that this alteration in the system, that state which is the primary and essential lesion in the tubercular cachexia, consists in a condition of depression of absolute nervous debility, and nothing less.

Rokitansky[3] divides tubercles into three kinds: simple-fibrinous, croupo-fibrinous, and albuminous. Laennec and others describe several varieties; but it is now generally admitted that they are all different forms or conditions of the same substance. Robin declares that tubercular matter is invariably yellow; but this inquiry is not material to the subject under consideration, and consequently I shall not pursue it further.

Article 3.

In the first part of this paper several conditions were assumed to be essential to disease, and it now remains to be determined whether or not phthisis, as explained in the preceding pages, complies with all of them.

(1.) An altered condition of the system resulting from the action of some general cause, and favourable to the operation of some particular one, was de-

[1] "Fibrin may be considered albumen in an advanced state of development."—*Simon.*

[2] See Bernard's Experiment.

[3] Handbuch der Pathologischen Anatomie, 1846.

elared to be the first step in the morbid process whereby disease is developed. I have already shown that in consequenee of the effect produced by the general causes to which I have alluded, a condition of debility, of low, vital, and organic aetion results, in which the circulating fluid beeomes vitiated, and by which the lungs are so impressed, as to become particularly susceptible to all irritating and congesting influences, whilst their formative power is materially abated.

(2.) A partieular cause acting in a speeial manner, was the next element mentioned as necessary to disease. From the explanations given already, it is evident that phthisis is not developed until some special cause presents itself by which the pulmonary tissue is made to take in a particular inflammatory action, wherein exudation takes place, which, from the impoverishment of the circulating fluid, and the altered condition of the tissues themselves, fails to organize, and deposits itself in the form of tubercle.

(3.) Effects or symptoms were then referred to as constituting the last link in the morbid chain. In phthisis they are twofold—that is, those which result from the action of the general cause, and others which are referable alone to the special cause, present themselves as concomitant phenomena. By the first, I mean those symptoms which are characteristie of the tubercular diathesis; and by the second, I refer to the effects of tubercular deposition upon the system at large.

These effeets are so well understood as to render it unneccssary for me to attempt any deseription of them in this connection. I have thus shown that phthisis complies with the conditions essential to disease, and that in doing so it serves to substantiate the truth of the explanation given of all morbid processes.

In order to eomprehend fully the deductions intended to be drawn from these conclusions it is nccessary to revert to that portion of this paper in whieh the doctrine of antagonism was expounded and demonstrated. It was thus shown that the only sure means of altering any particular condition of the economy, was to induee a state dissimilar and antagonistie to that already existing. Effeets or symptoms were declared to be the only means whereby eauses make themselves known; and as the particular cause depended for its operation on the existence of a general morbid state, induced by the aetion of some general eause, a continuance of the same morbid phenomena indicated that no change had been effected in the original abnormal condition; and that the curative process had not been commenced; whereas a change in the phenomena, proved that the original abnormal condition had been altered, and that the succession of morbid actions was broken up. From these eonsiderations it is evident that phthisis must be opposed by that condition which is antagonistie to it, and that the induction of phenomena dissimilar to those characteristic of this disease establishes the fact that its progress has been arrested. If it can be shown, then, that pregnaney establishes a state in the economy which is distinguished by effects directly opposed to those induced by phthisis, then

it follows that the particular cause has ceased to operate—that the morbid condition by which it was favoured and permitted to affect the system has been removed, and that an antagonistic and curative impression has been made upon the economy. The object of the succeeding pages shall be to investigate the nature of pregnancy, in order to demonstrate that it is essentially antagonistic to the progress of consumption.

CHAPTER II.

Article 1.

Pregnancy.—Nothing can be more important in all its bearings than that process by which the ovum is fecundated, the uterus impregnated, and the fœtus developed. Upon its proper performance and successful issue the perpetuation of the race depends, whilst the most serious physiological changes accompany and distinguish it. The organs concerned in this important work, possess a degree of adaptation to the duties imposed upon them as extraordinary as it is complete; a delicacy of structure unsurpassed by that of any other tissue, and an intimacy of relation with the system at large as wonderful in itself as it is important in its consequences. The uterus, in the female system, is the great fountain of sensibility and sympathy. When its tissues are intact, and its functions properly performed, the highest condition of health is maintained in the economy; whilst the slightest deviation from the normal standard, either in its structure or in the manner of its action, is felt throughout the entire frame, and responded to by every organ. Hippocrates long since enunciated a truth which has been universally received: "Morborum omnium qui muliebres vocantur uteri in causa sint;" whilst the declaration of Van Helmont, "propter solum uterum est mulier, id quod est," has passed into a physiological axiom. The actions whereby pregnancy is developed and perfected have their seat in this organ, and hence the nature of the relation which they sustain to the organism. Their influence upon the economy is most powerful and controlling, whilst the system in turn materially affects and modifies them.

Under ordinary circumstances, each cell possesses the power of reproduction; the tissues are capable of selecting and appropriating those elements which are essential to their nutrition; and the organs have an inherent ability to perform their functions properly. When there has been no impairment of the vital principle, and the body is in a state of absolute health, these processes are performed in such a manner as to secure the most perfect equilibrium and harmony in the economy. Physiological acts, then, require this condition of things as an essential prerequisite to their proper performance, and when they are successfully executed, evidence is thereby presented of the existence of a

condition in which the vital principle possesses its normal amount of activity, and the system is up to the standard of health. The uterus sustains relations of the most intimate and complicated nature with every other organ of the body. When diseased, the whole system feels the morbid impression, and presents infallible evidence of sympathy and suffering, whilst it in turn responds to the affections of other organs, and suspends its functions upon the invasion of any serious malady. If the integrity of the uterine functions be so dependent upon the healthful condition of the organism, and so indicative of the absence of serious disease, then, *a fortiori*, the perfection of its highest physiological act must require the suspension of all morbid conditions, and serve to demonstrate conclusively that they have been suppressed. Hence, the vast importance of this process, not only because of its effect upon society, but for the reason that it exercises a controlling and conservative influence upon the whole economy, whilst its successful issue demonstrates the abatement of abnormal actions and the suspension of all diseased conditions.

In treating of the nature of this great physiological process, I shall limit myself to a consideration of its effects upon the uterus itself and the system at large. One of the first evidences of pregnancy is the suspension of the menstrual flow, which results, not on account of any disease, general or special, but because the fluid is required for other purposes in the system. The symptoms which ordinarily attend the retention of this fluid, do not appear, for the reason that nature in her effort to perfect a high physiological act, gives to the system a certain tolerance or power of resistance that it does not ordinarily possess. The structure of the uterus is materially changed; its fibres are separated; numerous interspaces are left between them, and a *positive addition* is made to its substance. The cavity of the womb is materially increased in size, and filled up, not only with the fœtus itself, but with an entirely new membrane of fibrinous origin and character, rapid in its development, and important in its purposes. The vessels increase in number and capacity, which augmentation of vascular machinery implies, of course, an increase in the amount of circulating fluid in the womb. The nerves become hypertrophied from an absolute *increase of substance*, so that the sensibility of the organ is augmented, and its relations with the organism rendered more complete. In a word, it not only becomes the centre of nervous and vascular determination, but by reason of the increased vital action in it and the system at large, it acquires a principle of growth, and so increases in capacity as to accommodate itself to the important development within its cavity.

It produces in the system a condition of increased action, approaching even to plethora. This is evinced by the addition made to the vascular machinery; the augmentation of circulating fluid; the buffy coat of the blood; the unusual frequency of the pulse; the acquired tolerance of the lancet; increased susceptibility to the action of stimulants; difficulty of employing tonics to advantage, and the proteinaceous products which are developed within the womb. The testimony of able writers may be adduced in favour of it also.

"In the earlier stages of pregnancy especially, general and local plethora frequently presents itself." (Cazeaux.) "In pregnant women a physiological condition appears in which there is a positive augmentation of the mass of blood relatively to the capacity of the vessels." (Becquerel and Rodier.) "There is a tendency to the production of more blood than formerly." (Burns.)

"The general state is said to be one of plethora." (Churchill.) "The state of pregnancy is one of increased vascular action, not only in the great organ primarily affected, but generally throughout the system, by which a disposition to plethora is created." (Montgomery.)

Authorities might be multiplied indefinitely, for nearly every writer on the subject expresses the same opinion respecting the state of the system at this important period. Now, whatever may be the views of these authors, respecting the exact definition of the term plethora, there can be no doubt of the fact which they intend to assert, that a condition of excitement, of ultra health, of increased vital activity, attends and characterizes pregnancy in its development and progress.

This disposition to the establishment of inflammatory action, fevers, acute affections, &c., is so imminent as to require the production of a certain method of relief to the economy, whereby its normal condition may be secured and retained. A kind of safety valve is established through which this morbid proclivity may work itself off, without producing disease to the system. Thus, Denman has remarked, "It is a popular observation, that those women are less subject to abortion and ultimately fare better, who have such symptoms as sometimes attend pregnancy, than those who are exempt from them." Nausea, vomiting, disgust for food, &c., serve to restrain the disposition to disease characteristic of this condition, and to keep up the natural balance in the system, by lessening the quality of the circulating fluid, diverting nervous excitement, preventing plethora, and developing that state in the economy which is essential to the perfection of nature's most important work.[1]

Nothing is perhaps more indicative of the existence of this state of repletion, than the necessity which presents itself for the employment of the lancet, and the unanimity with which its advantages have been recognized by the profession. It is true that Hippocrates declares, "mulier in utero gestans, incisa vena abortit, idque magis si est fœtus auctor;" but his opinion is based upon the supposition that the suppression of the menses indicates a *necessity* for a superabundance of blood, and that its abstraction is in opposition to a law of nature. He, however, *purged* pregnant women excessively, as a means of preventing the appearance of plethora; and thus assisted in the establishment of a principle in direct opposition to that which he has enunciated in the 35th aphorism of his 5th Book.[2] Fernel was the first who dis-

[1] Churchill, Dewees, *et al.*

[2] 1558.

sented from the views of the sage of Cos, and bled pregnant women. He expresses himself in the following manner:[1] "Il ne sera pas hors d'apropos d'examiner si la grossesse doit être une contre indicacion a la saignée. Des considerations spécieuses appuyées sur l'avis d'Hippocrate, nous engageraient à la reserve lorsque il s'agit des femmes enceintes, même atteintes d'une maladie grave dans la vue du fœtus, qui pourrait en souffrir. Mais il n'est nullement constant de voir avorter une femme enceinte à laquelle on ouvre la veine, pas plus que de voir mourir necessairement une femme enceinte atteinte d'une grave maladie."[2] Guillemeau, who lived towards the end of the 16th century, sustains Fernel and gives both rules and reasons for the use of the lancet in pregnancy. Mauriceau says, that in his time (17th century) nearly all pregnant women insisted on being bled at half term, and the seventh month. He makes a just criticism on the teachings of Hippocrates in the following words: "Cet aphorisme ne nous doit pas defendre l'usage de la saignée quand le cas le requiert; mais il nous fait seulement connaitre, qu'il s'en faut servir avec une grande prudence, d'autant qu'il y a telle femme qui a besoin d'être saignée trois on quatre fois, et quelquefois davantage pendant sa grossesse, et a une autre deux seulement suffisent." In the first half of the 18th century, Dionis, Puzos, and Lamotte speak of *preventive* bleedings, and recommend the employment of the lancet. Dionis thinks that a woman should be bled at four months and a half, at the seventh month, and again at the eighth month, if plethoric symptoms continue to present themselves. He gave as reasons for the employment of the lancet, the following facts: a larger amount of blood is produced than under ordinary circumstances; an unusual supply is retained in consequence of the suspension of the menses; those women who menstruate during pregnancy are healthier than those who do not; and plethoric symptoms are relieved by this remedy with facility and certainty. Puzos advocates bloodletting also, but insists that the number of bleedings requisite for the proper control of morbid symptoms, cannot be fixed upon in advance. Levret bled in the cases marked by plethoric tendencies, and recommended the lancet as an invaluable agent in the accidents incident to that particular condition. The ablest writers of the 19th century have approved and tested those principles thoroughly. Thus, Gardien, Velpeau, Dubois, Piorry, Andral, Cazeaux, Becquard, Rodier, Chailly, and many others, have arrayed themselves among the advocates of the lancet, and borne irrefragable testimony in support of its utility, propriety, and necessity, in the arrest of that plethoric condition developed by pregnancy in the female system. Denman affirms that "venesection is found useful even in those constitutions which do not ordinarily bear it well." Dr. Burns says, "it is necessary frequently to lessen plethora and local irritation by bloodletting." Dr. Dewees draws the following conclusions, after a thorough examination of the whole subject: "Women bear

[1] Ferneli Opera, liv. 2d.

[2] See Guillemeau, 1698, p. 30, et suiv.

the loss of blood better when pregnant than at any other time. The acute diseases of pregnant women require a more extensive use of the lancet than under ordinary circumstances." But it is useless to multiply authorities, as it might be done indefinitely, for the opinions thus expressed are held by the ablest writers of all countries at the present day. From a consideration of these authorities and the facts to which they have testified, the following conclusions are inevitable:—

(1.) The utility of the lancet in pregnancy has been demonstrated.

(2.) This utility depends upon the fact that a disposition to plethora exists in connection with that condition.

It must be explained, however, in this connection, that the term plethora is not employed in the limited sense of a mere excess of red globules, as defined by Andral, but as meaning either an augmentation of the whole volume of the circulating fluid, or the increase of some one of its vitalizing elements. An examination of the blood will not only show that there has been more formed than usual, but that fibrin, its most essential principle, is largely increased. According to Becquerel and Rodier, the average proportion of red globules in man is 141 to 1000 parts of blood; and in woman 127. This average decreases progressively during pregnancy, not because the blood becomes impoverished, but in consequence of the great demand for fibrin, and the extraordinary production of that material.[1] During the first months, it remains at from 116 to 126; in the sixth and seventh months it averages between 100 and 120; whilst towards the close of the process it varies from 90 to 100. Albumen is about 70 in the state of health; in pregnancy it descends below 60. Fibrin is never found below the ordinary standard, but is always above it. Its average toward the end of pregnancy varies between 3.69 and 4.69, lower than in any other pathological state.[2]

Respiration is slightly increased, in the first instance, but diminishes subsequently as the uterus enlarges.[3] Thus, the process of oxidation does not take place so rapidly in that organ, and the principal burden of depuration is thrown upon the liver. The nervous system is in a state of excitement, as is shown not only by increased vital action, but by the wakefulness, watchfulness, &c., which distinguish the pregnant state.

The secreting functions participate in the general excitement, as must result from the altered condition of the nervous mass, and as is established by the *action* of the *salivary glands*, the state of the skin, &c., at this critical period of feminine existence.

Thus, from the character of the process which is accomplished during pregnancy, it is evident that the absence or subsidence of all organic disease is demanded by nature, for the perfection of her most important work; whilst an examination of the changes of the uterus itself, and the organism at large, clearly demonstrates the establishment of a condition of increased nervous energy, of extraordinary vital action, and of ultra health.

[1] Simon, Regnault. [2] Andral and Gavarret. [3] Rokitansky.

Article 2.

Having considered the nature of phthisis, together with its effect upon the economy, and discussed the changes which accompany and distinguish pregnancy, I shall now attempt to contrast the two, for the purpose of showing the antagonism between them.

(1.) Phthisis has two stages, the first marked by those symptoms which distinguish the tubercular diathesis; the second characterized by the deposition of tuberculous matter in the lungs. Both are essentially morbid, depending upon positive nervous debility, marked by low vital action, and attended with distinct organic changes, of a low asthenic nature, throughout the entire system.

Pregnancy implies the existence of a physiological process in the economy, having for its prerequisite a certain amount of health, demanding the arrest of organic lesions as an essential condition to its progress and perfection, and producing a state of repletion, in which the vital principle attains its full maximum of development, and the system is predisposed to the highest grades of action.

(2.) Phthisis is distinguished by the presence of *feeble and flabby muscles*,[1] loss of strength, emaciation of person, and anæmic appearance.

Pregnancy is marked by the extraordinary enlargement of the uterus, which is *composed chiefly of muscular* tissue, increase of strength, rotundity of person, and plethoric appearance.

(3.) Phthisis is preceded and accompanied by a positive impairment of the digestive process; a condition in which the nutritious elements of food are improperly prepared for the use of the economy; a state which precludes assimilation, both because of a defect in the pabulum supplied, and a diminution of the formative power of the tissues. Pregnancy is frequently attended with an *interruption* of the process of digestion, resulting, not from any inabilty of the parts concerned to perform their natural functions in its accomplishment—not because nutritive elements are deficient or defective—not for the reason that the tissues cannot appropriate the organizable elements upon which they live, but in consequence of some disturbance of nervous energy, or in obedience to that instinctive sympathy which teaches particular organs to respond to the necessities of the organism.

(4.) Phthisis has among its essential elements an alteration in the components of the circulating fluid. Albumen is defective and superabundant; red globules are not produced in their normal quantity, and fibrin loses its powers of organization, and is materially diminished in quantity. As a consequence of these changes, extravasations occur readily, neither organizatiou nor appropriation takes place, and depositions are made throughout the system, amorphous in their character, albuminous in composition, and distinctive in their effects upon the economy.

[1] Aré'ée.

Pregnancy also produces alterations in the blood, but they differ materially from the above. Albumen remains fixed; red globules diminish in quantity in consequence of the great demand for fibrin; and fibrin increases up to the highest possible ratio. The result of this change is manifested in the products of the uterus; for there is not only developed within its cavity a fœtus, consisting principally of protcinaceous elements, but membranes, bloodvessels, and nerves, which are essentially fibrinous in their origin and constituents; all of which are the direct consequences of a high physiological act, and subservient to the most important purposes known to the economy.

(5.) In phthisis the great burden of combustion and depuration falls on the lungs; the balance maintained between them and the liver is destroyed, and the hepatic functions materially interfered with. The pancreas, salivary apparatus, skin, and secerning functions generally, are rendered torpid or irregular, whilst the fluids peculiar to the various organs are altered in quantity and quality.

In pregnancy the balance is disturbed, but the burden falls on the liver.[1] The cavity of the thorax diminishes in capacity as the fœtus is developed, so that the lungs have less work to perform, which of course imposes the labour of depuration on those organs that have a corresponding function. The skin, also, for this reason, excretes with unusual rapidity, and lends a powerful assistance towards maintaining that equilibrium which is essential to health. The pancreas indicates no debility or derangement, but secrete properly that fluid whereby oleaginous elements are prepared for assimilation. The *salivary organs* are particularly active, as has been remarked by all writers on this subject. Thus, it becomes evident that the state of pregnancy is characterized, not by torpor of the organs and deficiency of the fluids, but by a state of great functional activity throughout the whole system.

(6.) In phthisis, a state of absolute depression or debility manifests itself in the entire nervous mass, so that the normal amount of nervous influence is neither generated in the centres nor transmitted to the organs.

In pregnancy there is a condition of exaltation, of excitement, of unusual action, developed in the nervous system, as is shown by the restlessness, irritability, reciprocal sympathy, and activity of function which attend its progress. Nervous tissue even becomes hypertrophied from excessive health, for the nerves of the uterus are not only found more sensitive, but positively enlarged during the continuance of the state of gestation.

(7.) In phthisis, tonics and stimulants, both local and general, are particularly *indicated*, whilst the employment of depleting measures is not only uncalled for, but positively dangerous to the patient.

In pregnancy, tonics and stimulants are contra-*indicated*, for they serve but to increase the tendency to plethora therein developed. Antiphlogistic measures, on the contrary, are rendered necessary by this state of general reple-

[1] Rokitansky, Montgomery, Burns, and Chailly.

tion, and play a most important part in the subjugation of all those morbid affections to which women are liable during the progress of fœtal development. In a word, an examination of phthisis and pregnancy clearly demonstrates that they are essentially different and antagonistic, both as regards their intrinsic character, the manner of their development, and the nature of the results which they produce in the economy. If, then, the doctrines of Hahnemann be true, the coexistence of these two opposite conditions is possible, and the progress of phthisis will not be restrained by the development of pregnancy. But, on the other hand, if the principle of "antagonism" already illustrated constitute, in fact, the great basis of therapeutical action, the existence of pregnancy must operate as a restraint upon the continuance of the tubercular diathesis.

It is hardly necessary to assert, in this connection, that phthisis does materially interfere with those processes whereby pregnancy is developed, for it is well known that morbid conditions cannot favour the consummation of a purely physiological act, and that a suppression of the menses is one of the earliest and most constant symptoms of the tubercular cachexia. Of course, it is far easier for a woman to become pregnant, when thus affected, than for phthisis to originate and progress during the continuance of the state of gestation, for the obvious reason that health is the *normal state* to which there is always a natural proclivity; and that Providence invariably manifests wonderful wisdom and foresight in dealing with final causes. Here, then, are two states sustaining certain reciprocal relations, which render them mutually dependent upon each other. One, by reason of the characters upon which these relations are based, serves as a check upon the other. What, then, must be the nature of the influence exerted in return? It must evidently be, one of control, of opposition, of restraint. The *second* must affect the *first*, just as the *first* affects the *second*, and it is proper to conclude that pregnancy retards the development of tubercles in the lungs.

Phthisis makes itself known by a set of phenomena of a particular character. Pregnancy is distinguished by phenomena entirely dissimilar and antagonistic. Their coexistence implies the continuance of two opposite conditions in the economy, and involves nature in the contradiction of perfecting antagonistic processes,[1] each affecting the system in all its parts and powers, at the same time and under identical circumstances. The natural antagonism between health and disease—between a state purely *physiological* and one essentially *pathological*, is sufficient in itself to account for the restraining influences which are reciprocally exerted by those two conditions; and thus for a double reason the antagonism between phthisis and pregnancy is rendered clear and palpable.

[1] See St. Hilaire, Meckel, Rudolphi, Serres and Vernois.

CHAPTER III.

Article 1.

In speaking of the special causes whereby the deposition of tubercles is effected, I mentioned that their potency depends upon a certain capability of producing irritation or congestion in the tissue of the lungs. So manifest is the fact, that the appearance of tubercles in the lungs is preceded by some irritation of their structure, that many accurate observers have maintained that phthisis originates exclusively in such a condition. Laennec has exploded this idea in a masterly manner, whilst Louis, Andral, and Grisolle have sustained his position by an array of facts and argument perfectly satisfactory and overwhelming. That irritation, congestion, &c., do play an important part in the development of phthisis, can be easily established, both by a reference to authorities, and an examination of the phenomena connected with that disease.

Wood declares: "Anything which is capable of irritating or inflaming the lungs; of producing an unusual influx of blood; or an unusual secretory effort, acts as an exciting cause to the deposition of tubercles in those predisposed to them."

Laennec says: "Although inflammation cannot by itself produce tubercles, it may *hasten* their appearance, in the same way as a soil well tilled after a long fallow, or left fallow after several years' culture, will cause many seeds to germinate which had lain within it in a state of inactivity for several years."

Cruveilhier gives the following experiment: "I injected through an opening made in the trachea of a dog, two ounces of mercury, the greater part of which was rejected by coughing. The dog, however, did become apparently phthisical, and did emaciate. At the end of two months the lungs were crammed with tubercles, both isolated and agglomerated."

Jackson affirms, "that the most usual exciting causes of pulmonary tubercles are, neglected catarrhs, and pneumonias of a feeble grade."

Bayle even declares, "that pleurisy, pneumonia, exanthematous diseases, &c., are sometimes the cause of phthisis, but for the most part, they only hasten its advent."

Morton says, "Et equidem non dubito quin in herpes morbi primordiis catarrhi, tussesque communis frequenter in phthisim pulmonarem degenerare soleant."

Hufeland believes that, "more than half of consumptions are the results of catarrhs."

Van Swieten affirms that, "pulmonary congestion is the principal cause of the development of phthisis."

Baron and Fournet have maintained the same opinion, whilst Andral ad-

mits that "hæmoptysis is in many instances the first step towards tubercular deposition, as well as the sure evidence of the local implication."

Stokes and Clark affirm, "that some congestion of the lungs always precedes the development of tubercles."

It is well known that those influences which interfere with the functions of the skin, and thus give a centripetal direction to the current of the blood, operate powerfully in developing the disease. A phthisical predisposition is also particularly characteristic of puberty, for the reason, that there is a concentration of nervous and vascular energy upon the lungs at that period.

The invasion of consumption is also especially favoured by those occupations in which pulmonary irritation is constantly developed. Thus, stone-cutters, scissor-grinders, &c., are particularly liable to phthisis.[1]

Lieutaud and Portal furnish instances in which phthisis resulted from the irritation occasioned by continued fever.

Amestoy gives the case of a man who foolishly attempted to swallow a nail, which unluckily fell first into the trachea, and then lodged in one of the bronchi. This produced an irritation of the parts which resulted in death. A *post-mortem* examination revealed the fact, that the lungs had been filled with tubercles.

Louis tells of a young butcher who received a violent blow on the chest, and died of consumption in a very short time. From a consideration of these facts it is evident, that in addition to the general predisposition to phthisis, a certain amount of local irritation or congestion is necessary to the completion of the morbid series which constitutes the disease.

Whatever, then, operates in such a manner as to prevent or relieve that irritation, and to render the lungs less susceptible to the causes which produce it, must exercise a most healthful influence upon those predisposed to phthisis, and resist the onward march of the disease, even when its particular diathesis has been established.

Article 2.

I shall endeavour to prove that pregnancy necessarily opposes this sanguineous determination to the lungs, and resists the establishment of that irritation upon which the development of tubercles depends.

(1.) The great principle of derivation and revulsion is universally appreciated by medical men, and constantly invoked in the treatment of disease. Derivation, in a therapeutical point of view, signifies that action by which the circulating current and nervous energy are drawn towards a particular point, as a means of diverting them from a part in which they are producing morbid accidents. According to Nysten, it is "an artificial excitation designed

[1] See Reports of Lombard, Dumeril, and Benoiston de Chateau-neuf. Archives Générales, 1830.

to break up a tendency which manifests itself in the fluids and forces to concentrate themselves wherever a centre of irritation exists."[1]

In the human system there is only a certain capacity of nervous action and a definite amount of blood.[2] Whenever there is a nervous or sanguineous concentration upon one point, there must necessarily be a deficiency elsewhere, and hence, the philosophy and importance of the principle of derivation in the treatment of disease.

The value of revulsion in the arrest of phthisis, can be made evident by a reference to a few acknowledged facts.

The use of blisters, setons, issues, &c., has been resorted to from the earliest times, and has been found of extreme importance in the management of consumption. Exercise, by giving a centrifugal direction to the circulating current, and by stimulating the skin, &c., to proper action, frequently produces a most happy result upon the progress of that disease. Intermittent fever[3] exercises a controlling influence upon phthisis. Fistula in ano connects itself in a special manner with phthisis, and frequently retards its march, and prevents the deposition of tubercles.

Emetics have been employed in the treatment of consumption from a very early period. Many able writers maintain that the most effectual method of relieving the morbid state upon which the development of tubercles depends, is to be found in the free use of emetics. Morton particularly recommends them, and he is sustained by Robinson, Reid, Dumas, Holland, and Carswell, all able writers and eminent pathologists. Giovanni di Vittis has given this class of remedies a most thorough trial, and is convinced of their great utility, especially in the early stages of phthisis. Piorry, Bouillaud, Trousseau, Valleix, Louis, Andral, Rogie, Lisfranc, and many others, have tested the merits of this plan of treatment, and testified to its efficacy in preventing the deposition of tubercles, and arresting the march of that cachexia which precedes and produces their development in the pulmonary tissue.

These facts clearly establish that consumption may be arrested before it is fully developed or perfected by the deposition of tubercles; and it follows as a necessary deduction, that when it can be established that a particular process diverts the fluids and forces of the system towards another organ, it is fair to attribute to that process certain curative powers and preventive influences in connection with the progress of the tubercular cachexia.

(2.) As soon as impregnation is effected, the uterus and its appendages become the seat of most important physiological actions and organic changes. Under the influence of the process thus established, these parts are made centres of nervous and sanguineous determination, to an extent that can only

[1] "Fluentium humorem revulsio me dela est derivatio autem eorum qua jam obsiderant membrum."—GALEN.

[2] Holland's notes. Tweedie's Practical Medicine.

[3] See Mémoire de M. Carriere, Bulletin de l'Académie de Médecine, 1844–5. Mémoire par M. Lefevre, Bulletin de l'Académie, p. 968, vol. x. &c.

he comprehended by a consideration of the wonderful results which are there accomplished. The development of the fœtus; the elaboration of organized membranes; the increase in the vascular apparatus of the organ; the formation and hypertrophy of the nervous filaments distributed to its tissues; and the perfection, in fact, of nature's highest and most complicated physiological work, demonstrates the necessity for the presence of a full tide of blood and nervous energy in the parts concerned in this important process, and proves that such a concentration has been effected. As a necessary consequence the whole system feels the effect of this derivation; and the lungs, in common with all other organs, are relieved both from the predisposition to irritation and the congestion which has been effected in them. Thus it becomes evident that the arrest of phthisis in those predisposed to it—that is, before the disease has been confirmed by the development of pulmonary irritation, &c., and the deposition of tubercular matter—is in direct conformity with an established law of nature, and that a denial of the fact involves the plainest principles of therapeutics in an interminable labyrinth of contradictions.

Article 3.

But pregnancy is not only opposed *per se* to the continuance of the tubercular diathesis, as has been shown above; it operates also by means of its secondary effects—if such an expression may be employed—in the arrest and removal of this particular cachexy.[1] Thus by diminishing the cavity of the chest, it exposes a smaller quantity of pulmonary membrane to the influence of external causes, and renders the lungs less liable to disease of an inflammable character; whilst by the pressure of the gravid uterus against the liver, stomach, pancreas, &c., it stimulates these organs to increased action, and gives additional relief to the one already suffering.

Again—some of the means whereby nature relieves herself from morbid predisposition,[2] serve in a most effectual manner to remove pulmonary irritation, and even to produce the discharge of abnormal products after they have accumulated in the lungs.[3] It is well known that one of the most frequent symptoms which presents itself in connection with pregnancy, is excessive nausea and vomiting. Now, as I have shown before, emetics are of great benefit in the tubercular cachexia, for the reason "that they prevent the development of pulmonary irritation,[4] and remove both congestion and unnatural products from the air-passages and the subjacent vesicles." It is manifest that the vomiting which connects itself with pregnancy, must operate in the same manner, and thus another excellent reason is furnished for the arrest of tubercular deposition in those predisposed to phthisis, by the development of that particular symptom. It is possible also, that hæmorrhoids, which are frequently produced by pregnancy, may serve as a centre of irritation and a

[1] Rokitansky. Manual of Morbid Anatomy.
[2] Denman.
[3] Carswell.
[4] Holland's Notes.

source of relief, in the same manner as fistula in ano usually does, and that in this way some retardation of the progress of phthisis may be effected.

Holland, in his *Medical Notes*, affirms, that nothing exercises a more potent influence upon the development or prevention of disease than the concentration of the attention upon any particular organ. This must be admitted by every careful observer of morbid actions, and is received as a truism by the profession. What can give more fixedness and concentration of attention than the expectation of being impregnated, the assurance that pregnancy has been established, and the certainty of becoming a mother? With what constant watchfulness must that woman regard her womb, who perceives that her menses have been arrested, that her abdomen is enlarging, and that a child is developing itself within her bosom? And if it be possible for disease to be removed from an organ, and for the nervous influence and sanguineous current to be directed upon another by any mental effort, under what circumstances could it be so well accomplished as when the uterus is engaged in the act of reproduction, and employed with all the changes, alterations, and labours incident to that important process? Here, then, is another reason for attributing to pregnancy the power of arresting the progress of tubercular deposition.

The object of pregnancy is to reproduce the species and perpetuate the race. Like all other physiological acts, it requires certain conditions for its perfection, which nature labours to supply with a generous and intelligent hand. Health is essential to the proper performance of all vital actions, and the amount of health demanded is always in direct proportion to the importance of the physiological process. Pregnancy implies the existence and progress of the most important process known to the economy. Its successful accomplishment requires, consequently, the maximum development of vital power, and the nearest approach to the normal standard of which the organism is capable; and hence, its proper performance is an evidence of the abatement of all serious morbid action, and the establishment of a condition essentially antagonistic to the invasion and progress of disease. This statement is verified by the following facts:—

(1.) Most women increase both in size and strength during the period of gestation.

(2.) Women who bear children habitually enjoy better health than those who do not.

(3.) Pregnant women are less susceptible to the influence of contagious diseases, epidemics, &c., than others who are in a normal condition, as has been affirmed by Bayle, Andral, Montgomery, Ashwell, Sydenham, and many others.

Thus it is evident that nature attempts to throw safeguards around this important process by inducing that condition most essential to its success, and by arresting every action calculated either to interfere with its progress or to prevent its consummation. From these considerations it is plain, that pregnancy must tend to prevent the progress of consumption with those in whom the tubercular diathesis has been established.

CHAPTER IV.

Article 1.

As I have thus attempted to establish by facts and arguments that pregnancy arrests the development of tubercles, I shall now endeavour to sustain that position by a reference to authorities.

"Dès qu une femme est grosse, les probabilities de sa vie augment."—*Gardien.*

"Where women who have been labouring under certain forms of disease happen to conceive, the morbid affection previously existing is oftentimes checked or even altogether suspended for a time, as has been frequently observed of persons affected with phthisis."—*Montgomery.*

"In a great majority of cases the symptoms of phthisis are suspended, or at least remain stationary during pregnancy."—*Andral.*

"It is a remarkable circumstance that pulmonary consumption is very generally suspended in its progress by pregnancy."—*Eberle.*

"During the progress of pregnancy consumption seems to be suspended."—*Heberden.*

"Des deux femmes phthisique au même dégré celle qui dévient enceinte, arrive surement au terme de la gestatione; tandisque l'autre périra avant le temps."—*Rozier de la Chassagne.*

"Phthisis pulmonalis frequently becomes modified during pregnancy, and is succeeded apparently by perfect health."—*Chailly.*

"A very salutary change is effected in the whole system, so that persons enjoy better health during pregnancy than at any other time."—*Burns.*

"The effect of disease seems also, in many cases, to be suspended during pregnancy. I do not recollect a single instance of any consumptive woman being unequal to her delivery, or having her fate hastened by it."—*Denman.*

"In females affected with pulmonary phthisis which has not reached the hectic stage, pregnancy goes on well to the full term. The progress of phthisis is often modified, and sometimes really arrested."—*Jacquemier.*

"You can understand, too, why this morbid nutritive activity, this disposition to deposit albuminous matter, should be shown in woman after the completion of utero-gestation, and in persons on the speedy healing of large suppurating wounds; circumstances which, as they continue, are known often to suspend the progress of consumptive disease."—*Williams.*

"Pregnancy cures hæmoptysis and hemorrhages distant from the uterus; chronic diseases are rendered slow in their progress, and some are cured; whilst a temporary benefit is experienced in phthisis."—*Nauche.*

"I cannot conclude better, than by a quotation illustrative of the effects of pregnancy upon existing diseases, with which, I may add, my own experience perfectly agrees. 'We have sufficient evidence to justify the belief, that pregnancy acts in a great degree as a protective against the reception of disease, and apparently on the common principle, that during the continuance of any one active operation in the system, it is thereby rendered less liable to be invaded or acted on by another; thus it has been observed, that during epidemics of different kinds, a much smaller proportion of pregnant women have been attacked than others; and when women who have been labouring under certain forms of disease happen to conceive, the morbid affection previously existing is either greatly checked, mitigated, or even altogether suspended.'"—*Churchill.*

"Nature assumes her rights, and combats every disease while this important process (pregnancy) is going on."—*Parr.*

"The fact that pregnancy not only checks the advance of existing tuberculosis, but also excludes its development, may be thus explained. As the abdomen enlarges, the thoracic cavity becomes encroached upon, and, the parenchyma of the lungs being exposed to pressure, a condition of venosity results. This is doubtless the reason why the fœtus is scarcely ever, and the placenta very rarely, tuberculous."—*Rokitansky.*

"They (consumptions) are often checked by the return of mild weather, but perhaps even in a still more remarkable manner by pregnancy."—*Gregory.*

"That pregnancy has almost an invariable tendency to suspend phthisis, is notorious. This I have known very strikingly illustrated in several cases, in which every symptom of pectoral affection ceased during the period of gestation."—*Chapman.*

"Nature, attentive to her work, seems to forget everything to carry it to perfection. The progress of fatal diseases is retarded, and pregnant women labouring under phthisis, who, in the usual course of that complaint, would soon perish, go through the regular period of utero-gestation."—*Richerand.*

"The symptoms of consumption are generally arrested, or at least greatly mitigated, during pregnancy."—*Morton.*

"Tubercular disease is rendered latent, or at least masked, by a peculiar condition of the system, or by the presence of other diseases. Pregnancy appears to retard, if not to suspend, its progress."—*Clark.*

"The arrest of phthisis is owing to that powerful excitement which the uterus receives at this critical and important period, by which the irritative pulmonary actions are subdued, and the impetus of vascular action directed into another course."—*Reid.*

This opinion numbers also amongst its supporters, Baumer, J. Frank, Bordeau, Portal, Dugès, Sydenham, Good, and many others of equal merit and respectability; and, in fact, has been almost universally accepted by medical men, from the days of Hippocrates down to the present time.

Article 2.

M. Dubreuilh[1] presented a communication to the French Academy in 1852, which utterly rejects the doctrine of antagonism between pregnancy and phthisis, and attempts to establish that the progress of tubercular development is really hastened by that particular condition. M. Grisolle,[2] who was appointed to report on the subject, fully sustains these conclusions, and adduces additional arguments in support of them. Neither of them, however, has examined the physiological questions involved in the inquiry, whilst both base their objections to the established doctrine on the subject upon the observation of a comparatively small number of cases of *well-developed phthisis* which have been brought within the pale of their experience. It is true that they appeal to Louis,[3] and invoke his experience and teachings in support of their positions; and, by a species of special pleading, succeed in making a very good case for themselves. They can, however, be easily met and answered, as I shall demonstrate in a few words.

1. Even if their conclusions are correct, nothing is established in opposition to the views presented in this paper. My object has been to show that pregnancy *prevents the development* of tubercles in those *predisposed to phthisis*, whilst they have laboured to prove that it does not ARREST phthisis itself, *when actually established*. It is certainly true that I have adduced facts, arguments, and authorities in support of the power of pregnancy to retard or prevent the progress of phthisis proper, but it has been done with especial reference to the establishment of an antagonism between that condition and the actual deposition of tuberculous matter, when only the tubercular cachexia exists. I have intended to show that if pregnancy mitigates, conceals, and actually arrests consumption when fairly developed, then, *à fortiori*, it must retard the deposition of tubercles in those *predisposed* to phthisis. This is the point at issue; and as the deductions of these gentlemen do not affect it in the slightest particular, the conclusion is inevitable that they have established nothing in opposition to the position assumed in this paper. I have shown that the *spark* may be extinguished by certain means; they attempt to prove that these means do not arrest the *flame;* so that the question which I have endeavoured to solve is not in the least degree decided by their investigations.

2. They have not established their position. The thirty-five instances to which they have referred, in support of their views, prove nothing when compared with the thousands of cases upon which the opinions of so many writers have been based. The authorities which maintain the existence of this "antagonism" are far more numerous than the cases collected and reported by these learned Frenchmen; and thus it becomes evident that they have done nothing towards the overthrow of this long-established and most logical hypothesis.

[1] Mémoire par Charles Dubreuilh, Bul. Académie de Médecine.

[2] Bul. de l'Académie de Médecine, tom. xvii. p. 14.

[3] Louis gives no positive opinion on the subject, and says he has not formed one.

When they have proved that pregnancy and phthisis develop conditions which are identical in their nature and similar in their results upon the system at large; when they have reconciled their necessary contradictions and peculiar antagonism, and established that an act purely vital and a process essentially morbid require like conditions for their perfection, the same laws for their government, and reciprocal support for their very existence, then will they have done something towards the overthrow of principles which the common experience of professional men proclaims to be true, and the establishment of more enlightened and logical doctrines of medical philosophy. To those acquainted with French hospitals, it will hardly be necessary to say that thirty-five cases selected from their wards, for the purpose of sustaining a foregone conclusion, do not furnish a sufficient basis for the foundation of opinions which are to establish a new principle in regard to a matter of the first importance to the medical world.

It may be urged that the fact of the development of various morbid symptoms in connection with pregnancy is an evidence that it may be perfected in conditions opposed to the normal state. To this I will answer, *first*, that these symptoms do not indicate the existence of any serious organic change, but, on the other hand, they establish the excessive development of the vital principle, and show that the peculiar state which is most antagonistic to tubercular progress has been produced to an extent that requires the intervention of nature to restrain it within proper limits; and, *secondly*, that they do not possess any morbid character when compared with that condition which, in the wisdom of Providence, they are designed to relieve.

Again, to suppose that a physiological process and a pathological action require the same conditions for their consummation, and similar laws for their government, is to convict nature of a contradiction which compromises both the wisdom and goodness of its author, whilst it precludes the study of natural phenomena upon rational principles, and prevents all advancement in the science of medicine. The universal law[1] that "nature is infallible, incapable of contradictions, and has but one plan in her views of organization," has long furnished the light by which scientific men have conducted their investigations, and supplied the only certain guide in the attainment of truth. The antagonism between pregnancy and phthisis demands, then, the suspension or arrest of this disease when the state of gestation is developed.

Article 3.

It may be affirmed that the proportion of females who die of consumption is greater than that of men, and that there can be no great conservative influence which operates for their protection. There is, however, no positive evidence of this fact; and, even if it were true, it would prove nothing in opposition to my hypothesis. It is true that Louis, Laennec, Papavoine, and Andral

[1] Geoffroy St. Hilaire.

agree that a majority of phthisical cases occur among females, yet Bayle, Clark, and others have doubted the truth of their conclusions, and furnished statistics in contradiction of them. The following table is given by Clark:—

At Hamburg,	out of	1,000	cases,	555	were	males, and	445	females.
" Rouen,	"	100	"	56	"	"	44	"
" Naples,	"	697	"	382	"	"	315	"
" New York,	"	2,954	"	1,584	"	"	1,370	"
" Genoa,	"	133	"	71	"	"	62	"
" Berlin,	"	620	"	328	"	"	292	"
" Sweden,	"	3,948	"	2,088	"	"	1,860	"
"	"	6,157	"	3,054	"	"	3,103	"
" Stuttgard,	"	500	"	256	"	"	147	"

Dr. Duncan shows from the Registrar's Report, the following facts: Out of 10,000 of the population of London, 828 died of consumption, of whom 457 were males and 371 females, and of the 936 who fell victims to phthisis in Birmingham, 526 were men and 410 women.

From these tables it is evident that the question of relative mortality is by no means a fixed one, and that there are good reasons for doubting the conclusions of Louis and Laennec in regard to the subject. In many thousands of instances at least, a great protecting principle has manifested itself in connection with the female system, and it is evident that without some such conservative influence the number of women who die of consumption would far exceed that of men, for the reason that their physical conformation, mental qualities, moral character, and natural habits, render them particularly susceptible to the action of those causes whereby phthisis is produced. That this immunity and protection are due to the effects of utero-gestation is evident from the following considerations:—

(1.) Pregnancy, as shown before, produces a condition of antagonism in the economy.

(2.) Pregnancy is a vital process, a high physiological act, and hence its existence is incompatible with the progress and perfection of a purely morbid effort.

(3.) Pregnancy diverts the forces and fluids *from* the lungs, and *to* the uterus.

(4.) Pregnancy is regarded by a large majority of medical men, as antagonistic to the march of consumption.

(5.) Pregnancy depends upon the existence of certain susceptibilities which are inherent in the female system, and hence it is more *universal* in its operation than any other imaginable cause.

(6.) Pregnancy, coition, &c., are particularly desired by women affected with phthisis, which constitutes a *pointing* of *nature* towards a *remedy* for the evils by which the system has been invaded.

But even if more women than men die of consumption, it establishes nothing in conflict with the position assumed in this paper.

If the natural predisposition of the two sexes were the same, and the influences around them identical, then the fact of a greater mortality among women would demand the interposition of some general cause in the production of the unequal result, and pregnancy might be assumed as that cause, both for the reason that it connects itself with the organ which has the most important part to play in the female system, and because of the *universality* of its operations. But it is entirely unnecessary to introduce any such influence for the purpose of explaining the inequality of men and women in regard to the effects of phthisis. It can be explained by a reference to the natural differences between the sexes, without searching for other causes than those which necessarily connect themselves with the progress of the disease.

Woman is naturally more delicate than man, whilst her natural susceptibilities to morbific agents are increased by her education, her passions, and her peculiar habits of life. For these reasons, consumption develops itself with more facility in their systems than in those of men, and hence, the fact of their greater mortality can be accounted for, without attributing to pregnancy any agency in effecting it. Thus, it becomes evident that though a greater ratio of women may fall victims to phthisis, pregnancy cannot occasion the difference; and as a consequence, it follows that the statements of Louis and Laennec do not contradict the assertions of this paper.

Besides this negative argument, another of a more positive character may be drawn from these considerations.

There is a natural inequality in the relations which the two sexes sustain to phthisis, dependent upon differences of conformation and character—*plain*, *palpable*, and *conspicuous*. An examination of phthisical statistics should show, then, a decided preponderance of female victims; it should demonstrate that the difference between the number of women who die of consumption and the number of males attacked, is as great as their dissimilarity of original predisposition. The fact that a larger proportion of females fall victims to phthisis, should be as *plain*, *palpable*, and *conspicuous*, as that they are more susceptible to those influences which produce the disease. But, as has been shown above, in a large number of instances the statistics of tubercular affections prove, that, notwithstanding the original predisposition of women, and their greater susceptibility to the influences whereby phthisis is developed, the proportion of victims among males is greater than among females; and even if these tables do not establish the rule in this matter, they certainly demonstrate, that so far from its being a fact, *plain*, *palpable*, and *conspicuous*, that more women die of consumption than men, the whole subject is so involved in doubt and obscurity as to justify the most contradictory opinions, and to demand much careful attention and patient research for its proper elucidation.

Some agent, then, most potent in its influence, and universal in its operation, interposes itself for the purpose of equalizing the account between the two sexes, and making up for their natural differences in this particular.

Pregnancy, as shown above, most completely fulfils all the conditions involved in the existence and operation of such an influence, and hence, it is proper to conclude, that it is the equalizing cause to which this result is attributable. I will state the argument more clearly:—

(1.) There is an inequality in the relations which men and women sustain to phthisis; the former being less liable to it than the latter.

(2.) This inequality depends upon certain differences of conformation, &c., which are *plain*, *palpable*, and *conspicuous*.

(3.) An examination of phthisical statistics should show that more women fall victims than men, and that the difference in the relative mortality of the two is as *plain*, *palpable*, and *conspicuous*, as their original dissimilarity of constitution and predisposition.

(4.) An examination of statistics proves, that *it is not* a settled *fact* that more females are destroyed by this malady, and that there is a positive approximation towards *equality* in the effects of phthisis upon the two sexes.

(5.) This "approximation towards equality" shows the operation of some great equalizing cause, by which a certain amount of protection is secured to the female system, that makes up for its greater original susceptibility, and affects the general result in the manner alluded to above.

(6.) Pregnancy complies with *all* the conditions which this cause demands for its operation, and it is fair to attribute this protecting, preventing, and equalizing effect to its influence upon the female system.

I have thus attempted, by arguments, facts, and authorities, to prove—that pregnancy prevents the progress of phthisis, even when that disease is perfectly developed. Whether this effort has been successful, or not, must be left to the judgment of my readers; and to them I confide my cause, with the full assurance, not only that their decision will be equitable in regard to all that has been urged in support of my position, but that they will agree with me in the conclusion that, if pregnancy can arrest the progress of consumption when fully established, then, for a still *stronger reason* must it "retard the development of tubercles in those predisposed to phthisis."

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