On healthy and diseased structure and the true principles of treatment for the cure of disease, especially consumption and scrofula : founded on microscopical analysis / by William Addison.

Contributors

Addison, William, 1802-1881.
Royal College of Physicians of Edinburgh

Publication/Creation

London : J. Churchill, 1849.

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ON

HEALTHY AND DISEASED STRUCTURE.

ON

HEALTHY AND DISEASED STRUCTURE

AND THE TRUE PRINCIPLES OF TREATMENT FOR THE

CURE OF DISEASE, ESPECIALLY

CONSUMPTION AND SCROFULA;

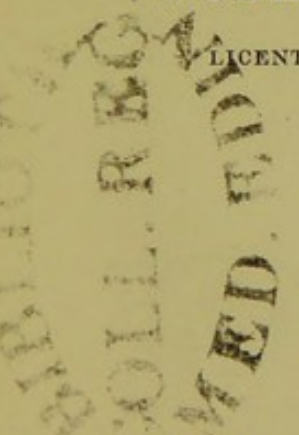
FOUNDED ON

MICROSCOPICAL ANALYSIS.

BY

WILLIAM ADDISON, M.D., F.R.S.

LICENTIATE OF THE ROYAL COLLEGE OF PHYSICIANS.



LONDON:

JOHN CHURCHILL, PRINCES STREET, SOHO.

MDCCCXLIX.

LONDON:
PRINTED BY G. J. PALMER, SAVOY STREET, STRAND.

TO ALL

FELLOW LABOURERS, IN THE BOUNDLESS FIELD OF

HYGIENE AND MEDICINE,

THIS ATTEMPT TO FOUND

PRACTICAL MEASURES FOR THE CURE OF CONSUMPTION

UPON

NATURAL LAWS,

IS RESPECTFULLY DEDICATED BY

THEIR FRIEND AND COADJUTOR,

THE AUTHOR.

PREFACE.

The author of the following work, in laying before his professional brethren, the results of twenty years' investigation upon the subject of Consumption, had one of two courses to pursue:—either to enter at large upon what others had done before him—or confine himself to facts arising from his own researches.

By pursuing the former course, he might have claimed credit for some discoveries in physiology and pathology; but choosing the latter—claiming only what the justice of his contemporaries may award—he has felt himself at liberty to study his premises in the book of Nature only, and to form his conclusions independently. The subject treated of, is one so various and complicated, that truths may be elicited in manifold ways; and deductions derived from microscopical analysis, need in no way interfere with results regarded in a chemical point of view.

Wimpole Street,
January, 1849.

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EXPLANATION OF THE PLATES.

PLATE I.

FIG. 1. Red and colourless cells, or corpuscles of blood; *the former* adhering together by their flat surfaces in bands or rolls: *the latter* round preserving their figure, and standing alone. This is an ordinary appearance of a thin film of blood seen with the microscope.

FIG. 2. Red and colourless blood-cells *immediately* after the addition of a drop of water; the former dissolve or burst and disappear, leaving molecular or granular particles behind; the latter increase in size; molecules and granules being visible in their interior.

FIG. 3. Colourless cells of blood, *five minutes* after the addition of water; they are still larger, appear filled with extremely minute molecules, or larger dark particles,—the former may sometimes be seen in rapid motion within the cell. Sometimes particles with a bright centre, as though of an oily nature, may be seen within the cells.

FIG. 4. Colourless blood-cells, fifteen minutes after the addition of water; the membrane or integument appears dissolved or torn; the molecular particles escaping, and often altering their appearance from contact with the water.

FIG. 5. A primary blood-vessel in the transparent membrane of a fœtal Hare; showing a column of red-cells in the centre of the vessel,—and colourless cells, with minute particles in their interior, adhering to the inner margin of its walls. The membrane farthest removed from the blood-current, has a coherent-cellular-texture; but the part next to it is fibrous. This being the regular morphological order in growth.

FIG. 6. Represents the changes observable in the colourless-cells of blood—upon the application of *water*, *dilute acetic acid*, and *liquor potassæ*; (*a*) as they appear before anything has been added to them; (*b*) the same after the addition of water; (*c*) their appearance upon the addition of a very dilute acetic acid; (*d*) the effect of a weak solution of liquor potassæ; the cell membrane bursts open suddenly, and minute molecules pour out of it in great profusion.

Fig. 1.

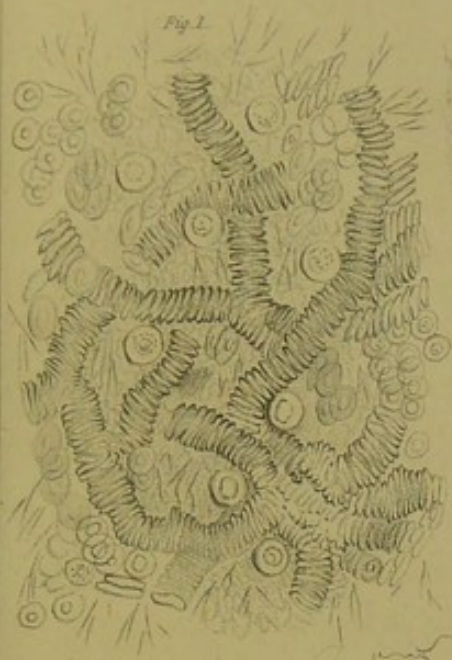

Fig. 2.

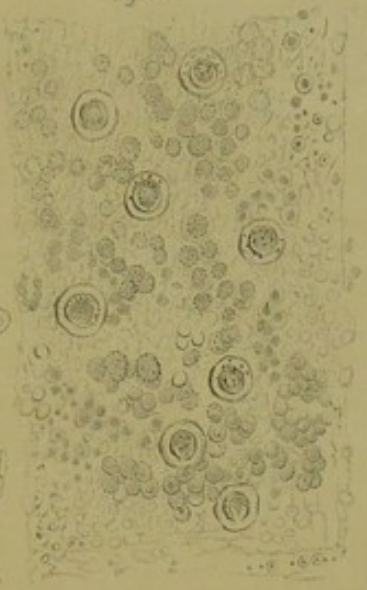

Fig. 3.

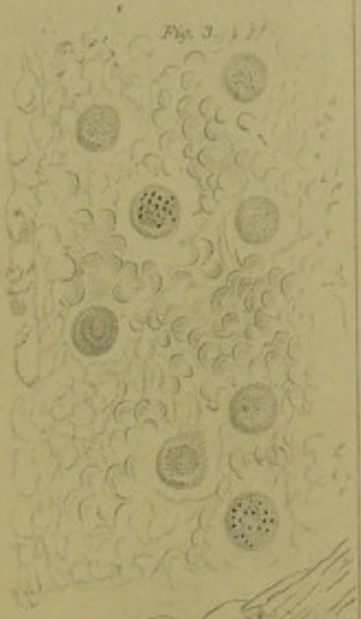

Fig. 4.

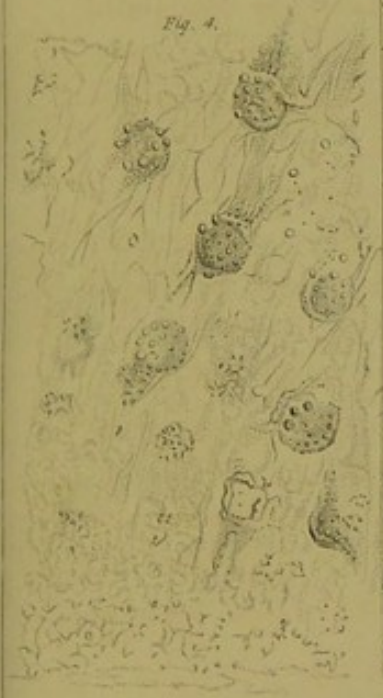

Fig. 5.

Fig. 6.

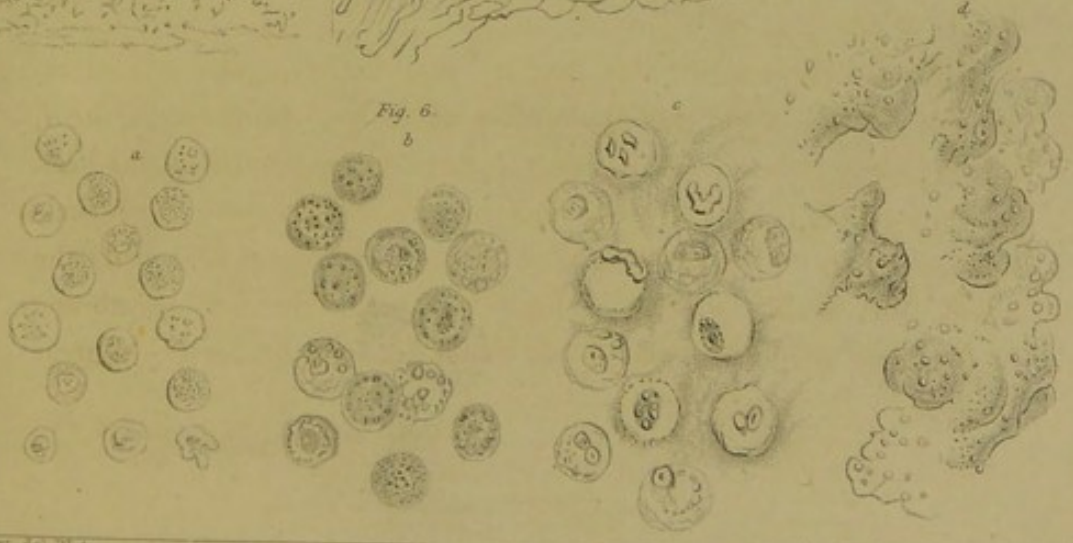

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PLATE II.

(900 *diameters.*)

FIG. 1. The appearance of a thin film of blood, drawn from a spot of inflammation (*erythema*) on the leg;—the *red-cells* have a remarkable adhesive quality, and are singularly drawn out or elongated thereby; the *colourless-cells* are very numerous and conspicuous, minute molecules and large granular particles are seen in their interior; some of them appear to have an opening at one side, from which a brush of delicate fibres may sometimes be seen issuing. The *blood-fluid* is everywhere traversed with delicate fibres, radiating from isolated molecules suspended in it.

FIG. 2. Colourless-cells of LYMPH,—with very active molecules in their interior, and isolated molecular particles and fibres; from the transparent, watery, or serous vesicles of *Herpes labialis.*

FIG. 3. Colourless-cells of PUS,—from an opaque pustule of *Porrigo.* A drop of *warm* water was mingled with them. Some of the cells have very active molecules within them; others, by watching, may be seen to *explode* and discharge their contents. Numerous isolated particles, some dark, others with a bright centre, are seen floating in the fluid.

FIG. 4. Colourless-cells seen abundantly in the SALIVA. Some are perfectly spherical and filled with very active molecules; others appear irregular, as though they had already discharged a portion of their contents. By watching the perfect cells, they may sometimes be seen to burst and discharge molecules abundantly.

FIG. 5. Colourless-cells fringed with cilia in active movement,—seen in the thin watery fluid from the nose in *catarrh.*

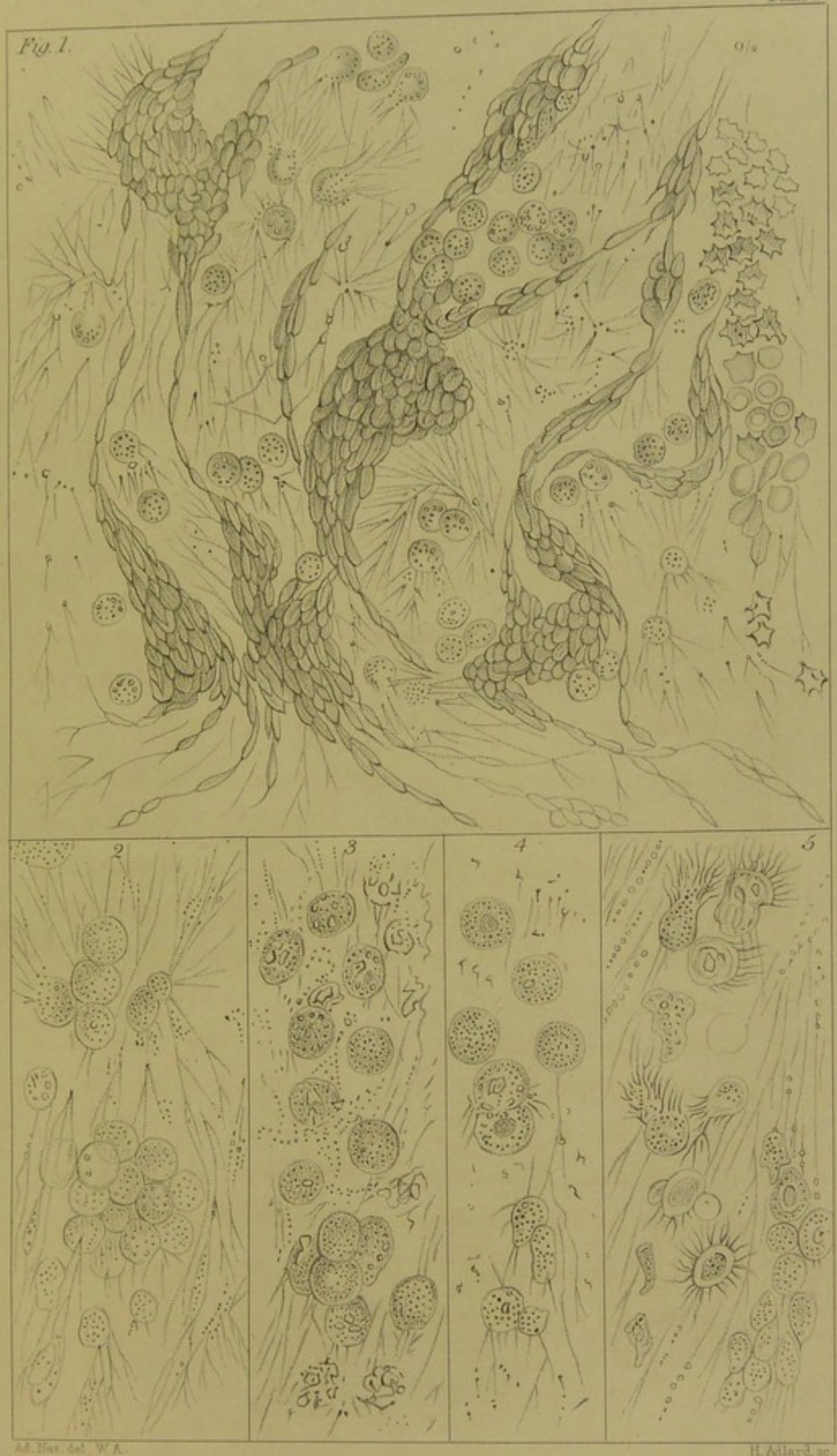

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PLATE III.

FIGS. 1 and 2. The structure of capillaries and minute blood-vessels in fibrous and serous textures; showing the absence of cell-organisms in the coats of the vessels of these textures. (p. 32.)

FIGS. 3, 4, and 5. The structure of capillaries, in the corpuscular secreting textures;—the blood channel is copiously bounded by cell-organisms several ranks deep. FIG. 3, a *white* granulation in the *plexus chorŏides*. FIG. 4, an intestinal villus. FIG. 5, a mucous follicle in the tongue of the Frog. (p. 32.)

FIG. 6. The structure of a minute blood-vessel in the human ovum, to which the explanation, fig. 5, plate 1, and the text, pp. 43, *et seq.*, applies.

FIGS. 7 and 8. The natural structure of a capillary vessel in the *tunica conjunctiva* of the eye; and the change experienced during inflammation. FIG. 7. The vessel simply fibrous in its natural or healthy state. FIG. 8. Its calibre enlarged, and its coats thickly studded with cell-organisms during inflammation. (Vide case, p. 66.)

FIG. 9. A fibrous capillary, becoming clothed with cell-organisms; *showing the elements of a retrograde growth.* Were this vessel deflected in the middle, and the two extremities brought together as represented in FIG. 4, it would exhibit, not only the essential characteristics, but the form of a *villus*, (FIG. 4,) or of a granulation. (FIG. 3. See also p. 139, &c.) The normal elements of a fibrous capillary (FIGS. 1 and 2) becoming more and more interrupted by cell-organisms, is a phenomenon common to inflammation and scrofulous disease—preceding all those forms of disease which in morbid anatomy we recognize as granulations, tubercles, exudations, false-membranes, hepatization, and ulceration, (See pp. 285 to 288.)

FIG. 10. CELLS, more highly magnified.

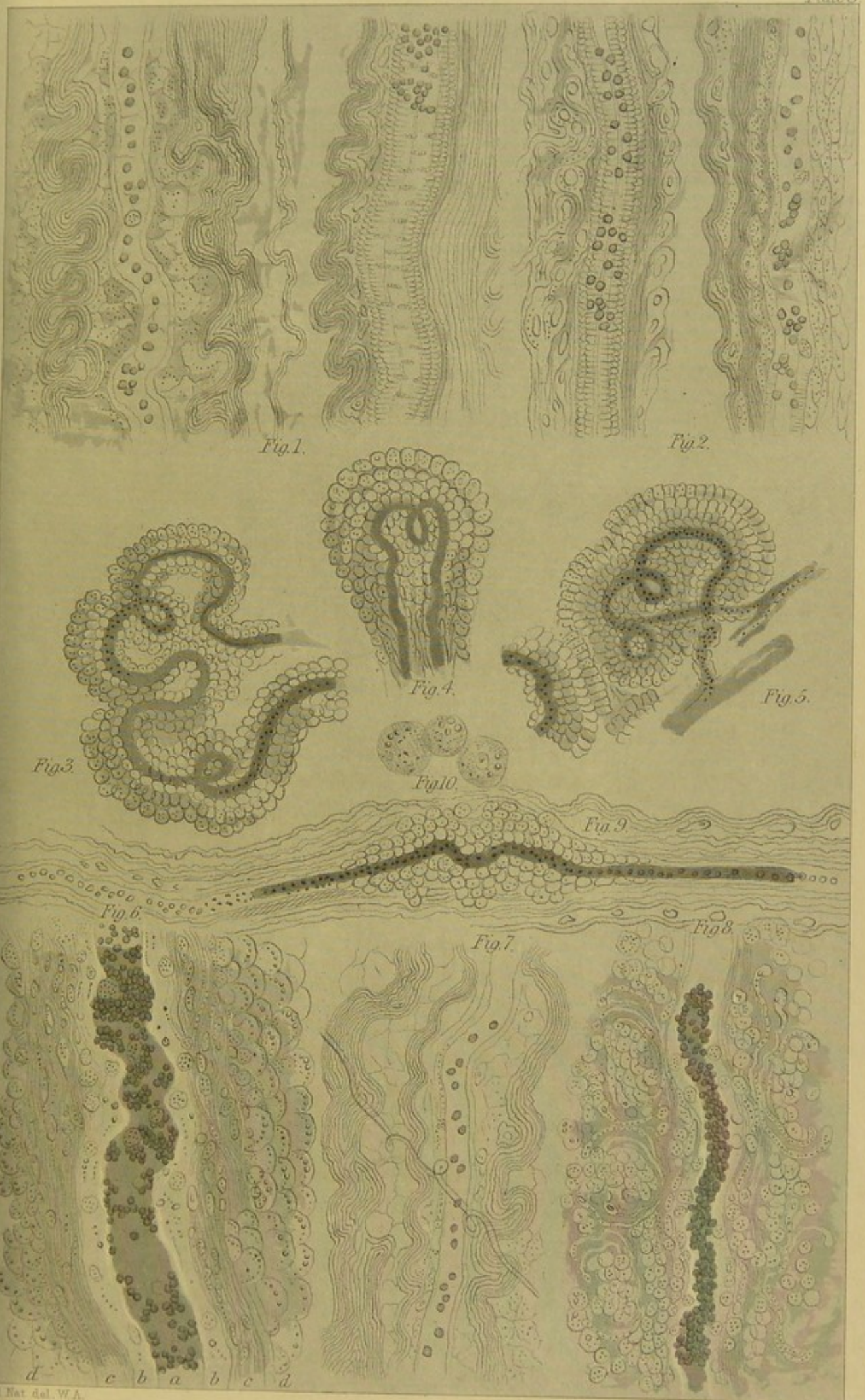

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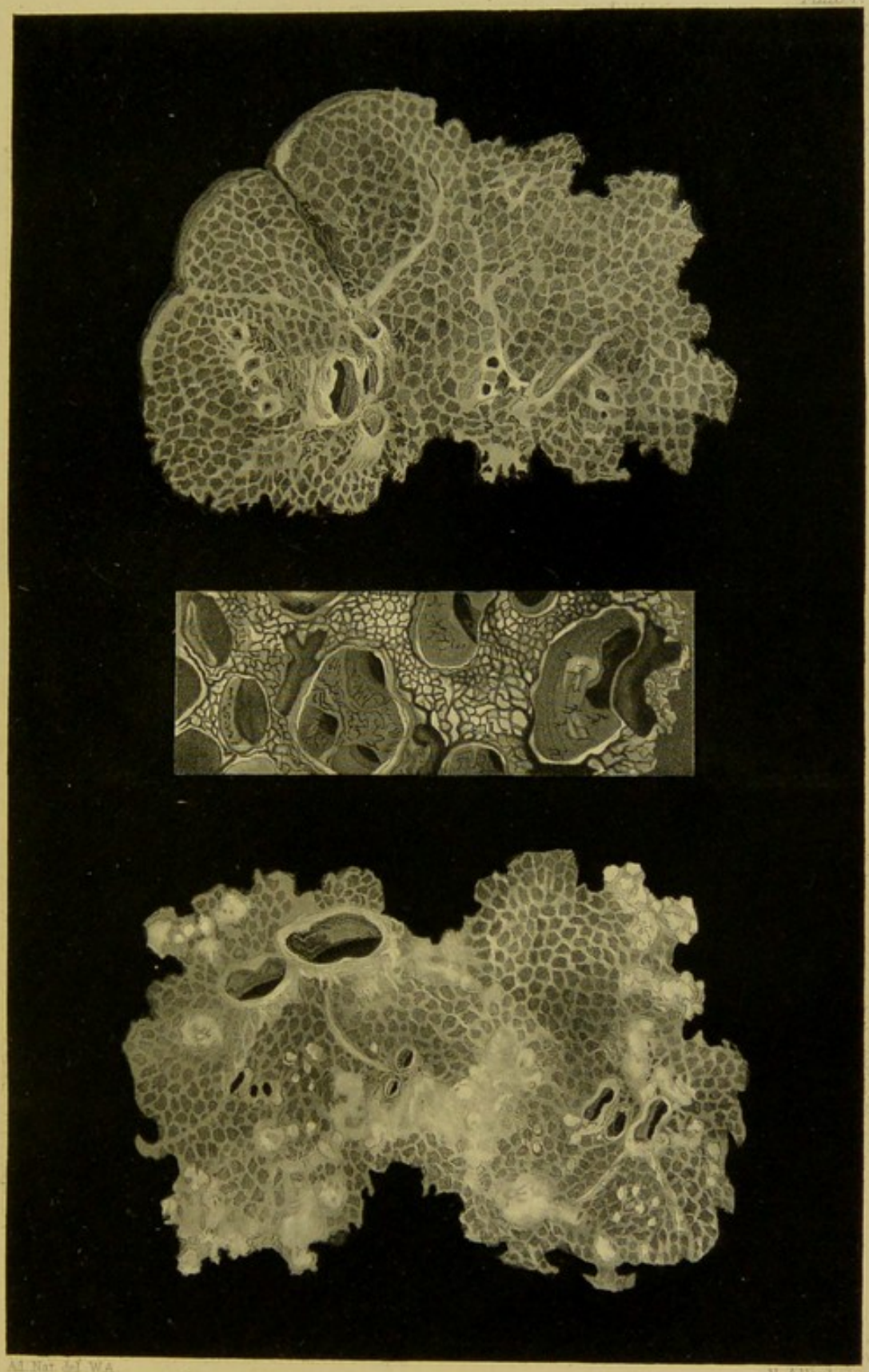
PLATE IV.

The upper figure represents a very thin section of healthy lung magnified by a lens.

The centre figure is a highly magnified view of the capillary network of the lung,—which in consumption is wholly destroyed.

The lower figure represents minute tubercles, and tubercular infiltration ; a condition preliminary to the active stages of consumption. (Vide pp. 77, 252, and 255.)

(In the upper and lower figures large circular openings are seen in perspective, they represent sections of air-tubes and blood-vessels divided in making the preparations.)



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H. Adlard, sc.

ERRATA.

Page 60, in the note, *for* pathologici, *read* pathologicæ.

63, ninth line from the bottom, *for* are, *read* as.

93, ninth line from the top, *for* springs, *read* spring.

165 and 166, *for* hœmoptysis, *read* hæmoptysis.

175, *for* Hale Townsend, *read* Hare Townsend.

INTRODUCTION.

THE fact that the material elements of all organic beings—plants and animals—originate from minute cell-organisms, was first announced by OKEN; * it has been ably illustrated and enforced by Schleiden, Schwann, Barry, and other physiologists; and is now universally concurred in, as a truth of the highest interest and importance to physiology, and practical medicine. The organisms here spoken of, and variously termed, vesicles, corpuscles, or cells, are microscopic objects, usually of a globular or oval figure, various in colour, and consist of four parts, an exterior integument, a nucleus, and an interior viscous or granular matter, mixed with molecules.

The exterior integument, or cell membrane, is a thin homogeneous pellicle, through which the interior contents of the cell may be discerned: the nucleus is an

* Die Zeugung. Frankfurt, 1805.

apparently compact body, adherent to some point of the cell membrane; and the viscous or granular matter and molecules are the ingredients to which the sensible properties or qualities of the cell, and the characteristics of the materials formed by its morphology must be referred. In their original process of production, these cell-organisms have been regarded by Oken as the primary forms whence all larger and more compound structures were originally evolved. Without entering upon the merits of this general theory, it is quite true that microscopic cells abound in every department of life, and that they are the only material elements of the early human embryo.

Recent improvements in the microscope having placed these elementary organisms within the sphere of visual analysis, and demonstrated their universality in the structure and secretions of animal bodies and man; have thereby altered the value of anatomical researches, conducted without a suspicion of their existence; and conclusions based upon views with the unaided eye alone, to which these organisms are quite invisible, must be amended or abandoned. So the multiform changes wrought in the textures of the human body by scrofula and inflammation have been topics of anxious and unwearied investigation from the period anatomical studies commenced; but if a microscopical analysis of the healthy tissues shows the physiological conclusions derived from an unaided visual anatomy to require revision and amendment, then it follows necessarily that patho-

logical conclusions derived from the same source must undergo a similar revision.

It is not long since earth, air, and water were considered and treated of in chemical works as elements; but when it was proved that they are compound bodies, it became necessary to review the phenomena in which they take part, and to assign to each component its appropriate place and proper agency in every change effected. So when blood was deemed a homogeneous fluid, and capillary vessels to be simply tubes, they were looked upon as agents; but now, when we know from microscopical demonstration that blood consists of various cell-organisms floating in a fibrillating fluid, and that capillary vessels are not simple tubes, it becomes necessary to determine the part which each element performs in the phenomena of growth, nutrition, and disease. The fact being that the microscope has placed physiology and pathology in a position analogous to that of chemistry at the æra of the discoveries of Watt, Cavendish, and Priestly.

In passing, by means of the microscope, from the confines of the visible to those of the invisible domain of matter, we must bear in mind that the latter or the invisible is quite as important as the former or the visible; for all objects become invisible long before we arrive at the end of their composition.

The ultimate atoms or forms of oxygen, nitrogen, carbonic acid, and water, surrounding us, and as we inhale or exhale them, cannot be rendered visible by the

most powerful microscope; and we may safely conclude that the smallest visible molecule, forming part of an organized structure, is a compound body. Moreover, organisms, at least twenty times smaller than blood-cells, may be seen by the microscope in decomposing animal infusions, moving rapidly about from place to place, darting to and fro, and exhibiting properties of a peculiar order. These have members, and are composed of several parts; therefore we must prepare ourselves to consider the blood-cells, with reference to living beings below them in the scale of magnitude, as *large and complicated structures*, composed of various parts, and containing various products.

"The knowledge of man hitherto," says Bacon, "hath been determined by the view or sight; so that whatsoever is invisible, either in respect of the fineness of the body itself, or the smallness of the parts, or of the subtilty of the motion, is little inquired; and yet these be the things that govern nature principally, and without which you cannot make any true analysis and indication of the proceedings of nature."

The great importance of the *colourless* cells of the blood in nutrition is already beginning to be fully acknowledged; every new observer of the beautiful process of fibrillation in the liquor sanguinis wonders that *that* had never been studied before; and the *process of nutrition* developed in the following pages, enables us to see why things,

apparently so different as perspiration and exercise, ablution and friction of the surface of the body, counter-irritation, purgatives, and bleeding, must all concur in modifying the nutritive changes of the tissues, and thereby alter the condition of the blood; and how change of air, change of diet, and change in the nature of liquids received within the body, by varying the nutritive elements which form the blood, may either produce or cure diseases.

Liebig has justly remarked that "the most exact anatomical knowledge of the structure of the tissues cannot teach us their uses; and from the microscopical examination of the most minute reticulations of the vessels we can learn no more of their functions than we have learned concerning vision from counting the surfaces on the eye of the fly."

The most successfully injected anatomical preparations, exquisite and beautiful as they are, can be compared only to deserted houses; we can learn no more of the processes of secretion and nutrition from them than we could of the habits or movements of the inhabitants by wandering through the streets of a deserted city. But if we turn the microscope to the study of other objects—the more perishable elements of the structure—then it is probable that we may, again to use Liebig's words, "arrive at conclusions calculated to give us a more profound insight into the essence of the vital processes."

The rapidity of decomposition (of the changes)

in the elementary cell structures of the body is in a direct ratio to their importance as respects the functions of nutrition, secretion, and life; and all the future advancing steps of physiological and pathological anatomy will be accomplished by those who carry with them the microscope and the test-tube to the dissecting room, and seize upon the objects which adhere to and leave their stain upon the bright blade of the scalpel.

All natural science is progressive; some branches advance with great rapidity, from the facility with which observations may be made and facts accumulated; others make slower progress, from the intrinsic difficulties of the subject. Chemistry, which has to do with the qualities and properties of matter generally, is an example of the former; Physiology, which embraces the peculiar powers and properties of living structures, of the latter kind.

The *practice* of medicine is founded on experience and observation; but the *science* of medicine is based on chemistry and physiology. Chemistry has made rapid strides by a series of brilliant experimental results, offering to the medical philosopher an alluring and seductive course; while the sister science, struggling with almost insuperable difficulties, seems barren and profitless.

Fortunately, the great excellence to which the microscope has been brought, and the many philosophical observers, commencing with Schleiden and Schwann, who

have now for some years been accumulating facts, seem at least to promise a rich harvest for physiology, and tend to place her as much in advance of chemistry in respect of the phenomena of health and disease, as she has hitherto, for a long series of years, been behind. The result will be to establish the science of medicine upon a surer and more philosophical foundation, and thereby enable us to extend our remedies and to suggest new *physiological* methods of treatment for the maladies of mankind.

In claiming for the microscope a paramount importance in the study of disease, it may be remarked that microscopical researches comprehend in the strictest sense anatomical demonstrations. The microscope as an instrument of analysis is as much to be relied on as the scalpel. Moreover, these researches point distinctly to the existence of a great natural law in the evolution of complex animal structures, whereby their diseases may be interpreted. At first it was to be expected—the subject being new—that objects seen only with the microscope, by different and distant observers, without the means of comparison, would be variously designated, and that the same things might be called by different names. This has occurred, and although the existence and general characteristics of the objects described are undoubted, there have from this source been obstacles in determining the true value of some of these minute investigations. It is, therefore, the more desirable on entering upon a new field of inductive inquiry,

that the reader should from the first comprehend the design of the author, and the scope of the conclusions he proposes to draw; for this a few words will suffice.

The admitted doctrines of vegetable morphology assume to demonstrate the law of development of the perfect plant from the embryo, to show that leaves are primary organs of vegetation;—that bracteæ are leaves affected by the vicinity of the fructification,—that the calyx and corolla are formed by the adhesion and verticillation of leaves,—that the filament is a form of petiole, and the anther of lamina,—and finally that the ovarium is a convolute leaf. This law being established, they show that if the green parenchymatous cells of the leaf make their appearance in the petals, or if the coloured cells of the petal appear in the filament or anther, distorting its form and altering its properties, that the metamorphosis is retrograde; that is to say, the elements of an early or prior texture have made their appearance in one of a later, higher, or more special type. But the doctrines of vegetable morphology do not pretend to explain or account for the origin or multiplication of the parenchymatous cells of the leaf during its growth, nor to assign a reason why the contents of some cells are sweet or bitter, of others hot or sour;—why oil of peppermint is formed in some, and prussic acid or bergamotte in others; nor does it enter upon the chemical qualities observable in vegetable products. It aspires only to trace the natural structure and situation of the different organs,

the order of their succession, and the excess, deficiency, or displacement of their elements, without affecting to explain the epigenesis of the cell-organisms from which the matter of their construction arises.

In like manner, following the analogies in vegetable bodies, we propose in the following pages—after briefly relating the phenomena of vegetable structure—to demonstrate the law of development of the textures of the human structure, to show that they all originate from the metamorphosis of cell-organisms in the embryo; are nourished by the metamorphosis of cell-organisms in the blood,—and are displaced, interrupted, or go back again to cell-organisms in scrofulous disease, phthisis, and ulceration. In proving the last of these events in the serous and fibrous textures, we demonstrate the analogies between scrofulous disease, and those phenomena of vegetable structure which are embraced in the term retrograde metamorphosis. We do not attempt to explain the epigenesis of cells, or to assign a reason why some are red, in blood; others white, in mucus, saliva, and pus; why some contain brain matter, others milk or bile; some the elements of one secretion, and others of another. We simply observe the phenomena of growth, nutrition, and disease, and prove by microscopical demonstration that in consumption and scrofulous disease, cell-organisms, characteristic of the embryo structure and of blood, reappear amongst, and supplant the elements characteristic of the healthy adult texture.

If the structure of a leaf of flowering plants be examined in very thin sections, with a sufficiently high magnifying power (600 or 700 diameters linear), it will be found composed of two distinct cellular elements, a fibrous tissue, spiral vessels, stomata, and air-bubbles. On the upper surface of the leaf, is a thin transparent membrane, marked by a number of cellular compartments, irregular in form, and variable in size in different species of plants. On the under surface, is a similar membrane thickly interspersed with the stomata. These membranes are the exterior portions of a strongly coherent cellular texture, running through the entire thickness of the leaf, and there so disposed as to leave numerous air-passages connected with the stomata. In the interior meshes of this texture, around the walls of the air-passages, and in close apposition with the air contained in them, is a less coherent texture, the parenchyma, consisting of smaller and but slightly adhering cell-organisms, containing within them numerous green granules, termed chlorophylle, which give colour and other qualities to the leaf.

The general nature of the structure of leaves has been well explained by Link and others, and was figured by Mohl in 1828; but the most complete account is that of M. Adolphe Brongniart in 1830. "The cuticle is a layer of cells adhering firmly to each other, and but slightly to the subjacent tissue, from which they are entirely different in form and nature; in form, for the cells are depressed, and in consequence of the

variety of outline they present, form meshes either regular or irregular; and in nature, because these cells are perfectly transparent and colourless, they scarcely ever contain any organic particles. On the other hand, the cells of the subjacent parenchyma are filled with the green substance that determines the colour of the leaf." *

The term cellular tissue has been indiscriminately applied to many portions of vegetable structure, and it is therefore necessary to state prominently the distinction which a careful examination of the leaf appears to me to establish between the coherent cellular texture of the cuticle and ribs of the leaf, and the incoherent cellular texture of the parenchyma.

If a thin section be taken from any of the ribs of a leaf, the cellular texture disclosed has the following properties and appearance. It is strong and coherent, the interior of the cells is nearly or quite free from chlorophylle granules, and their walls are comparatively thick with a double outline, the structural materials not occupying the central part of the cell, but being collected apparently outside and between the cell-walls. But if having previously sliced away the cuticle or outer integument of a leaf, a thin section be taken of the green parenchyma, the cellular texture displayed has very different properties. It consists of

* See Lindley's Introduction to Botany, p. 85, ed. 1832. For figs. of the *incoherent* cells of the parenchyma, and the *coherent* cells of the cuticle and ribs, vide Plate I., figs. 2, 3, 6, and 7.

smaller, and but slightly adherent cells, filled with numerous green granules, and if a leaf of Sedum acre be crushed with a drop of water between two slips of glass, the incoherent cells of the parenchyma are seen dispersed and swimming in the fluid. It is well known that two important functions are performed by leaves, respiration and secretion. That the interior of a leaf is full of air, may be demonstrated by a microscopical examination of the parenchyma; and that the air is situated in numerous air-passages, bounded by the cells of the parenchyma, is also evident at the same time. That this air may be forced out by heat, is readily shown by immersing a leaf in boiling water, when the under surface becomes thickly coated with air-bubbles, which appear to escape by the stomata, for the upper surface if uninjured, never allows the escape of similar bubbles. When, therefore, the broad upper surface of a leaf is exposed to the noonday sun, the air in its interior must expand, and if all the air-passages be full, some portion must escape, either through the stomata, or by some other means. But at night, or when the sun's rays are intercepted by passing clouds, the air within the leaf, becoming cooled, will contract in volume, and there will then be space for fresh portions of the outward air to enter. Heat, or caloric, therefore, is the efficient cause, and change of temperature,—day and night,—sun and cloud,—the conditions of respiration in vegetable structures. Inspiration going on at night and

during the passage of clouds across the sky, expiration taking place when the sun shines upon the leaf. In most herbaceous plants, the green matter of the lower leaves visibly diminishes during the inflorescence and the growth of the seed, and sometimes they wither and dry up. This is very remarkably the case in the sedums, lilies, &c , and the fact is observable in all succulent plants, especially should there be any lack of moisture at the important time of flowering. If a plant, of the garden Nasturtium, Tropœolum majus, be pulled up whilst in vigorous growth in the autumn, and thrown upon the ground in the sun, it will go on flowering for a month or more, putting forth new shoots, new leaves, flowers, and seeds ; but during all this time the older leaves are gradually from below upwards one after another exhausted of their green matter, withering and shrivelling up. From these facts, and many others well known to botanists, but which it is unnecessary here to particularize, it is concluded that two kinds of cellular texture exist in the structure of leaves,—a coherent texture administering to the expanded form of the leaf, and an incoherent cell texture, executing the functions of growth and secretion. The former having a ministerial or mechanical office, the latter performing the elaborating vital function ;—the green matter in the latter cells being a secretion formed within them, under the joint influences of air, light, heat, and moisture, giving sensible qualities to the plant, and essential to the

growth and welfare of the subsequent parts of the structure—the bud, the flower, and the seed.

I am sensible that the terms coherent and incoherent do but inadequately express the distinction insisted on between the elaborating or secreting,—and the ministerial non-secreting cellular textures, between the soft pulverulent parenchymatous cells, and the outer membranes of the leaf. The distinction, however, clearly exists in nature, and is important to be borne in mind. I purpose, therefore, in speaking of the anatomical details of the human structure, occasionally to use the word CORPUSCULAR-TEXTURE, as expressive of the soft, friable, parenchymatous textures formed of elaborating cell-organisms, limiting the term CELLULAR-TEXTURE to those which are coherent, non-elaborating, and elastic; for example, the parenchymatous texture of the liver, brain, and intestinal villi, requires to be distinguished from the parenchymatous cellular-texture of the lung.

If adopting this distinction, we extend our microscopical researches to the lower orders of vegetation, we find—

1. Forms consisting of incoherent corpuscular textures, masses of cells with an interior granular or viscous, usually green matter;—these are the lowest forms, algæ and lichens, the structure being no more than a light powder, or mucoid and soft.

2. Forms composed of coherent cells, fungi, mosses, and ferns.

3. Forms consisting of the two textures—incoherent cells in the parenchyma, and coherent cells in the cuticle, as in the leaves of phanerogamic plants. The order of vegetable structures, upon this view or classification, may therefore be thus stated.

1. Incoherent corpuscles or cells—(the lowest).
2. Coherent cellular textures—(the next).
3. Incoherent corpuscular, and coherent cellular textures, conjoined, with the addition of stomata, spiral fibres, and woody textures—(the highest).

The last being formed by additions to, and not by superseding the prior forms.

VEGETABLE MORPHOLOGY, which investigates the gradual transformation of the primary cell-elements of the embryo plant into the various special organs of the structure, has long formed an interesting and essential department of physiological botany. The doctrine seems to have originated with Linnæus, was deeply entered on by the celebrated Goëthe, has been universally adopted in Germany, and since received in France and England by most botanists of the present day. The first idea of the subject appeared in the second volume of the tenth edition of the *Systema Naturæ* in 1759; and in 1760, the propositions were sustained by Linnæus, in a Thesis prepared in the name of his pupil, Ullmark, and called *Prolepsis Plantarum.* It would be out of place here to enlarge upon botanical facts, regarding the regular metamorphosis of plants which have been firmly established.

"The plan upon which it takes place, is—" according to Dr. Lindley—"notwithstanding the infinite variety observable, extremely simple, and executed by modifications of the leafy (parenchymatous) texture." "There is not only a continuous uninterrupted passage from leaves to bracteæ, from bracteæ to calyx, from calyx to corolla, from corolla to stamens, and from stamens to pistillum,—but there is also," let the reader observe, "a continued tendency on the part of every one of them to revert to the texture, and even to the form of the leaf."*

If the structure of a petal be examined with the microscope, we find a coherent cellular texture abounding with air. The cells of this texture usually contain either a coloured fluid, or numerous active molecules, the cell-walls are irregular in outline, and frequently marked with delicate striæ, and it is evident if the contents of the cells of a petal are formed by a process of metamorphosis from the leafy texture, that it is the green chlorophylle of the parenchymatous cells that has experienced the greatest amount of change;—that is to say, whereas the colour of the leaf is green, and the colour of a petal blue, scarlet, or yellow,—so therefore it must be the green matter—the secreted and proper juices of the leaf—that have experienced the greatest amount of alteration. Again, if the structure of an unripe fruit—the plum or cherry for instance—be examined with the microscope, it is found composed

* Introduction to Botany—ante.

of cells filled with numerous green granules, apparently identical with those of the parenchyma of the leaf, but when the fruits are ripe, the cells are filled with coloured fluids of a very different nature,—red, purplish, or yellow, and the green granules have for the most part, or entirely, disappeared.

In this instance, of regular metamorphosis, it is clearly the green chlorophylle of the primary cells that is metamorphosed in the juices of the ripe fruit.

Alterations of form, or diseases, in vegetable structures, rank under the terms irregular and retrograde metamorphosis. Examples of *irregular metamorphosis* in some part of vegetable structures are innumerable. Roots and tubers exhibit a variety of changes and alterations, chiefly the effects of domestication. The root of the celery is fibrous when wild, but under domestication it becomes round and fleshy like the turnip. In short, leaves, stem, root, flowers, and fruit, exhibit countless irregular metamorphoses, for examples of which the reader is referred to Lindley's Introduction to Botany.

Instances of *retrograde metamorphosis* are almost equally numerous. The general resemblance of the sepals of the calyx to the ordinary leaves of vegetation is well known; their green colour and tendency to revert into true leaves, is so notorious that it need not be insisted on. In the cowslip and polyanthus, the calyx is frequently formed of five perfect leaves, in no respect different from the others, except in being a

little smaller. Several instances have been observed in which petals have reverted to the state of sepals and leaves. In a Campanula Rapunculus seen by Röper, the corolla had become five green sepals like those of the calyx ; the same was found in an individual of Verbascum pyramidatum, described by Du Petit Thouars. Proliferous flowers of Geum and Rosa, in which the petals had retrograded into leaves, are adduced by Linnæus. In double roses and camellias, the nature of a retrograde metamorphosis is shown in a very instructive way. If any double rose be examined, it will be seen that the filaments of those stamens which stand nearest to the petals, are expanded and coloured like the petals ; and sometimes the perfect lobe of an anther will be found on one side the upper margin of the abnormal and expanded filament, and the imperfect remains of another lobe on the opposite side, a convincing proof that the unnatural number of petals has been produced by a retrograde metamorphosis of the stamens. Nothing is more common than to find the pistil converted either into petals or green leaves ; in the blackberry roses, and the double cherry, the ovaria have been seen converted into bracteæ and perfect leaves.* But it is unnecessary to particularize examples, let us therefore

* The year 1845 was remarkable for an absence of fruit on the common bramble, there was hardly a fruited bush to be seen ; on examining the abortive flowers, it was found that the seeds and fruit were metamorphosed into bracts.

state the conclusions which are settled and established with regard to the morphology of plants ;—

1. Regular metamorphosis comprehends the process by which the type, texture, form, and qualities established by nature for the species are, each in its appointed place, and time, perfected and handed down from parent to offspring, without fault, deviation, or change. It is the ultimate fact of living structure. Why it is that there is one form, one colour, and one kind of quality springing up in a particular part of a plant, and others in another part, we do not know. And all we can do is to study the normal forms and qualities of every portion of the structure, so that we may learn the order of nature in forming the perfect individual, and thereby estimate the changes and deviations which constitute disease.

2. Irregular metamorphosis is characterized by parts of the structure being either checked or stunted in their growth, or becoming unnaturally exuberant. The structural elements are not changed, but there is either deficiency or excess. Thus, leaves become more succulent, and roll inwards, forming what is called a heart, as in the cabbage and lettuce ; and fruits become larger and more juicy. These changes are the more common, because the gardener delights in and fosters the irregularity. If the green parenchymatous texture of leaves be exuberant, and extend more rapidly than the veins or ribs, they pucker ; and if the parenchyma and cuticle are together in excess, then the leaf is

copiously and curiously curled, as in cress, savory, and endive.

3. Retrograde metamorphosis occurs when the form and qualities of a texture are completely changed by the intrusion of elements distinctive of a prior or lower type; as when the green chlorophylle cells of the leaf intrude upon and displace the coloured cells of the petal; or when the structure of the stamens assumes the characteristics of the petals. In these cases, the function, quality, and character of an organ are subverted, not from the intrusion of elements wholly foreign to the organism, but in consequence of the displacement of natural elements, by others of a prior or lower type.

As respects the causes of these changes,—it is well known that gardeners, if they wish to have double flowers, or to propagate any remarkable variety, sow the seed of that variety;—experience having taught them they are more likely thus to succeed, than if they chose the seed of other and more natural plants. From which we may conclude that an inherent disposition to alteration of structure is imparted by the parent to the seed. The young plants exhibiting the same morphological alienations as those of the stock from which they sprung.

"It is probable," says Dr. Lindley, "that all plants have a particular range—in some cases more extended than others—to which they are best suited in consequence of their constitutional (inherent) peculiarities,

which become known by the effects produced from a change of situation, although not otherwise appreciable. The two great external agents by which they are affected are soil and atmosphere, and the action of these upon plants in their natural situations will be uniform; and so long as this uniformity continues their structure will remain unchanged; but let an alteration take place — their atmosphere, for instance, change from that of the valley to that of the mountain,—the soil from alluvial deposit, to chalk or slate, and the mean temperature under which they grow fall several degrees; or remove a plant from its native spot and cultivate it in the rich soil of a garden, thus submitting it to what may be called domestication. Under such circumstances, an alteration will be produced in the structure of the plant which will become manifest by external characters. This is what is called irregular metamorphosis. We are ignorant of the specific causes by which the metamorphosis is effected, but we know that it is the leafy texture, the secreted and proper juices of the plant which chiefly manifest their sensibility of change."*

It is, then, evident that two causes operate in the production of disease in plants,—the one inherent—a peculiar constitutional disposition derived from parent to offspring; the other external—unsuitable conditions of soil, light, heat, air, and moisture. These may variously antagonize each other;—an inherent constitu-

* Introduction to Botany.—Ante.

tional disposition to structural deviations may prevail notwithstanding favourable conditions; and unsuitable external conditions may produce a degraded morphology even where the constitutional disposition is otherwise good.

PART I.

CHAPTER I.

PRACTICAL PHYSIOLOGY.

"No man ever penetrated far into any study, but he was carried up at last into principles which are the source of all others; and no man ever studied wisely who stopped short of these depths. If you are afraid of depth; if you think that general principles are useless, because, to be stated generally, they must assume an abstract and mysterious character; if you will deal only with what shallow-minded men call *practical* questions—as if anything could be practical which is not founded on truth, or anything be true, which, if expressed in all its fulness, would not seem a problem and a mystery—you are not a fit person to study any science." . . . . . "Men are sick of the shallow, superficial, meagre speculations which these *practical* notions have engendered."—SEWELL.

SECTION I.

ELEMENTS AND MORPHOLOGY OF THE HUMAN STRUCTURE.

RECENT microscopical researches have established the fact that the primary texture of the human em-

bryo and its appendages is corpuscular;—that is to say, composed of corpuscles or cell-organisms having but a slight coherency. When the embryo is growing, its membranous envelopes are first corpuscular, and lastly fibrous, and the walls of the blood-vessels ramifying upon them, undergo corresponding changes. In the embryo itself, a month, or five weeks old, and half an inch in length, the head, eyes, and extremities,—the spinal column, liver, and heart, may be discriminated through a lens,—and all these parts are found, upon microscopical examination, to consist wholly of incoherent colourless cells, very soft, easily separable from each other, and containing a viscous, colourless matter mixed with molecules. At this early period nothing of a membranous, coherent, or fibrous texture can be found, all is soft and pulpy, no blood-vessels, muscular fibres, or nerves can be discriminated, nor can anything hard as cartilage or bone be detected.

When the embryo is four months old, and seven inches long, the muscular fibrillæ are distinguishable, but nothing resembling nerves can be detected, unless it be in the form of corpuscles or cells having long projecting tubes filled with molecules.

The skin viewed with a low magnifying power exhibits a numerous series of spots or granulations, which, more highly magnified, are found to be groups of cells distinguishable from those of the surrounding texture only by their larger size.

The brain and liver are both soft corpuscular tex-

tures; the heart is composed of elongated cells, and it is only in the pericardium and other strong membranes that a few waved fibres can be detected.

From these facts, and from the multiplied observations of other microscopical observers—which it is unnecessary here to enlarge upon—it is concluded that the law or order comprising the evolution of the elements of the human structure is as follows:—cells—fibres—cartilage and bone. That is to say, there are first, cell-organisms, forming soft parenchymatous, or corpuscular granulation textures—then coherent cellular and fibrous textures—and lastly, cartilage and bone. And it appears that the multiplication of cell-organisms and their association in groups or granulations typical of the future organs, take place before the formation of blood-vessels or nerves can be detected; and in this respect the growth of the human embryo is analogous to the growth of the vegetable embryo prior to the formation of a green leafy parenchyma. But as in the vegetable body the parenchymatous cells of the leaf are absolutely necessary to the full growth of the structure, so in the human body are the cells of the blood.

Blood consists of a limpid saline fluid, holding in suspension two kinds of cell-organisms, the one red and flattened, the other colourless and round; it may, therefore, with propriety, be termed a corpuscular fluid. On its first discharge from the living vessels, blood drops like water, but speedily becomes viscous.

and then coagulates, forming a soft solid, which at length separates into two parts,—a red clot and a fluid serum. But blood, before it coagulates, frequently separates into two fluid portions, the uppermost quite colourless, the lower red, and as both portions coagulate, the solid clot is in part colourless and in part red. This remarkable phenomenon is always observable when blood is rich in the materials of nutrition;—as it is during pregnancy, in persons who live luxuriously, and during inflammation.

"If we consider," says MOHL, and he is speaking of the cells of plants, "the place at which in the interior of cells, new cells" (or new matter) "is on the point of being formed, we find that the mother cell contains a viscous colourless mass mixed with minute granules; and since this viscous mass everywhere precedes the first solid formations, I trust it will be considered justifiable if I propose to designate it by the word *protoplasma*—a term which recalls to mind its physiological function." *

Now, if a film of the colourless matter of blood, before it coagulates, be examined with the microscope, we see innumerable colourless cells and groups of molecules floating in it; within the cells are a number of similar molecules, and when coagulation commences, it is by the formation of fibres interlacing each other in all directions, and enveloping both cells and molecules.

* See the translation of Mohl's Paper in the Annals and Magazine of Nat. Hist., July, 1846.

If water or a weak alkaline solution be added to the colourless cells before the coagulation, they enlarge in size, and then burst open, discharging a viscous matter capable of forming fibres; so that, adopting Mohl's term, the colourless elements of blood may be considered as consisting of cells and protoplasma, with water sufficient to render them liquid. (Plate I. figs. 1, 2, 3, 4 and 6, with the explanation.)

All mucous secretions and the saliva contain abundance of colourless cells, and the viscous matter of these secretions is elaborated in the interior of cells identical with those seen microscopically, floating in them; and although fibres do not spontaneously form in mucous secretions or saliva, still they may be abundantly produced in them by water, alcohol, or acetic acid. We shall hereafter prove that it is the cell-organisms (termed by anatomists epithelium) which clothe secreting vessels and ducts that elaborate the matter of the secretions in their interior, the contents of many cells, mingling together, forming the secretion. In the complex secretions, milk, saliva, and bile, there are no reasons for inferring that there are particular cells for each proximate element of the secretion; on the contrary, every cell contains a portion of each ingredient. For instance, the albuminous—oily and saccharine elements of milk—are not presumed to have distinct cells, but that every cell contains a portion of these materials. This conclusion is based partly on microscopical demonstration, and partly upon the ground of analogy;

and we may infer from it that the fibro-albuminous and oily elements of blood are derived from the colourless cells floating in it. The lymph, protoplasma, or liquor sanguinis, being as much entitled to be considered as a secretion, or product of cell-elaboration, as any of the products of the structure. The cells furnishing the protoplasma, and the protoplasma furnishing the fibro-albuminous elements.

The process of secretion thus effected by the agency of epithelial cell-organisms, is clearly susceptible of analysis into two distinct stages; in the first, the materials are shut up in the interior of the cells, excluded from all exterior agents and influences, except those specially admitted by endosmosis through the cell membrane; in the other, the materials having escaped from the cell, not only mingle with the products of other cells, but are now exposed to new agencies or conditions, whereby new properties may be acquired. Before the rupture or disintegration of the cells it is impossible to determine the properties of the matter within them; but after this event they may be readily ascertained; and it is a fact corroborating the conclusions hereafter to be stated, that when blood or pus-cells are ruptured by liquor potassæ, the resulting material is a viscous matter, apparently identical in all essential respects with lymph or mucus, capable of forming fibres—sometimes spontaneously, and always upon the application of re-agents, leaving an albuminous material in solution.

Physiologists have hitherto spoken of blood-vessels and ducts secreting; but a microscopical analysis of the textures proves that the walls or coats of all secreting vessels and ducts are clothed with multitudes of minute cell-organisms, and that it is in their interior the transformations constituting true secretions take place. But if the cells be cast off entire, with imperfectly elaborated contents inclosed within them, then they are found unbroken and mixed with the secretion, and the phenomenon differs essentially from that of true secretion, which involves the disintegration or opening of the cell, and the discharge of its contents.

The amount of cells, discharged entire from the mucous membranes, is increased if they be irritated; and innumerable cells are discharged or thrown off from all wounded and healing textures, where any process of reparation or reproduction is going on; and from diseased textures, ulcers and abscesses,—from scrofulous joints, and from the cavities of the lung in consumption; the cells in these latter instances forming a white opake matter termed *pus*, or purulent matter which owes its peculiarities to the number of unbroken cells.

Recently excreted purulent matter displays under the microscope an abundance of colourless cells, the interior of which presents various appearances. The cells vary in magnitude, and active molecules are sometimes visible within them. Water, or a weak alkaline solution, causes them first to enlarge, and then burst

open, discharging their contents, which—as in the case of colourless blood-cells—consists of a viscous matter and molecules.

No wounded or abraded texture heals,—and no diseased texture ulcerates, without discharging an abundance of colourless cells; and no specific distinctions can be perceived between the colourless cells of blood, mucus and pus. (Plate II. figs. 1, 2, 3, 4.)

When, therefore, a healing wound discharges pus it must be regarded as indicating a superabundance of cells, which, from an actual excess, over-crowding or other causes, do not meet with the conditions required for them to take part in the metamorphoses necessary for the reparation of the texture; whereas in the case of an ulcerating wound,—where there is no reparative process discharging pus, it appears that the whole of the cells have lost the property of a conformable metamorphosis. This explanation of the fact of colourless cell-organisms appearing both in healing and ulcerating textures, implies, in the former case, a great excess of natural agents, and this, which some might imagine contrary to, is in fact strictly in accordance with the plan of nature in other instances. In the repair of a fractured bone, what an apparent excess of nutritive matter—under the name of *callus*—is accumulated for the cure, and gradually removed when the fractured extremities of the bone have united. In what apparent excess are the pollen-cells of vegetable structures produced; of the myriads discharged from

the anther, how few are expended in the fertilization of the embryo, compared with the numbers which seem to be wasted! In animals and man analogous phenomena might be cited in illustration. Hence it would appear, from these facts, and from the trifling effects of a considerable loss of blood—that special functions are secured, and the repair of injuries accomplished, by a superabundance of morphological cells. Nature working with an excess of elements to prevent mischances.

Blood-vessels are of three kinds—arteries, veins and capillaries—none of which have open terminations; the blood flows from the heart in the arteries, passes through the capillaries, and returns by the veins. The structure of all these vessels at the early periods of embryonic growth corresponds with that of the texture they traverse, that is to say, the coats of all blood-vessels are first corpuscular; but as the body grows, and different textures are established, so *pari passu* arteries and veins which simply transmit the current, become strong, assuming a fibrous structure, But the capillaries are bounded by the special elements of the texture.

As all fibrous structures originate in gelatinous protoplasma, and this again from corpuscles or cells, so therefore, the coats or walls of arteries and veins vary as regards the elements of their structure with the morphological evolution of the embryonic textures, being corpuscular when all the textures are corpus-

cular, gelatinous in a gelatinous texture, and fibrous only when the morphology has attained the fibrous stage.

The capillaries of the adult body are of two principal kinds, fibrous and corpuscular. There are many intermediate kinds, but a brief description of the two extremes will suffice. The simplest form of a corpuscular capillary—that is to say, a capillary bounded by spherical cell-organisms– may be well seen with a microscope in the *plexus chorö̈ides,* or intestinal villi, where the slender blood channel, originating from the artery, takes a longer or shorter course, and turns back upon itself, or forms a net-work ending in a vein; the walls of the capillary being bounded by cell-organisms or epithelial particles several ranks deep. (Plate III. fig. 3, 4, 5,)

Examples of fibrous capillaries, that is to say, capillaries bounded by fibres, may be seen in the pia mater, the areolar texture, or the omentum. Here the walls of the vessels are almost altogether formed of waved or straight fibres, enclosing nuclei, and there are few or no spherical cell-organisms to be detected. (Plate III. fig. 1, 2.)

THE TEXTURES OR MEMBRANES of the human body have long been distinguished by anatomists into mucous and serous, and without entering here into unnecessary details, a microscopical analysis will show that the distinctions are grounded upon a difference in the nature, properties, and functions of the elements form-

ing the walls of the capillaries. Villi, papillæ, follicles, and granulations are characteristics of the mucous textures, and these all have cell-organisms or epithelial cells thickly grouped around the blood current; whereas the capillaries of the serous and the fibrous textures, are either entirely, or for the most part, devoid of any great number of such cells.

In the embryo, all the textures being corpuscular, and all the blood currents bounded by cells, it is some time before any distinction between mucous and serous, or fibrous textures, exists; and when, subsequently, the fibrous or serous textures are distinguishable from the mucous, a microscopical examination of the former will readily detect the remains of the embryonic form, or corpuscular type; numerous granulations, composed of cells, being found interspersed among the fibres, and cell-organisms being still largely distributed in the nascent fibres of the coats of the blood-vessels (Plate I. fig. 5.)

The delicate membrane containing an embryo calf a few weeks old, has from twenty to thirty placentulæ upon it; each of which is composed of numerous villi. (Plate III. fig. 4.) Each villus consists of spherical cell-organisms in the midst of which the capillary blood-channels take their course. Between the placentulæ, the membrane is sprinkled with numerous small spots or granulations which with the microscope are seen composed of similar spherical cells. These granulations are receding forms, for the membrane at length be-

comes entirely fibrous; but the placentulæ are advancing forms, for they grow rapidly and draw towards them large supplies of blood. Now, in its primary stage the whole of this membrane was composed of spherical cells; as it grows and extends, it becomes spotted with granulations, having a corpuscular composition. But the embryo enclosed in this membrane is dependent on it for its nourishment, and, therefore, by a natural law we cannot explain, some of the early corpuscular granulations metamorphose into placentulæ, retaining their corpuscular type; whilst the remainder of the embryonic granulations, not being required after the development of the placentulæ, gradually metamorphose into fibres, forming a strong coherent serous membrane. The same fact is true of the human embryo,—the outer membrane, or chorion, being at first distinctly villous over the whole of its outer surface. Subsequently the villi are more luxuriant at that side where the placenta will afterwards be found, and still later, when the placenta is fully formed, the rest of the villi have disappeared.

Now, taking the facts here ascertained, the following appears to be the natural history of the fibrous and serous textures. At first, in the embryo, all the textures and the coats of blood-vessels are formed of spherical cell-organisms. Subsequently, we see groups of cells, which, with low magnifying power, appear as small grains or granulations. In the actively secreting and mucous textures, these embryonic

granulations grow into villi, papillæ, and follicles; but in the fibrous and serous textures they are suppressed and disappear, the cells metamorphosing into fibres, in conformity with the law governing the growth of the structure.

The adult serous and fibrous textures—the pleura, peritoneum, pia mater, and—as will presently appear—according to our researches, the parenchyma of the lung—have all a very simple composition. There are no granulations, villi, or follicles, such as constitute the distinguishing features of a mucous membrane; their vessels are merely transparent, fibrous canals. But when these textures become the subjects of inflammation or scrofulous disease, the concurrent testimony of all recent pathologists bears witness to their assuming a granulation or villous state; and my own investigations, presently to be related, have satisfied me that this change takes place not simply in consequence of a multiplication of blood-vessels, but concomitantly with a change in the elements composing the walls of the vessels, from simple fibres to cell-organisms. When this change occurs, the texture is in a state of retrograde metamorphosis, for it has returned to a condition analogous to that in which it was, in the early embryonic state. And should the abnormal villi or granulations pour forth cells, protoplasma, or mucus, the texture has then exchanged its serous or fibrous non-secreting for the mucous or corpuscular secreting type.

In all cases of injury with destruction of the skin,

the exposed areolar texture, before the wound heals, is covered with red granulations, resembling the papillæ of a mucous membrane, discharging cells, lymph, and mucus; and we have been unable to discover any distinction between the granulations of the healing wound and those of a scrofulous fungosity,—excepting that the one heals by the metamorphosis of the granulations into a fibrous cicatrix, which the other fails to do.

If we investigate the structure of the larger *organs* of the human body, we shall find them composed of corpuscular and fibrous textures.

The parenchyma of the LIVER is a corpuscular texture, the cells of which elaborate a yellow matter, a species of animal endochrome, which, when set free, constitutes the secretion termed bile. This parenchyma is divided and subdivided into lobes and lobules, each of which is limited and enclosed in a thin serous membrane or *indusium*, which ultimately—under the designation of peritoneum—gives a smooth and equable covering to the whole organ. In the spaces between the lobules, the branches and subdivisions of the arteries, veins, and bile ducts are distributed, embedded in a loose fibrous texture, termed areolar texture.

The parenchyma of the BRAIN is another corpuscular texture. The corpuscles or cells of which, like others of their class, have a tender transparent integument inclosing an elaborated matter mixed with molecules. This parenchyma is likewise divided and subdivided into lobes, lobules, and configurated tracts, limited by the

involutions of a fibrous or serous texture, of which the lining membrane of the ventricles—the tunica arachnoidea—and the pia mater are examples.

The parenchyma of the LUNG in the embryo and fœtus is a corpuscular texture, but at birth it appears as a simple eminently vascular membrane, prolonged from the ends of the air-tubes, each prolongation being distended by the inspired air into several cellular spaces. These spaces or air-cells are not indiscriminately thrown together in the interior of the lungs, notwithstanding they appear so; on the contrary, they are symmetrical prolongations of the air-tubes. A group of them surrounded by a serous indusium, forms a lobule; many lobules form a lobe, and five lobes form the organ termed the lung. The membrane which limits the configuration of the lobes and lobules is termed pleura, and a loose areolar texture accompanies all the divisions and subdivisions of the blood-vessels and air-tubes. The outer texture of the air-tubes is a fibrous texture continuous with the areolar texture, but internally it is a mucous texture; the fibres here being interspersed with follicles or granulations, excreting mucus, and cells.

THE PARENCHYMA OF THE LUNG is usually supposed to be a mucous texture, but a microscopical examination proves that it does not possess the elements nor the aspect of a mucous texture. Its perfect transparency and elasticity are characteristics of a serous or fibrous texture; its capillary vessels have no spherical

cells or corpuscles bounding them; no similarity whatever exists between these vessels and those of a mucous texture, and their special respiratory function is well known and established.

Bearing in mind the distinction insisted on between the corpuscular and fibrous, or mucous and serous textures, it is demonstrable that the secreting properties of the former arise from the presence of elaborating cell-organisms, which are temporary and evanescent elements, whilst the more mechanical or ministerial functions of the latter arise from the presence of fibrous elements which are comparatively durable and permanent. And as the changes or succession which the elements of a structure experience, is in a direct ratio, with their importance to the functions of secretion and growth, so, therefore, the corpuscular textures hold a higher rank, have more activity than the fibrous, the mucous than the serous. This conclusion is substantiated by the amount of vascularity in the two textures. The corpuscular or secreting textures are everywhere traversed by multitudes of nutrient capillaries specially disposed in different organs, whereas the fibrous and serous textures, although in a few instances extremely vascular, have but few nutrient capillaries, and these variable and irregular in their distribution. The dura mater and pia mater are both fibrous membranes, enclosing and supporting the tender corpuscular parenchyma of the brain. The dura mater is very tough and strong, transmitting im-

mense columns of blood to and from the brain, yet is itself scantily supplied with nutrient capillaries. But the arterial currents traversing the dura mater, and those derived from other quarters, before they can be admitted into the soft corpuscular parenchyma of the brain, must be divided and subdivided into slender streams, and the impetus of the heart's action subdued by turns and windings. For these ministerial purposes, a more delicate fibrous texture, the pia mater is interposed, which not only affords space and area for the subdivisions of the blood-current, thereby itself becoming extremely vascular, but, dipping down between all the lobular subdivisions of the brain, termed convolutions, it enters the recesses of the organ, supporting the parenchyma, and conveying side by side arteries and veins through which the blood current reaches and returns from this great organ of life and being. The great vascularity of the pia mater, therefore, is not subservient to any special vital process of secretion in the texture itself, but simply ministerial to the capillary circulation of the corpuscular parenchyma of the brain. So likewise the parenchyma of the lung affords space and area for an extreme subdivision of the blood-current for the purposes of respiration; and its vascularity is analogous to that of the pia mater—a ministerial and not a nutritive vascularity—subservient, not to any process of secretion, but to respiration. The only outlet and inlet to the lung is by the windpipe, and if the air-spaces, which have

been computed to number 3,488,000,000,* or if an expanse of membrane equal in area to 1,500 square feet,† were a secreting texture, persons would be always coughing and spitting, which we know, in health, is not the case.

Section II.

THE PROCESS OF NUTRITION; OR, THE RECIPROCAL ACTION BETWEEN THE BLOOD AND THE TEXTURES.

The growth and preservation of every part of the human structure, and the renewal of its textures and secretions, depend upon a reciprocal action between the blood and the solid parts termed the Process of Nutrition, in which certain general elements withdrawn from the circulating current become part of the special texture. If the newly-withdrawn matter conform in all respects to the special morphological requirement of the part, the process is said to be normal or healthy; but if it varies from it, so as to change the nature or office of the special elements, or alter the quality of the secretion, it is said to be abnormal or unhealthy. From this general statement, it is evident

* Keil. † Lieberkuhn.

that in the process of nutrition by blood, there are two chief phenomena to be attended to, the one, the abstraction of the general elements from the circulating current; the other, the metamorphosis of these elements whereby they incorporate with the special texture. And upon consideration, it is evident that the elements withdrawn from the blood may undergo the required metamorphosis perfectly or imperfectly, or remain in the state in which they are when first separated from the nutrient current.

If the circulation of the blood be observed with the microscope, in vessels of a transparent texture in the living animal, without any previous rude handling or irritation, the stream is seen rapid and uniform, without any check or perturbation, and it is impossible, from the rapidity of the current, to discriminate its cells or corpuscular elements, except that here and there colourless-cells, by clinging to the sides of the vessels, or slowly gliding along them, become discernible. But, if the part under observation be irritated, the regularity of the stream is disturbed in a very remarkable manner, and, as if in consequence thereof, colourless-cells in great multitudes are seen separating themselves from the current,—becoming fixed to the walls of the vessels. Some time after the appearance of this phenomenon, a slender line of colourless matter is more or less visible between the stream of red blood and the solid texture, in which the stationary cells are embedded; so that the irritant, of

whatsoever nature it be, has produced a separation between the colourless and red elements of the blood, which is seen to take place within the living vessels, the red, flowing onward sometimes with the utmost rapidity, the colourless remaining stationary, and forming a new interior coat or wall to the vessels. The nature or meaning of this phenomenon is interpreted by the result, which clearly proves it to be one of increased nutrition, for the irritated texture in a few hours is much thickened, and its elements altered, multiplied, or increased. And the fact clearly shows how the elements of any special texture may become mingled with, or supplanted by, cell-organisms, furnished from the blood.

We are precluded from making this satisfactory and conclusive observation in the living human body, because there is no accessible part sufficiently thin and transparent for the purpose; but we have ample grounds for admitting that in man, analogous irritants are followed by similar results. For, if blood be drawn from the reddened skin of a blister, scarlet-fever, or erysipelas, where new layers of cuticle are forming, or from the neighbourhood of a part discharging pus, an unusual amount of colourless cells may be oberved in it with the microscope.

That the separation of the colourless cells and protoplasma of the blood from the red current, is an ordinary phenomenon of growth or nutrition, appears to be proved by a careful microscopical examination of

the walls of blood-vessels in embryonic structures. Plate 3, fig. 6, represents the appearance of a blood-vessel, in the transparent membrane of a human embryo, that is to say, in a texture not only growing rapidly, but undergoing a metamorphosis from cellular to fibrous. The dark portion *a* represents the column of red cells in the centre of the vessel. At *b* is a transparent layer of colourless matter—cells and protoplasma—intervening between the red blood and the proper coat of the vessel *c*. At *c* is the proper coat or wall of the vessel composed of nuclei and cells, embedded in fibrils, which in this example had scarcely more coherence than the fibrils of a mucus. At *d*, still further from the blood column, is the coherent cellular texture of the membrane itself, and it appears clearly, that during growth the whole thickness of the wall of the vessel experiences an alteration.

The example cited is that of a coherent cellular membrane in progress towards a fibrous morphology. The texture nearest to the protoplasma is becoming fibrous, whilst that further from the blood is yet cellular. In a perfectly formed fibrous texture, the elements of the texture and the coats of the vessels are fibrous. If in this condition, unconformable cells accumulate in the protoplasma space *b*, the coats of the vessel *c* soon become corpuscular, and the action or growth continuing in this type, the fibrous texture would at last become again corpuscular, thus reverting to its embryoniform condition.

The elements of blood then, administering to growth, are colourless cells, aud protoplasma; and the nature of the walls of the vessels of growing or extending textures, arise from the comformable or non-conformable metamorphosis of these primary elements. In short, the reciprocal action between the blood and the texture, in growth is not a species of exosmosis, through a structureless membrane, with the genesis of cells from germs in the exudation, but a phenomenon of morphology. We have been careful to produce the facts placing this question in its proper light, because it is not generally admitted, and next, because upon it depend the explanation of phenomena in the progress and cure of disease.

Upon a review of the facts, then, it appears that all living beings are amenable to external agents, and that it is a law of their structure that unusual conditions are followed by unusual or exaggerated nutritive phenomena; living textures answering to the application of a stimulus or an irritant, by an unwonted accumulation of nutritive elements in the stimulated parts. An increased amount of nutritive matter thus determined to a particular part, is clearly a deviation from its ordinary law of nutrition, and must therefore be classed as an irregular phenomenon; but whether it prove a benefit or an injury, conduce to health or disease, will depend upon the requirements and the subsequent morphology. For example, in a wound or a fracture, an increased amount of nutritive elements is required and furnished in virtue of the law that irritated parts

have their nutrition increased. If the morphology of these new elements conform in all respects to the law of the texture, the result is cure; but if it be uncomformable, the cure does not take place. The demonstration of this law between irritation and nutrition in its beneficial aspect is seen in vegetable structures, by their larger size, more vigorous growth, and brilliant colour, under the stimulus of a rich soil, and increased light and heat; and in its prejudicial aspect, in galls and excrescences from the puncture of insects. It is seen in the human structure, in its beneficial aspect, by the healing of wounds, and the union of fractured bones; and in its prejudicial aspect, in disease, for example inflammation, and scrofula. Universally throughout all classes of living beings, the elements of growth and secretion, the characteristic solid and fluid matters of the structure, are prepared or elaborated in the interior of microscopic cell-organisms, and there are many analogies between the parenchymatous cells of the leaf of the higher orders of vegetables, and the cells of the blood of animals.

The general elaborating cells of a leaf are fixed in an expanded frame-work, and the exterior aërial influences necessary for their functions pass around them in their fixed position; whereas, the general elaborating cells of blood flow in a current throughout the animal body. In vegetables, unusual stimulants or irritation give rise to an increased quantity of parenchymatous cell-texture; in animals, nourished by

blood, unusual stimuli or irritants determine a greater number of the flowing cells of blood to become adherent upon the solid texture. In the ordinary nutrition of vegetables, soil, light, heat, air, and water, are stimuli promoting the reciprocal action between the leaf and the rest of the structure which unusual stimuli exaggerate — sometimes beneficially—sometimes prejudicially. So in the ordinary nutrition of animals and man—food, temperature, air, and water, are stimuli, maintaining a certain ordinary amount of action between the blood and the solid textures, which irritants exaggerate beneficially in fractures, wounds and burns—but prejudicially in scrofulous and inflammatory diseases. The differences arising, among other things, from the conformable or uncomformable metamorphosis of the embryoniform elements, accumulated in virtue of the law by which the irritant acts upon living textures.

CHAPTER II.

PRACTICAL PATHOLOGY.

"He that knowes not the wayes of NATURE, how can he succor her, or turne her about?"—LORD BACON.

SECTION I.

SCROFULA.

SCROFULA and scrofulous diathesis are terms used to designate a particular state or condition of the human body rendered apparent by the phenomena of its growth and disease. If there be one fact better established with respect to this condition than another, it is its hereditary character—the offspring not only exhibiting particular forms of growth but forms of disease identical with those which have been known or recognized previously in one or both parents. That the lineaments of the face—the colour of the hair and eyes—the tones of the voice—an ear for music, and mental aptitudes, are transmitted from parent to child, are facts concerning which there can be

no doubt; and being established, it cannot be a matter of surprise that constitutional dispositions, diseases, and temperaments, are also hereditary. "It may truly be asserted," says an eminent medical authority, "that no original temperament or frame of body confers complete immunity from scrofulous diseases, for they are observed to originate in the healthy offspring of healthy parents under exposure to cold and damp,—with insufficient food,—privation of pure air, and want of healthful exercise. Instances are recorded where persons in good health have been affected with scrofulous diseases after being confined in dungeons or prisons, and there scantily fed. The influence of such causes in producing scrofulous diseases in the inferior animals has been made the subject of experiment by Dr. Jenner, Dr. Baron, and others; and the results have satisfactorily proved the great extent of that influence, and the power we possess of removing the factitious disease by replacing the animals in healthy situations, and there supplying them with wholesome food."*

"In all parts of Europe," says Dr. Baly, physician to the Millbank penitentiary, "the proportion of deaths has been much greater among criminals in prison, than amongst persons of a corresponding class out of prison; and the increased mortality is due to various forms of scrofula, and especially tubercular phthisis. The causes which contribute to this result are cold—poorness of diet—deficient ventilation—want of sufficient bodily exercise

* Dr. Cumin, Cyclopædia of Practical Medicine, Art. Scrofula.

and dejection of mind. In a great number of cases of phthisis in this prison, apparently hopeless, the disease was immediately checked on the release of the prisoners, many of whom entirely recovered."

Hence, then, without entering largely into the details of this part of our subject, we may conclude that the analogy between the causes of scrofulous disease in man, and the irregular growth of plants, is recognised and established; there being in both two conditions—the one inherent, the other external. And as in plants the inherent disposition may prevail over external conditions, so also may it in man. For an hereditary disposition to scrofula may produce disease notwithstanding the most careful regard to hygiène; and a neglect of hygiène may produce scrofulous disease where the inherent disposition is naturally good.

Most writers upon scrofula describe certain general appearances in the form of the body, in the countenance, or complexion, by which they say the inherent disposition or diathesis may be determined. But as long as the body remains in health, and has never been otherwise, it is impossible to speak with certainty respecting the scrofulous diathesis, whether it be or be not present; for it is not by the phenomena of health, but of disorder or disturbance, that this is determinable; when, for instance, a part has suffered irritation, and had its nutrition increased in consequence, the inherent constitutional disposition discovers itself by the ensuing morphology.

The term constitution or diathesis, as applied to the human structure, expresses only certain qualities hereditary or acquired; and as the structure must exist before its qualities can be known; so it is evident that morphological phenomena must be the antecedents, of which the constitution or diathesis is the consequent. We may form a suspicion of the diathesis of a person by the hue of the complexion, the colour of the hair, and the contour of the face, but a practical conclusion is rather to be drawn from the phenomena of any irregular morphological action, which may occur,—from the behaviour of the textures under the infliction of wounds and injuries, or under the ordinary and common forms of illness,—measles—dentition—scarlet fever and hooping-cough—to which all growing human structures are liable. When a bone is broken, a joint sprained, or a wound inflicted on the skin, the phenomena—times and stages of the reparative process in healthy bodies or in good constitutions—have been ascertained by experience and recorded;—any unusual prolongation of the period or any irregularity in the operation of a cure being rightly attributed to a scrofulous diathesis.

Tubercular consumption and phthisis are terms used to designate that species of disease which is characterised by the filling up of the air-spaces of the lungs and the destruction of the vascular parenchyma by a soft, brittle, white matter, named tubercle and tuberculous matter. Recent authors have differed in their opinions regarding the seat and nature of tubercles in the lungs,

nor are they agreed as to the changes they undergo. Laënnec describes them as small firm bodies, which gradually enlarge, then soften, and by degrees become converted into a liquid mass. Andral differs somewhat from Laënnec; he says that tubercles soften not from any spontaneous changes in themselves, but from the admixture of pus poured out from the living texture immediately surrounding them. Dr. Carswell states that tubercles originate from morbid changes in the blood; and Dr. J. C. B. Williams finds that lymph, pus and tubercle pass by imperceptible gradations into each other. Louis, who is the greatest authority we possess in questions relating to the anatomy of consumption, says "The matter of tubercles may appear under two primary forms, that of insulated bodies and infiltrations." "The former when first visible to the naked eye resembling small semi-transparent grains or granulations, which adhere intimately to, and form part of, the texture from which they grow; the latter resembling a viscous lymph or mucus."

From my researches tubercles appear to be present in the lungs more frequently than is generally imagined. I have examined with a lens many apparently healthy lungs, and have found them more or less abundantly in one third. In these instances the tubercles escape notice unless searched for in very thin sections, first macerated in water to remove the air-bubbles, and then gently extended upon a dark surface. In order to make out correctly the primary situation

of a tubercle, the examination should be made in the lungs of young persons who have died of other diseases; for in those who die of consumption so many changes have taken place, and the several textures of the lungs have been so altered, that it is impossible to find tubercles in that early condition in which alone their nature and situation can be determined. I have repeatedly examined with the microscope the material deposited in the air-cells of the lung in *pneumonia*, and compared its characters and appearance with that forming a tubercle, without being able to detect any more essential or specific difference between them than exists between purulent matter recently excreted and that of an old chronic abscess. The same class of objects, colourless cells and altered protoplasmatous matter constitute in both cases the bulk of the material. And were we to imagine the fluid elements of old pus, removed or absorbed, the remaining solid matter would appear to possess the characters of tuberculous matter; the colourless elements of blood—pus and tubercle—passing by insensible gradations into each other.

In pneumonia, the consolidating matter is as it were suddenly thrown out over a wide extent of lung. All the capillaries are loaded with colourless elements. The blood itself, when withdrawn by venæsection, assumes the buffy-coat, and the texture from the various blendings of the red colour of the blood with the white colour of the new material separated from it, assumes various hues between dark red and whitish yellow.

In tuberculosis, on the other hand, the consolidating material is deposited at distant points in a much slower manner; and I have seen sections of the lung display an appearance analogous to that of the face in small-pox, and this, too, in a patient who did not die of consumption.

My researches have, in like manner, been extended to the characters and appearance presented under the microscope by the materials taken from pimples, boils, and other kinds of eruption on the skin; and in all these instances, granular colourless cells,—molecules and a more or less viscous transparent fluid-matter have been seen,—the cells usually in the greatest abundance. Moreover, the same objects have been detected not only in the more healthy texture surrounding the diseased spot, but also in the blood of the neighbouring vessels contributing to the nutrition of the diseased part. Lebert states that the cells he has seen in tubercle and tuberculous matter have certain peculiar and distinctive characters, but we have found all the characters he describes in some of the cells of ordinary purulent matter from simple pimples on the skin—and are, therefore, unable to subscribe to his doctrine of specific tubercular cells. In our observations, almost all the cells of the most recent tuberculous matter have presented a coarsely granular appearance, being crowded with dark particles, apparently of a fatty or oily nature; —whereas in the cells of ordinary purulent matter it is a few only that present this appearance; but a differ-

ence of this kind, which is one of relative numbers only, can scarcely, we think, be deemed a sufficient ground for a specific distinction.*

Case I.—A man, aged thirty-seven years, died of consumption, and the body was examined forty-eight hours afterwards. On opening the chest, the right lung was immediately perceived to be wholly different from any thing at all resembling the healthy organ, having been converted into a brittle texture, which did not in the least degree collapse on opening the chest. The pleura first arrested my attention; it was covered with a thick layer of viscous or gelatinous matter, traversed by numerous bands of waved fibres and blood-vessels. The size, number and arrangement of the vessels bore no resemblance to those of the healthy texture. In one place fifteen large vessels, varying from $\frac{1}{50}$th to $\frac{1}{80}$th of an inch in diameter, were counted running together a straight or parallel course for an inch or more—a thing never seen in the normal structure. With high magnifying power, multitudes of colourless-cells containing molecules were found imbedded in the gelatinous matter; and all the smaller ramifications of the blood-vessels were nothing more than simple channels in the material itself, appearing as though they had not yet acquired their distinctive coats; the microscopical aspect being identical with that I have observed in early embryonic fibrous textures.

* Experimental Researches. First Series—pp. 57 to 62.

On making incisions into the lung, the new textures were found partly red, and partly white or grey,—with numerous cavities in their interior. The surface of the cavities in the red parts was uniform or smooth, and formed of a soft corpuscular material, having a villous aspect when viewed with a lens, and supplied with blood from numerous straggling vessels which became visible to the naked eye, after the softer portions of the corpuscular matter had been gently washed away. The surface of the cavities in the white parts of the texture was rough, dry, and irregular, and only here and there reddened by the presence of blood-vessels: the tuberculous substance being composed of colourless cells, molecules, and granulous matter.

"In very acute cases of pleuritis, which have proved rapidly fatal, I have repeatedly observed," says Dr. J. H. Bennett, "the following appearances. On carefully raising the sternum, the pleural cavity on the side affected has been found full of apparently a clear fluid of a yellowish or greenish tint. On emptying out this by means of a small cup, it has been observed, that the deeper we descend, the more turbid it becomes, until at length a semi-fluid mass is removed; and it will frequently be found that large portions of this mass are semi-transparent, resembling a light-coloured calf's foot jelly, whilst other portions present the usual opaque appearance." Sometimes the matter "assumes a more consistent appearance, and forms flocculi of different sizes, or a distinct lining, varying in"

"thickness from half a line to an inch over the inflamed part. This occasionally is smooth, but sometimes it presents a honey-combed appearance, or hangs in loose flakes in the serum." "Serous membranes, when inflamed, frequently resemble mucous surfaces from the villous appearance the effused matter assumes; and in point of fact, it performs the functions of a mucous membrane for a time, and is very active. This villous aspect is very commonly seen on the pericardium and peritoneum. In some cases, where the inflammation is of longer standing, we find after death that the blood-plasma or lymph, assumes a fibrous appearance, the fibres extending between the opposed surfaces in the form of bands, which have considerable tenacity and strength. These bands have a great disposition to contract, and ultimately become shorter and shorter, and assist in forming a dense substance, which at length firmly unites together the serous surfaces. This uniting (fibrous) substance becomes more and more dense, and not unfrequently resembles ligament in toughness and general aspect. In this form it may frequently be seen in phthisical cases, uniting together the lobes of the lung. Occasionally it assumes even a cartilaginous hardness, resembling the filro-cartilage of the intervertebral substance. Lastly, it sometimes produces white indurated patches of a glistening cartilaginous appearance, varying in extent, the surface of which has assumed the character of a serous surface. All examples of recently exuded lymph on the surface of serous"

" membranes will be found at first made up of corpuscles and filaments. The latter being most abundant in those portions which adhere together, and the former in the pulpy and more fluid portions. At a later period the lymph is more consistent, and filaments are seen in it in every respect similar to those observed in the ordinary areolar or filamentous textures of descriptive anatomists,—and when it firmly unites opposite surfaces, the fibres are arranged close together, as is observed in the ligamentous tissues in general. The white, glistening, and indurated patches do not present the cellular structure, but are densely fibrous, and analogous to fibro-cartilage. Such are the ordinary appearances and minute structures which the exudation or the lymph presents, when formed upon the surface of serous membranes. At the very earliest period, when it presents the gelatinous semi-transparent appearance, it is identical with the structure observed in the colourless clots of blood so frequently found in the heart, and with the buffy-coat of inflamed blood as seen to form under the microscope by Addison. The mode in which the filaments are deposited is best seen in blood removed from a man labouring under acute pleuritis. I have frequently had opportunities of confirming the observations of Addison, and of seeing these filaments form under the microscope. The process is somewhat analogous to crystallization, except that no regular forms are produced."*

* Treatise on Inflammation as a process of Anormal Nutrition, by John Hughes Bennett, M.D., F.R.S.E., &c. &c.

Case II.—A young lady aged twenty-one years, died of consumption, and the body was examined a few hours after death. On raising the sternum, the lungs did not collapse, being extensively adherent to the walls of the chest, by soft and brittle membranous bands, which were furnished with blood-vessels in continuity with those of the adjacent pleura. On examining the coats of these vessels with the microscope, they were found composed of cells—here and there only intermingled with a few fibres. On pressing these soft and brittle membranous bands between the fingers and thumb, numerous small tubercles were felt.

On examining the lungs, multitudes of tubercles and cavities were found, the latter for the most part containing a thick, white, homogeneous pus. The cavities communicated with each other in all directions; into several of them large bronchial tubes opened, and the lining texture of the cavity was as if the mucous texture of the air-tube had become continuous with it. But the texture, forming the interior surface of these cavities, and also of the sinuous channels of communication between them, was here and there marked with broad red patches, in which could be seen with a lens many apparently varicose vessels, quite foreign to the natural textures, and upon examination, their coats were found composed of colourless cells. The weather at the time being unusually cold, portions of the lung were frozen, by exposure at night—and then by taking very thin sections, the elements of

the coats of the abnormal blood-vessels were readily examined with the microscope. The redder portions of the texture appeared to be formed entirely of strange blood-vessels, which ran round the crude tubercles, without entering into their substance, and the walls of these vessels were so slightly coherent, that when thawed, the slightest motion between the slips of glass was sufficient to obliterate all traces of structure, leaving only a mass of cells upon the object glass.

The researches of MM. Shroëder van der Kolk, and Natalis Guillot, have shown that a great transformation in the vascular system of the lungs, is one of the most remarkable phenomena attending the evolution of phthisis. The injections, dissections, and microscopical examinations of the latter especially, have shown that as respiratory capillaries of the walls of the air-spaces, and the branches of the pulmonary artery supplying them, are obliterated and plugged up, they are replaced by a new vascular system, supplied not by dark and venous blood, but with bright arterial, derived from new capillaries in connexion with the bronchial arteries, and the vessels of the mucous texture of the air-tubes. In proportion as this new vascular system extends, so the tubercles soften, and the branches of the pulmonary artery are more and more replaced by the new formed vessels. These vessels, which at a certain period of the disease become incalculably numerous, do not penetrate into the substance of the

tubercles; but the case is different in respect of the cavities, they extend into the prominences on the surface of these, and ramify abundantly in, and impress colour upon the bands so frequently stretched from one point to another of their parietes. If a portion of the wall of a cavity be placed under water, after all mucous and purulent matter has been washed from its surface, this surface is seen studded over with tufts of new vessels, which represent a sort of villous structure, as observed with a common lens. "Hence," observes M. Guillot, "it is not only the highly vascular network surrounding the cavities with its new circulation that constitutes a striking feature in the anatomy of these excavations,--but further, the terminal tufts or villi, which bring arterial blood derived from the aortic circulation into contact with the air, having replaced the normal capillaries, which before brought venous blood in contact with the air."*

Case III.—A woman, aged thirty four years, died of scrofulous disease of the bones and joints, and consumption. The body was examined some hours afterwards. Four sinuses, with external outlets, existed on the right shoulder, leading down to diseased bone; and another sinus passed through the breast bone into the loose areolar tissue beneath it. The surface of

* See Observationes Anatomico-Pathologici, &c., by Schroëder van der Kolk—also L'Experience, tom. 1, p. 545, and Researches on Phthisis, by Louis.—Syd. Soc. Ed.

these sinuses was covered with red patches and granulations. With a common lens the blood-vessels were seen much more numerous, and to have a different arrangement from those of the healthy texture. On opening the chest, the sinus or canal passing through the breast bone, was found communicating with a mass of altered areolar texture, consisting of whitish and red granulations. The coats of the vessels of this altered texture, when examined with the microscope, were seen composed of numerous ranks of colourless cells—intermingled with fibres—and it was evident that the mucous and purulent matter discharged from the sinuses was excreted from them; so that here the areolar fibrous texture had assumed the properties of a corpuscular texture, at the same time that the lungs were invaded with a similar morphological change,—constituting phthisis.

Louis, in his work on Phthisis, states, that after twenty years devoted to clinical observations, he has not met with a single instance of an individual dying phthisical, whose lungs did not present, as their chief morbid change, a greater or less number of semi-transparent granulations—tubercles and tuberculous cavities. And he agrees with Laënnec in recognizing semi-transparent granulations, as the first stage of tubercles. These granulations, however, are not peculiar to the parenchyma of the lungs, nor are the tubercles into which they pass,—on the contrary, they are found in all the serous and fibrous textures,—in the

pleura, on the free surface of the peritoneum, in the substance of the pia mater, and in the great omentum.

The nature of these granulations, therefore, require a more minute investigation.

Case IV.—A little girl, aged fifteen years, died after an attack of influenza, with symptoms of disease in the lungs and brain. The body was examined twelve hours afterwards. On opening the chest, numerous large abnormal blood-vessels were seen branching upon the outside of the pericardium, and upon laying it open, its interior was found to have lost its smooth glistening aspect, being covered with innumerable semi-transparent granulations, giving to the texture a kind of villous aspect. These granulations were composed of colourless cells, and the blood-vessels supplying them were bounded by cells. The lung contained many minute tubercles, and on the left side this organ adhered slightly to the wall of the chest. When these adhesions were broken through the surface both of the lung and of the wall of the chest was rough from granulations, similar to those on the interior of the pericardium. On opening the head, the pia mater was seen unusually red, all the vessels being turgid with blood. Numerous small granulations, and larger patches of soft opaque matter were scattered at various points upon the texture. These granulations were composed of colourless cells, and the various columns of blood still remaining in the

vessels, were bounded by ranks of similar cells. The delicate lining membrane of the ventricles was opaque and granular. The natural granulations of the plexus choroides were larger and paler, and the ranks of cells which are here normally grouped around the blood-current, were larger and more numerous than usual. The velum interpositum was studded with granulations, and infiltrated with a viscous gelatinous matter, transversed with blood-vessels. Beneath this membrane the parenchyma of the brain was softened, and the incoherent matter, when examined with the microscope, was found composed of cells resembling pus-cells.

Several other post-mortem examinations of a similar kind, of which I have notes, might here be related, but this is deemed unnecessary, as they all establish the same facts, the growth of corpuscular granulations or villi in the serous and fibrous textures, as the primary change ;—the transformation of these granulations into opake tubercles or tuberculous matter, as the next, and the retrogradation of the natural textures surrounding the tubercles are the essential phenomenon of consumption, the indispensable anatomical change of phthisis.

Hence, then, these microscopical researches not only corroborate the truth of the descriptions given by Shroëder van der Kolk, Guillot, and Bennett, but they appear to justify conclusions not stated by either of these anatomists, and to show that the great vascular transformation, and villous growths they speak of, are

the features or accompaniments of a great metamorphosis of the pulmonary parenchyma, in which the simple fibrous, non-secreting respiratory capillaries, and normal texture of the lung, assume an early corpuscular, or embryonic type, with an occlusion of the air-spaces. The phenomenon being analogous to the retrograde metamorphosis of vegetable structures—inasmuch as the slightly coherent cell or corpuscular elements of the diseased structures are a much nearer approach to the elements of the embryo and of blood, than those which are natural. Just as in the retrograde metamorphosis of plants—the cells of the degraded form—the abnormal leaf—are a much nearer approach to the parenchymatous cells of the true leaf, than are those of the natural texture of the petal, stamen, or pistil.

Section II.

INFLAMMATION.

The textures implicated in the injury by which a bone is broken, are irritated textures ;—they have been violently torn or wounded, and in virtue of the law before mentioned (p. 44) their nutrition is exaggerated or increased. If we examine the broken ends of a fractured bone, between the first and tenth day after the injury, we find the periosteum and medullary membrane torn, —the neighbouring soft parts swollen, and blood effused between the fragments. The periosteum is highly vascular, it has lost its fibrous character, and a viscid

gelatinous matter (protoplasma) makes its appearance in the situation of the fracture. The medullary membrane undergoes similar changes, and the marrow is converted into a mass of granulations, which grow in the form of rosy points, and unite, interlacing with each other, so that the fractured ends of the bone are surrounded on all sides with a new granulation fabric, excreting gelatinous matter mixed with cells. From the tenth to the twentieth day, the new texture thus enclosing the fragments, gradually assumes a firmer and distinctly circumscribed character; the granulations are converted into a fibrous texture, which forms a tumour called the *callus*. Between the twentieth and sixtieth day, according to the age and constitution of the patient—the callus is converted into cartilage, the process beginning at the centre, and proceeding to the circumference. Speedily after, ossification succeeds, and thus the whole mass becomes converted into a spongy texture of bone. The facts here briefly narrated, show that the exaggerated nutrition excited in the textures involved in the injury of a broken bone—first establishes a granulation fabric—the component elements of which observe a morphological order, in all respects the same with that observed in the growth of the embryonic structure, and as by it the injured limb is restored to its natural state, so therefore the metamorphosis is natural, and being natural, it is also both conformable and regular. But it is admitted by all surgical writers, that *inflammation*

attends the union of a fractured bone—let this be granted, and it follows that inflammation, in this beneficial sense, is an increased process of nutrition, with the formation of conformable textures by a regular morphology. If the morphological process were to stop, or be arrested at any stage, short of complete ossification, the limb would not be restored to its natural state, the morphology would be unconformable or irregular—the inflammation would therefore be unhealthy or prejudicial, and from this fact the presence of a scrofulous diathesis must be inferred.

The transparent texture covering the front part of the eye-ball, and termed *tunica conjunctiva*, is usually ranked by physiologists as a mucous membrane. Analysed with a microscope in its healthy adult state, it is a fibrous membrane, similar in elementary composition to the areolar texture. (Plate III. fig. 1, and fig. 2.) It has therefore more the anatomical structure of a fibrous or serous, than a mucous structure. It is very sparingly supplied with blood-vessels, the coats of which are fibrous, and "we have no evidence that it is a secreting surface in the healthy state."*

In its early fœtal state, however, groups of microscopic granulations are more or less observable in the texture, and cells enter into the composition of the walls of the blood-vessels.

Case V.—A labouring man, twenty seven-years of age, applied for relief from a purulent ophthalmia,

* Travers's Synopsis of the Diseases of the Eye. Second Edition, page 96.

which had existed from his account seven days. The eye-lids were swollen and closed, and upon separating them, a thick, white, opaque matter escaped. The cornea was clear and bright, but seemed buried in a red and highly vascular texture, composed of granulations, or fungosities, having a fleshy appearance. With a pair of curved scissars, I snipped off a small portion of this granulation fabric, and on submitting it to microscopical examination, it was found composed of colourless-cells, fibres of two distinct kinds, and numerous blood-vessels. In physical properties the texture was coherent and elastic. The cells, however, greatly predominated, they were filled with a viscous colourless matter and molecules, and those fixed in the textures, forming the walls of the blood-vessels, appeared identical in character with those of the purulent secretion. One kind of fibres were simple protoplasmatous fibres, resembling those of a clot of blood; others had a double outline, and appeared tubular, filled with minute molecules. These tubular fibres were, in numerous instances, seen springing from a colourless cell, and they had the same aspect as the tubular fibres and cells seen in the embryonic nervous structures. The coats of the blood-vessels were very thick, three or four times the breadth of the blood-column still visible in their interior, and they were composed of the cells, and two kinds of fibres just described.—(Plate III. fig. 8.)

These cells were not confined to the exterior or outer

parts of the coats of the vessels, but were distributed throughout, the blood itself being in contact with the most interior ones. Whether these cells, resembling in all essential points the colourless cells of blood, were generated from germs pre-existing in the texture, or in any exudation,—or whether they were supplied from the blood, is a point upon which I have elsewhere expressed a decided opinion. But it is unnecessary to recur to the question here,—it is sufficient, that the red granulations on the conjunctiva, and the walls of the blood-vessels, were chiefly composed of spherical cells, and its being demonstrable in this and in other cases, that the walls of the blood-vessels of a fibrous or serous texture, exchange their elements to cells before the texture discharges pus. On the other hand, the major part of natural papillæ, follicles, villi, and granulations, characteristic of secreting and mucous textures, are already and normally corpuscular; their blood-vessels are clothed with several ranks of spherical cells,—and therefore they discharge cells without morphological transformation. And it is easy to comprehend, that ulceration of a mucous structure has the same morphological relation to that species of structure, that villi or granulations, supplanting fibres, have to a fibrous texture. Both being retrogradations from the normal type; a mucous or corpuscular texture ulcerates,—discharging incoherent cells—under those conditions, which in a fibrous or serous texture would lead to the growth of villi or granulations.

It may now be advantageous to regard the phenomena of this case in respect of time. The first stages, or origin of the disease were not seen,—but in seven days, the transparent natural texture had become transformed into one, red, very vascular, fleshy-looking and copiously discharging a thick pus. From the tenth to the sixteenth day, this form of texture maintained its ground actively engaged in the excreting function, notwithstanding applications of what we call remedies,—that is of agents deemed adverse to the continuance of that state. From the sixteenth to the twentieth day, however, it became gradually, but decidedly less prominent and paler,—less blood appeared to be circulating through its vessels. The quantity of purulent matter discharged was less, and it was more transparent, more viscous and protoplasma-like. On the twenty-fourth-day the granulations had very much shrunk and diminished—their vascularity was much less, and the secretion though still viscous, was quite transparent. On the thirtieth day, the texture was fast resuming its natural state, but on examination with a lens, it was still minutely granular.

In this cured case of inflammation, it appears from the facts that we had the same kind of phenomena to deal with, as we have both in scrofulous diseases, and consumption; namely, a new growth, largely composed of spherical cells, and nourished by new blood-vessels bounded in great measure by similar cells:—normal

growth, inflammatory products, and scrofulous diseases —in as far as the reciprocal action between the blood and the solid textures is concerned, seeming to be analogous operations; marked by the origin of blood-vessels bounded by spherical cell-organisms, and the growth of corpuscular granulations. The distinctions arising from the morphological history of these new cell-textures; that is to say, in all cases of growth— in the healing of wounds, repair of fractures, in the products of inflammation and in scrofulous disease— the first observable phenomenon is the congregation or accumulation of spherical cells, and the genesis of embryoniform cell-textures with blood-vessels conformable to that early type. The cells accumulating in inflammation and scrofulous disease, by virtue of the universal law that irritation exaggerates nutrition, and each cell being individually a source of morphological properties; so where they are congregated, morphological phenomena ensue.

If normal and special textures are reproduced or repaired, if wounds heal, and injured parts are restored to their natural state—the inflammation, or nutritive energy is healing, healthy, or conservative;—if granulation fabrics arise, persist, and will not heal, the inflammation is unhealthy or asthenic, and if the special textures of the part recede or give way before the abnormal fabric, scrofulous diseases are the result.

An increased redness or vascularity, with an unusual nutritive activity and new products, have been consi-

dered characteristics of inflammation. But it is manifest that an increased redness, heat, pain, &c., when followed by the union of a fractured bone—by bone, and the absorption of redundant materials, have a very different result from the increased redness, vascularity, and morphological phenomena observed in pleurisy, in mollities ossium, in scrofulous joints, ulcerations, and consumption: these different results occurring not from differences in the first stage, but in the subsequent morphology. But let us examine the subject practically, taking the simplest and most common, the visible and therefore the best known examples. A person is scalded;—here the exciting cause, the hot water acts but momentarily, and only once; but having acted, there is nothing that will stop the nutritive disturbance, or the morphological effects. The living texture has been severely irritated, and it *will* answer to the irritant by an increased nutritive activity. There will be more or less inflammation, followed by serous effusion or new layers of cuticle. Again, a person is severely burnt—here also the exciting cause, the hot iron—acts momentarily, and only once; but having acted, the morphological phenomena will ensue, and a new nutritive activity will arise, new morphological elements will appear, and the living texture will disentangle itself from the dead. Multitudes of new blood-vessels, and new granulation fabrics are formed, which excreting incoherent cell-organisms (pus) in great abundance separate the living

parts from the dead; and when the dead part falls off, the living texture is found to have assumed at its surface a granulation and secreting type. Here, where the texture of the skin is much more severely damaged than in scalds, it is to be observed, that morphological action makes the sore, and morphological action heals it. The hot iron truly makes the original wound—but this is a very different thing from the granulating sore secreting pus which casts off the slough, and which is formed by the morphology—and which moreover heals, let it be observed, not by the reproduction of the natural texture, but by a fibrous cicatrix. The sore of a burn in its granulation state, is, strictly speaking, scrofulous—inasmuch as it represents a type anterior to that of the normal areolar fibrous texture on which it appears. But if within the proper time the granulations undergo a conformable metamorphosis, and the sore heals by a fibrous cicatrix, we do not apply to it the term scrofulous—we do so only when the granulations persist, and as it were refuse, notwithstanding the resources of nature and art, to proceed conformably to the higher grade, and heal the wound.

In the cure of a broken bone, the inflammation consequent upon the injury arises in a few hours, but the granulations afterwards surrounding the fragments, require several days to form. The granulations are necessary to the cure, and yet, as before observed, their persistence would amount to an important

disease, for the limb would never recover whilst they remained. So also in the cure of a burn, the granulations necessarily precede, but must afterwards give way to the fibrous metamorphosis for the cure. Hence the very same condition of the texture, which is at one period a necessary stage of the cure, is at another, later period a form of disease. Again, the bones of the new-born infant are scarcely more than highly vascular cartilage ;—but if the bones of a child at two years old are in the same condition, the child is ricketty. Here then are facts with respect to time and stages to guide us in our difficulties in estimating what is going on in the interior structures of the living body ; so that if the symptoms of an internal malady be unusually prolonged, we may infer a disposition in the morphology to remain stationary in some retrograde position, short of the requirements of the special texture. And it behoves us not to confound symptoms or originating causes with the disease. The disease is a morphological phenomenon, and must, where possible, be traced up to its elementary point. For instance, the cause of ricketts is said to be the softness of the bones, and a bad constitution ; but the softness of the bones, and the unhealthy constitution are the phenomena we seek to explain, and for which morphological reasons must be discovered, or else we do not go to the root of the disease. And until the discovery be made, an empirical, and not a scientific treatment must be submitted to. Again, we frequently see children

falling away without any evident cause—and we have found parents quite satisfied, when told it is an atrophy—an expression conveying not one whit more information, either to the physician or the patient, than what is known to every casual observer.

In all inflammations, there are three stages more or less clearly distinguishable; first, the exaggerated nutritive action, by which cells and protoplasma are accumulated in the part;—secondly, the change which their accumulation produces in the walls of the vessels, from fibrous to corpuscular elements; and thirdly, the new growth, product, or secretion. In what are termed acute inflammations, all these phases are prominently pronounced by signs or symptoms;—but in scrofulous diseases, the first two phases, being slow and inenergetic, evolve no sensible signs, or are obscure, it being the growth or product, the granulations or their resulting tubercles that constitute the palpable disease.

In the first stage of pneumonia, the respiratory capillaries are more than usually filled with blood;—colourless elements and lymph, or cells and protoplasma, loosely adhering to their inner surface. In twenty-four or forty-eight hours, these colourless elements adhere more intimately to, and form part of, the coats of the vessels—this is the second stage. In two or three days abnormal products appear outside the vessels, filling up the air cells,—which constitutes the third stage. In the formation of granulations and tubercles,

analogous stages occur; the differences being that in pneumonia, the nutritive activity arises quickly—usually from some known external irritation—extends simultaneously over a wide expanse of texture; urgent symptoms immediately arise—and on post-mortem inspection, the changes are at once visible to the naked eye. Whereas, semi-transparent granulations arise more slowly, usually supervening upon some other malady; they evolve no well-marked symptoms, and although often multitudinous and running together, are yet so small as to be limited to almost microscopic spots, requiring a lens and careful investigation for their detection after death. The principal difference, however,—as respects ulterior events—the cure—between pneumonia and semi-transparent granulations—besides those mentioned, is in the condition of the natural texture, which in a hepatized pneumonic lobule is recoverable, but which in the crude tubercles resulting from semi-transparent granulations is irrecoverable. But of this we shall have to speak more at large hereafter.

It appears, then, clearly from the facts that have come before us in these investigations, that the phenomena of inflammation are not altogether dependent upon the quantity of red blood in the part, nor on the quickness or slowness of the circulation, nor upon enlargement or diminution of the calibre of the vessels; but upon an increased amount of stationary colourless cells and protoplasma preceding an active morphologi-

cal action. We often see persons with very red hands in cold weather, or with varicose capillaries on the cheeks, without any of the phenomena of inflammation; but should these appearances be accompanied with an increased amount of matter in the part and morphological phenomena, they would come then within the category of inflammation. In simple inflammation, the newly congregated cells and protoplasma are intermingled with the natural elements of the part; whereas, in scrofulous diseases, the new elements and new granulation fabrics overrun and destroy the natural texture. Hence it is, that in simple inflammation, when the new elements have run through the stages of their metamorphosis, the natural elements resume their accustomed properties and function, and the cure is perfect: whereas in scrofulous diseases, the natural textures having been destroyed, the cure is incomplete:—deep marks upon the skin—stiff joints—deformed bones—and puckerings in the lungs remaining permanently, after the nutritive energy has subsided. But in all departments of life and organization, it is well known that nature is ever prone to follow her appointed course, and to preserve against more general laws the particular forms she has established. It is by our experience of this, indeed, that the laws of life are recognized and established; and the fact is constantly before us in medical practice, the term *vis medicatrix naturæ* being used in the sense of an agent interposing to counteract interferences and stop the progress of

disease. This fact being established, it would appear from the frequently stationary character of pulmonary tubercles,—from the absence of any active nutritive function in the texture around them—from their degenerate structure and want of vascularity, that they are blighted granulations. Their presence proves that the texture is not healthy, but an active nutritive energy, and a retrograde morphology in the contiguous texture is necessary to constitute *phthisis*. The mere presence of tubercles is not consumption.

Man is but an individual of a class in nature's works; and in him the universal law of growth from cell organisms prevails. Special laws govern the evolution of special textures, but all are based upon the fundamental fact of antecedent cells; and a scrofulous disease, or an asthenic inflammation, which involves the disappearance of the special forms—fibres—cartilage or bone,—muscle—nerve or brain, and the occupation of their place by unnatural cells; that is to say, in technical language—the granulation of a fibrous, or the ulceration of a mucous texture, is therefore a retrogradation—inasmuch as it is the immerging of the special or particular in the more general or universal—healthy growth being the emerging of the special out of the general. And if, as we may well do, we use the term VIS MEDICATRIX NATURÆ to express the reproduction of the special from the general—and thereby include the phenomena of cures;—so, analogously, we may use the term VIS SCROFULOSA to express the immerging of the special

in the universal: thus including the chief and most characteristic phenomenon of scrofulous disease.

Life—healthy growth—normal nutrition—and good constitution, equally express the integrity of all the special forms and functions, and therefore make manifest the vis medicatrix. Unhealthy growth—abnormal nutrition—bad constitutions and scrofulous diathesis, express the retrogradation of special forms, and make manifest the *vis scrofulosa*. The natural laws upon which these phenomena are grounded, are the laws of health and disease—of cures and incurable maladies; they form the basis of medical and therapeutical science; and the object of the physician's or surgeon's treatment is clearly, upon their showing, to uphold or bring into operation a various class of special laws in opposition to the continuance of those of a more general kind;—to prevent particular forms from degenerating to the more universal. And it is evident from the facts observed in the cure of a burn or a fracture, that it is not sufficient for this purpose simply to remove the ostensible exciting or originating cause—the hot water, hot iron, &c.—because a succession of morphological growths conformable in type and time is necessary to reproduce the special form, and cure the disease.

The colourless elements of blood, are, as it were, embryonic forms circulating through the body—the general source—from which the elements of special textures and secretions originate, and to which microscopical anatomy proves they are disposed to revert in scrofulous

disease and ulceration; every blood-cell assisting in the reproduction of forms of matter subservient to special purposes in a complex structure.

Let us now recapitulate the foregoing facts and conclusions in the form of propositions.

Growth—nutrition—inflammation—and scrofulous disease are analogous phenomena.

Growth expresses the evolution or unfolding of special textures from the embryonic cell basis. Nutrition expresses the preservation of these textures by the circulation of embryonic forms in the blood. Inflammation is an exaggerated nutrition; and an inflammatory product is its result—whether bone in a fracture, or granulations in a burn. Scrofulous diseases express the retrogradation of a special texture to some earlier cell-type. And consumption is the retrogradation of the pulmonary or respiratory parenchyma.

As it is important, therapeutically, that there should be no doubt respecting the truth of these propositions, let us state them more fully in different points of view; and the reader who may wish further to consult the facts upon which they are grounded, is referred to *The Experimental Researches, &c.* in the *eleventh and twelfth volumes* of the *Transactions of the Provincial Medical and Surgical Association;* to *A Treatise on Nutrition;* and lastly to the *Memoir on the Morphology of Animal Textures* in the *Provincial Medical Journal for* 1847.

Normal or healthy growth implies the original

formation of the various special textures, and of the whole body, by the evolution—elaborating functions—and morphological activity of embryonic cell-elements. It continues until the original *idea* is fulfilled; the bulk of the body,—the relation of the various textures to each other,—and their functions, being established and limited by the law of the species. A law which we may admire, must observe and study, but cannot explain.

Normal or healthy nutrition is a continuation of the activity of cell and protoplasma elements within the sphere of growth as limited by the law of the species. In man it is secured by a continuous circulation of cell and protoplasma elements through all parts of the structure. In more technical terms, it embraces a reciprocal action—first between the food, external elements, and the blood; and secondly, between the blood and the solid textures, whereby the organs and functions established by growth are continued and preserved.

Abnormal or unhealthy growth implies the formation of an unnatural texture; one exceeding the limits, or unconformable to the law of healthy growth in the species.

Inflammation, in its full meaning, is an exaggerated or irregular nutrition, based upon the law of irritability in all living structures, whereby they answer to the application of stimuli, by an unusual accumulation of morphological elements. If this accumulation or

copiousness be in answer to a stimulus from without, and the elements become engaged in the reparation, or security of the structure, certain times and morphological stages comprised in the law of normal growth are observed, and being accomplished, the exaggerated nutritive activity spontaneously subsides, any excess of matter is absorbed, and the parts return to their natural state. This process being that form of inflammation, termed healthy or conservative, the nutritive activity leads to conformable results, and thereby exemplifies the operation of what is termed *vis medicatrix*, in which the blood is as amenable to that law as the texture. But if the copiousness be not in answer to any injury or irritation requiring reparation,—or if the elements be not engaged in any reparative function, but on the contrary, occupied in establishing new and uncalled-for products,—then the terms, inflammation—organic disease—scrofula—and scrofulous disease, are, in some pathological senses, applicable.

Inflammation, and organic disease, are appropriate terms when new products *arise in addition to*, or upon the normal textures; for instance—false membranes—exudations—secreting villi or granulations *on* the pleura; layers of lymph *on* the iris or pia mater; solid matter *in* the air-cells of the lungs; or red fungosities *sprouting from* the conjunctiva of the eye. Scrofula and scrofulous disease are applicable terms when the new products *destroy* the natural fabric—fungosities

supplanting the cartilage of the joint, or the hard structure of a bone—ulcerations yielding pus *displacing* the papillæ of mucous membranes—and villous secreting fabrics *destroying* the respiratory parenchyma.

Lastly, during inflammation—using the word in the general sense here indicated—there is more or less marked increase of colourless elements and protoplasma in the parts affected. At first—*in the first stage*—these elements adhere but slightly along the inner margin or boundary of the nutrient vessels, and are therefore still within the influence of the circulating current; belonging, as it were, at this period, as much, or rather to the blood, than to the fixed solid. Secondly—*in the second stage*—they are more firmly fixed in the walls of the vessels, and therefore now without the influence of the circulating current. Thirdly—*in the third stage*—new elements appear at the outer border of the vessels, where they add to the texture, form a new product, or are liberated as an excretion. In the sequence of these phenomena, the second stage does not prevent or stop the first, nor does the third prevent the other two. At first, there is only the first stage; then the first and second stages; and lastly we have them all;—the second and the third superadded to the first. These stages of inflammation have been confused—the term *inflammation* being appropriated to the first or second stages, and the term organic disease to the last; whereas an organic disease is only the last

stage of an unconformable morphology, of which some form of exaggerated or abnormal nutrition is the first.

In extending this analysis of the phenomena of inflammation by means of the microscope, thereby increasing our knowledge of disease, and gaining strength in the right direction, it behoves us not to overlook any part of the circumstances surrounding the medical art. The physician has nothing to do with the formation and growth of natural textures—the unfolding of their functions—or the limitation of their bulk; nor has he any influence over the form or fashioning of the structure. The infant body comes into his hands full of energy, full of life and irritability; not indeed complete in bulk, passionate in temperament, or noble in intellect, but with every material fabric pre-fashioned even to the length of the little finger, and the tiny nail upon it. The mysterious genesis of brain, heart, lung, nerves, and muscles, with their appropriate interior facts or special properties deeply founded, is accomplished before the duties of the medical art begin. The therapeutician's task is to ward off accidents, not to interfere with the subject. He dare not separate the agents, the external world, and the new-born structure—or interrupt the reciprocal actions of life and matter; but he seeks to bring accumulated experience and renovated science to bear, in opposition to unnatural superventions or retrogradations which the new world or new stimulants may occasion. And thus,

while life continues, it is the physician's part to rule or regulate the reciprocal actions between external agents—climate—food—air—and blood; and between the elements of blood and the pre-formed textures.

CHAPTER III.

PRACTICAL PSYCHOLOGY.

"The testimony of natural reason must of necessity stop short of those truths which it is the object of revelation to make known; but, while it places the existence and principal attributes of a Deity on such grounds as to render doubt absurd and atheism ridiculous, it unquestionably opposes no natural or necessary obstacle to further progress. The character of the true philosopher is to hope all things not impossible, and to believe all things not unreasonable."—HERSCHEL.

SECTION I.

CAUSES—INORGANIC, MORPHOLOGICAL, EMOTIONAL, AND MENTAL.

MAN is a subject for study and contemplation in two distinct points of view. First, as an individual possessing a conscious unity—a personality insusceptible of division or analysis. Secondly, as a living being composed of parts, and subject to the laws of matter.

The unity of consciousness, and the high truths of faith and revelation, are far beyond the sphere of reason or scientific inquiry, and in no way interfere

with the expedients of a philosophical classification. But to a bodily structure, composed of various parts, and having different kinds of perceptions and sensations, scientific rules are applicable; and if, as in the practice of medicine, we be required to assuage a pain, alter a sensation, and stop the progress of disease—we must, to the utmost extent, analyse the phenomena of life in a twofold—a somatic and psychological point of view—classify the facts and form a theory of causes.

In studying the phenomena of external nature, every thing exhibits a multiplicity of operations and changes, an endless divisibility of parts, and the influence of motion, numbers, and arrangement, in the production of sensible effects. But when we turn inward upon ourselves, and contemplate the feelings and consciousness of self, although we meet with great complexity and variety, yet here there is a principle of unity, an individuality in which all feeling centres. This perfect conviction of unity and identity, springing up, as it were, or maintained and supported by such a multiplicity of parts and operations, is incomprehensible to our reason, the great mystery of man's nature, and beyond the range of his inductive inquiries. After many reiterated but fruitless attempts, from Aristotle down to the present time, to reconcile the qualities and appearances of things without, with the oneness of consciousness and thought within, and to remove the veil thrown over the inscrutable union of the living body, with the intellectual

power which governs and controls its movements, the effort has been found hopeless, and has been abandoned.

It is not my intention to enter into any metaphysical disquisition, yet I cannot omit here observing, that volition may properly be considered under two distinct points of view; thus a man may will to speak, or be silent, to take off, or put on his hat; and he has at his command the structural power and bodily configuration to realize his wish; if he has not, he is paralytic, or his body is diseased. But if he wills to visit the moon, to fly through the air, or stay his descent when falling from a height, his will must remain a wish or a desire, for he has neither structural power nor bodily conformation to accomplish such a wish. In the former case, his inability is a deprivation and a loss, which may possibly be remedied; in the latter, it can hardly be viewed in the same light; at all events it is irremediable. Corporeal or structural power, therefore, limits the operations of volition; but the boundary of knowledge is the only confine to our *desires*.

The Christian philosopher pursues his investigations with a settled belief that an ALMIGHTY CREATOR exists; and having in view only the discovery of those general laws, which may be deduced by the contemplation of a particular class of facts, or series of phenomena or appearances, he does not speculate on the abstract nature of matter or force; neither does he

try to know what becomes of this or that invisible power, when, as in the example of the voltaic pile, he is able at his will to concentrate and direct, or to dissipate and annul it; nor, when he heats and cools a bar of iron is he disappointed because he is ignorant of the nature of heat, and cannot tell whence it comes or whither it goes. On the contrary, he knows that in all, even in the simplest or most common cases, there must be residual phenomena or ultimate facts, quite beyond his comprehension; he, therefore, does not doubt the possibility of forms of power existing in a very different state, and under very different arrangements to any he witnesses here. "The possibility," to use the words of a distinguished writer, "of the occasional direct operation of the Power which formed the world, in varying the usual course of events, it would be in the highest degree unphilosophical to deny." * But belief beyond reason is based upon grounds entirely distinct from those arising within the scope of any *experimental* research; the object of which is, in all cases, to remove the antecedent or the primary phenomenon as far back as possible, and to discover combinations, appearances, and results, as they are, without questioning those which a Supreme Intelligence *has willed they shall be*.

Bearing in mind, then, the true aim and scope of all inductive researches, it is evident, to whatever ex-

* *Inquiry into the Relation of Cause and Effect*, by R. Brown, M.D., F.R.S.

tent they may be carried, on the subject of life, or whatever may be the forms of expression which the inadequacy of language may constrain us to adopt in explaining the phenomena, we can arrive at no other conclusions than those convincing us of *our utter ignorance*, except from Revelation, *of the real origin or final destination of any form of power*.

Since all living structures are built up by the agency of cells, the most scientific classification of general anatomy would be one founded on the metamorphosis of cells, were it not that in the history of animals two distinct series of phenomena—the psychological and the material—have to be considered.

In the vegetable world we at once observe the prominence of the morphological and material—the variety and beauty of form and colour; but the more interior facts of irritability and sensibility are less attended to, because they are more obscure. In animals and man, the case is very different, for here the interior psychological facts are as prominently pronounced as the material. So again, in the diseases of vegetables, our attention is confined to their altered forms, lumps, galls, exudations, and excrescences: whereas, in the diseases of animals and man, we have forced upon our regard urgent psychological facts in addition to the morphological appearances. Therefore in recognizing cell-organisms and their metamorphosis as the basis of a classification of general anatomy, we must take into our consideration the two phases—psychological and

morphological—under which they appear. For example, the most active portions of the brain and liver are composed of slightly cohering cells, but in the former our attention is rivetted by psychological, in the latter, by material, phenomena. We recognise the brain as the root of sensual perceptions, the material expression of mind, and have no very accurate knowledge of the provisions for carrying away materials that have served their turn in its functions. Whereas in the liver, it is just the reverse; there we recognise a large apparatus of ducts, and a copious secretion, without any very accurate knowledge of what—with due deference to authority we may venture to designate—the hepatic psychology. But let us illustrate, by a familiar example, the meaning of our remark. For there are difficulties in the selection of words, we would fain hope to escape. In the galvanic trough, the electrician, pursuing his own chain of investigation, concentrates his attention upon the facts of the invisible power, overlooking and disregarding the concomitant material or chemical changes;—on the other hand, the chemist, observing the changes of form and quality in the visible material elements, pays no regard to the interior invisible powers engaged in the operation. But it is obvious that such partial views are fatal to the science of physiology, and its two sister sciences, pathology and the practice of medicine. No single basis of classification will suffice,—no partial views can be regarded in the phenomena of human life, human sor-

rows, and human diseases, where we have to deal with the visible and invisible; have to assuage pain, delirium, coma, and distress;—and at the same time contend with the material products of inflammation and scrofula.

The word CAUSE, in the popular sense, means no more than the antecedent of any two phenomena occurring in succession, and in medical discussions it has for the most part no higher meaning; but in philosophical language the word cause implies a power or force capable of originating new phenomena, and making things yield or subserve to its influence. In this latter sense of the word we have abundant proof of the existence of causes or powers in external nature, and of other different powers inherent in the living body; an appropriate conception of which is necessary to elucidate the symptoms, and indicate the treatment proper for scrofulous disease.

A classification of facts conformable to the laws of nature, is essential to every discussion claiming the dignity of a science, and we now propose to show that the physiologist and physician may rest their apprehension of the causes influencing the phenomena of life, health, and disease, upon a well known and established classification. "It appears," says Dr. Whewell, "that there are certain ideas or forms of mental apprehension which may be so applied to facts as to bring into view fundamental principles of science; while the same facts, however arranged or reasoned

about, so long as the appropriate ideas are not employed, cannot give rise to any exact or substantial knowledge." "We call the reader's attention," says Sir J. Herschel, "to this passage, because the forms of mental apprehension to which Dr. Whewell alludes, play a very conspicuous part in his philosophical views. The obvious sense of the passage to those who are familiar with what has previously been written on this subject, would seem to be that there are both appropriate and inappropriate heads of classification under which facts may be grouped, and that if grouped under the former,—causes—whether proximate or ultimate—or laws—fitted to form elements of higher inductions, will, ipso facto, be suggested, if under the latter, nothing but vague and fallacious inductions will be raised, while the true principles will elude our grasp."

Now all the facts of human experience have long been grouped in four great classes.

1. The inorganic.
2. The vegetable.
3. Animal.
4. Man.

This classification we assume to be appropriate on the ground of antiquity and universal assent; and if appropriate, then, according to the authorities cited, causes are *ipso facto* suggested.

Assuming then, in conformity with this classification, the existence of four causes, let us, in order to avoid confusion, designate them by the symbols, *a. b. c. d.*

a. Being the sign of the cause or power, upon which the properties of inorganic matters depend—their cohesion, crystallization, weight, impenetrability, and affinities.

b. The sign of the morphological force—the organic vital power of vegetable structures;—as evidenced in growth, nutrition, reproduction, and secretion.

c. The sign of the power from which springs the sensual perceptions—the emotions—and emotional movements of animals—and

d. The symbol of the power, embracing the thoughts, mind, and moral sentiments of man.

Upon this view of the subject, it is evident that in vegetable bodies, the vital morphological force (*b*), does not supersede the inorganic force (*a*), but is superadded to, and incorporated with it. Growth, nutrition, and secretion, co-existing with cohesion, weight, and impenetrability. So in animals the cause of sensual perceptions and motions (*c*) does not supersede either the morphological or the inorganic force (*b* and *a*), but is superinduced and incorporated with them. And lastly, in man, thoughts, mind, and moral feelings (*d*) are superadded to, or engrafted upon, the lower animal—vegetable and inorganic natures. The subject, therefore, may be thus represented.

1st Class.—Inorganic.—*a*.
2nd Class.—Vegetables.—$a+b$.
3rd Class.—Animals.—$a+b+c$.
4th Class.—Man.—$a+b+c+d$.

This quadripartite subdivision of the causes of human life, enables us to appreciate distinctions in the terms —structure, constitution, temperament, and mind. For inorganic bodies have a structure; vegetables have a structure and a constitution; animals have a structure a constitution, and a temperament; and man has a structure, a constitution, a temperament, and a mind. Moreover, there are distinctions in the organs of the human body co-ordinate with this subdivision. Bones, ligaments, and fibrous textures administering to the inorganic properties, cohesion and form;—lungs, liver, digestive organs and blood, to the morphological functions;—ganglia, nerves, and muscles, to motions and sensual perceptions; and the brain proper to intellect and mind.

"The inherent activity of matter," says Sir J. Herschel, "is proved not only by the production of motion, by mutual attractions and repulsions of distant or contiguous masses, but by the changes and apparent transformations which different substances undergo in their sensible qualities." *

"It is certain," says Lord Bacon, "that all bodies whatsoever, though they have no sense, yet they have perception; for when one body is applied to another there is a kind of election to embrace that which is agreeable, and exclude or expel that which is ingrate; and whether the body be alterant or altered, evermore a perception precedeth operation, for else all bodies

* *Preliminary Discourse*, p. 297; also pp. 59, &c.

would be alike one to another. And sometimes this perception in some kind of bodies is far more subtle than the sense, so that the sense is but a dull thing in comparison of it: we see a weather-glass will find the least difference in heat or cold, when men find it not; and this perception also is sometimes at a distance as well as upon touch, as when the loadstone draweth iron." *

"I am prepared to admit," observes Dr. Faraday, "both with respect to the attraction of aggregation and chemical affinity, that the sphere of action of atoms or particles extends beyond those other particles with which they are immediately and evidently in union. Thus in water a particle of hydrogen in combination with oxygen is considered as not altogether indifferent to other particles of hydrogen, but to have an affinity or attraction towards them; and in many cases this affinity produces effects rising into considerable importance." †

The "inherent activity" of Herschel, the "perception" of Bacon, the "non-indifference" of Faraday, the "elective affinity" of the chemists, or the "polarity" of electricians, are only different modes of giving expression to the very evident fact that the Creator has endowed all particles of matter with extraordinary invisible powers or qualities.

Now the particles of matter are probably not at one

* *Sylva Sylvarum*, p. 171, edition 1651.

† *Experimental Researches in Electricity*, pp. 150, 180, &c.

time endowed with an "inherent activity," and at another deprived of it altogether; it is neither philosophical, nor consonant with the phenomena, to suppose that inert materials can invest themselves with any kind or degree of energy or activity whatever, or that, when once possessing they can divest themselves of it; hence the condition of repose in which visible objects appear, if it does not arise from the absence of an "inherent activity," must be referred to an equilibrium of opposing forces. As long as this equilibrium is maintained among their ultimate particles, bodies have fixed qualities or properties. But whenever it is disturbed, either among the ultimate particles, or in the mass individually, then properties alter, and the phenomena of force or power begin.

Thus, a series of disturbances or decompositions and recombinations among the ultimate elements of inorganic bodies, may be so disposed or arranged together as to render manifest a force or power, which has so far an independent character, that it may be conducted or led away from the materials in which it originates, and made to act upon bodies at a distance from its source, so as to put them in motion, to raise their temperature, and otherwise alter their sensible properties.*

It is upon the ground of these and other well known phenomena, that our mental apprehension of the force *a* is based; and avoiding recapitulation, it is upon ana-

* *Vide Daniell's Introduction to Chemical Philosophy*, p. 405.

logous, but sufficiently distinct phenomena—vegetable, animal, and human, that the presence of other forces, morphological, sensual, and intellectual is based. And it is evident upon the slightest consideration, that there is in all kinds of matter, an interior sphere of activity, which becomes more and more complex and difficult of comprehension, in proportion as we ascend through vegetable and animal natures up to man.

All who have studied human nature agree upon its twofold characteristics—its somatic and psychological aspects, body and soul; and, guided by the principles of our classification, we have for scientific uses subdivided each of these two fundamentals into two others; the somatic into bodies in external nature, and the body of the living individual; the psychological into temperament and mind. But the word temperament is in common use, and not applicable to the pains and unnatural sensations of disease, therefore we propose to use the word NEUROLOGICAL to designate them. And, as structural or morphological changes are estimated by comparison with a standard visible type and form; so analogically, pains, unusual sensations, and abnormal feelings are judged of by the standard function of sentient elements in different parts of the body in health. Thus, in the skin, smarting, itching, pricking, and burning;—in the eye, flashes of light, colours, and floating spots; in the ear, buzzing, whizzing, and drumming; in the stomach, nausea, and in the bowels, griping,—are all neurological disturbances

referrible to the healthy standard for their peculiarities. And the natural sensual function of an organ is disturbed, by morphological disease, because the sentient elements are, as it were, rooted in the structure in which anatomical change is going on. And mental phenomena are disturbed, because sentient elements in the diseased part, are, through nerves, in continuity with the brain; and also because the blood or nutritive fluid, which supplies the diseased part, also supplies the wants of the natural structures, and passing through abnormal vessels, goes afterwards to distant parts; so that whatever changes may be occasioned in its standard composition, or in the morphological properties of its cells—by passing through the diseased parts—are transmitted to the brain as well as other organs.

Hence in the midst of the utmost complexity, the unity and harmony of structure and function is preserved, first, by the continuity of all sentient elements through nerves with the brain; and secondly, by the continual circulation of morphological elements, and their community from all parts of the structure.

Section II.

MORPHOLOGICAL AND NEUROLOGICAL PHENOMENA.

A mustard plaister applied to the surface of the body, fills all the cutaneous capillaries with blood, and makes the skin red. In a few days the redness subsides, and several layers of new cuticle form beneath the former one, which exfoliates or peels off.

A blister applied to the skin produces redness, and a copious excretion of watery fluid which raises the cuticle in large bladders. This watery fluid being evacuated, new layers of cuticle form, and the old ones peel away. Antimonial ointment rubbed upon the skin, causes the papillæ to swell, and rise up in multitudes of small red points, which speedily show white heads discharging pus. These are three well known examples of inflammation;—of the effects of irritants upon the skin,—which, in accordance with the law before referred to, answers to their application by an increased nutritive energy, an accumulation of cell-organisms and new morphological products. The effects we know depend much upon the quantity of the irritant, and upon the time it is allowed to act; but besides this, each article appears to have its own peculiar mode of action. The mustard application reddens the

skin more quickly than the blister or antimony, and the redness terminates, without any intermediate phenomenon, in the formation of additional cuticle; which is the proof of an accelerated nutrition, and a conformable morphology. The blister more readily raises vesications than the mustard or antimony, and the fluid must be removed ere the formation of new cuticle is concluded. The antimony appears to act specifically upon the papillæ, and instead of watery vesications gives rise to numerous white heads of pus. The morphological phenomena of irritants, therefore, may be of three kinds,—(1,) increased nutrition simply, (2,) increased nutrition with serous effusion, and (3,) increased nutrition with pus. But the skin is a highly sensitive surface, having sentient elements grouped around the capillary vessels, or embedded in their walls. These take part in the morphological disturbance, and the subject would be very imperfect were we to confine our analysis of disease to the morphological, and overlook the neurological and mental phenomena. Thus, mustard plaisters, blisters, and antimonial ointment, are very painful applications, accompanied by heat, burning, smarting, and pungent sensations in the part; and we are often obliged to forego or relinquish their therapeutical use on account of these neurological effects. Moreover, in some persons, besides the local pain, they produce also restlessness and hysterical phenomena, thirst and fever, and prevent sleep; though other persons care little for their application, and sleep

all the better for the drawing of a blister. These neurological and mental phenomena constitute the constitutional disturbance of medical writers, and daily experience shows, that with the same amount and kind of morphological disturbance, the neurological and mental phenomena vary in different individuals.

Of these three kinds of inflammation we know the treatment and cure, whether regarded in its morphological, neurological, or mental aspects, because we know and can remove the agent producing them. Thus counselling the patient to fortitude and endurance, and calling into play confidence and hope—will sooth and allay mental anxiety;— narcotic medicines, opium, henbane, and camphor, will controul the neurological symptoms, and lull the pain of a blister, notwithstanding the continuance of the morphological effect. On the other hand, new irritants, resinous applications, &c., will cause the wound of a blister to sprout forth in granulations discharging pus, and their withdrawal simply is all that is necessary to the cure, to enable the cells to metamorphose into cuticle and heal the wound.

Diseases of the skin exhibit similar phenomena. Erythema, mild erysipelas, and scalds, resemble the mustard irritation; there is increased vascularity, and an accelerated nutrition marked by the formation of new layers of cuticle. Pemphigus, herpes, severe scalds, and graver cases of erysipelas, resemble the blister irritation, for there is an excretion of watery

fluid previous to the formation of new cuticle. And numerous chronic cutaneous eruptions simulate the antimonial irritation. In all these cases there are neurological, and in most of them mental phenomena. Heat, burning, pricking, itching, or smarting in the part, with general restlessness, and sometimes fever, drowsiness, delirium or coma. And here also, as in the other outward examples before given, with the same apparent amount of morphological disturbance,—that is to say, with the same amount and kind of inflammation,—neurological and mental symptoms vary greatly in different persons.

The internal mucous membranes being analogous in their structure to the skin, so analogous phenomena arise from their irritation. Calomel and rhubarb produce an abundant secretion from the bowels of a natural kind; stronger purgatives, as elaterium, produce copious watery discharges, with nausea and griping; and drastic purgatives excite the evacuation of purulent mucus, with severe pain and tenesmus. So, in like manner, a mild diarrhœa simulates the effect of a mild aperient; a severe diarrhœa resembles the effects of elaterium; and in dysentery, the discharge from the bowels, and the neurological symptoms are such as would be produced by the most drastic purges.

These familiar examples are sufficient to show that the science of Medicine, is co-extensive with the phenomena of life, and eminently analytical, taking cognizance of mind, temperament, and constitution, as the

natural expressions of human nature in health; and of mental, neurological, and morphological phenomena, as the expressions of disorders and disease. And moreover, of all external agents—contributing to the one, or promoting the continuance of the other.

But as there are no broad lines of demarcation in the several departments of nature, so we avoid entering upon searching definitions either of causes or phenomena—of mind, temperament, or constitution, health, scrofula, or inflammation. The universal principles which operate in this respect in every science, may be illustrated by two familiar examples. Every fibre of a rope is an element of its strength or power, yet single fibres may be plucked away without any apparent diminution of its properties. Were a weight suspended over our head by a cable, we might probably be indifferent to the removal of a few almost invisible threads; but would any person permit this operation to be indefinitely continued? Every particle of sand in the hour glass is an ingredient in the true indication of the instrument, yet ten or a dozen grains may be abstracted without sensible influence; nevertheless, it might be proved that the abstraction of a single grain must have an effect on the time marked by the falling of the remainder. The same kind of reasoning applies to every element of blood and nerve, and every part of the living body in its relations to health and disease. Every sensual perception, every motion, and every morphological change, is alike dependent on microsco-

pical elements—each of which contributes its share to the sum of the phenomena, although we may be unable to appreciate or comprehend it. And as it is impossible to define or limit the influence of any of the fibres of the rope upon its strength, or of the grains of sand, upon the time; so, analogously, we are incompetent to define the influence of individual elements upon health or disease. We recognize life by its phenomena, and we carry on our analysis when we suspect that what are regarded by others as ultimate facts, admit of further solution into other facts still more elementary; and there is a great difference between the doubt which prompts us to examine every principle, to be sure that inquiry has not terminated too soon, and that which examines only to discover what apparent inconsistencies may be found. The one is the doubt of the philosopher, the other, the doubt of the sceptic. As long as we remained content with investigating the nature of scrofulous diseases and inflammation, by the unaided visual anatomy of the scalpel, we were unable to effect any solution of established facts;—but the more delicate and extended analysis of the microscope at once resolves them into others of a more elementary kind. With the eye alone, no distinctions can be perceived in the nature of the materials composing the walls of capillary vessels, or between the red and colourless elements of blood, and we remain ignorant of the fibrillating characteristic of the protoplasma. But with the microscope we detect distinctions between

the capillaries of fibrous and mucous textures—we follow the history and development of these textures in the embryo—we analyse the blood, and are enabled to see the reciprocal action between its elements and those of the solid texture in the living structure. In like manner the eye alone could never make us acquainted with the elements of tubercles or pus—of inflammatory or scrofulous products; but this the microscope effects, and carries out the analysis of what were before considered ultimate facts, to the extent of demonstrating that growth, inflammation, and scrofulous disease are analogous phenomena, in so far as the evolution or congregation of cell-organisms is an event common to them all. For this event, and the subsequent morphology in all normal instances—the repair of fractures, the healing of wounds, the cure of diseases, and the growth of the body—we assume a cause (*b*), a vital or morphological power. And the same cause is presumed to be in operation in all abnormal instances, as when we assert and admit that scrofulous diseases and inflammation can occur only in living parts. But the repair of fractures, the healing of wounds, and the growth of the body, require in addition to this assumed cause, certain external agents or conditions, (*a*)—and so do also scrofulous diseases and inflammation. External warmth or temperature (60° F.) is necessary to normal growth and nutrition. It is a required stimulus. A greater degree of warmth or heat (212° F.) is a greater stimulus; it accelerates

nutrition, accumulates morphological elements, and produces inflammation. A less degree of warmth or cold (32° F.) interrupts the process of nutrition, deteriorates the morphological elaborations, and produces chilblains and scrofula. In this example of heat, we have three terms or conditions of the same exterior agent, the middle one of which is necessary to healthy growth, the excess and the deficiency both giving rise to disorder or disease—scrofula and inflammation. During the growth of the body from infancy to manhood, new phenomena arise—sensual perceptions, pains, pleasures, and emotions;—moral sentiments, and intellect. For these phenomena, we assume upon the basis of our classification two additional causes, (*c* and *d*) each of which in their proper order, and in the character of agents, react upon the morphological phenomena—and *pari passu* as they are unfolded, so disorders multiply; morphological only in utero; morphological and neurological in infancy and youth; and morphological, neurological, and mental in manhood.

And here we cannot fail of remarking analogies running through the whole series of phenomena, and of the causes assumed as their basis. Thus, in respect of inorganic agents or forces, it is the middle term only that is compatible with health, too much or too little food, drink, or temperature, being prejudicial; so also in respect of emotional agents or forces, too little passion, affection, or feeling, is as much a departure from the natural standard of man's nature, as too much;—

insensibility as much a form of disorder as pain:—the same remarks apply analogically in the case of intellect or mind. If, therefore, we grant physiologically that human nature is susceptible of the quadripartite consideration, which we have endeavoured to illustrate and establish—inorganic, morphological, sensual, and intellectual; and if, moreover, we trace in man's bodily structure, organs appropriate to each;— then we must be prepared to carry out these principles into the domain of diseases and cures; and as there is a normal or healthy, and an abnormal or diseased morphology, so there will be a healthy, and a diseased or disordered temperament; and a healthy or diseased mind. It would carry us far beyond our present intention, to follow out these principles, which not only indicate a scientific foundation for the classification of diseases morphological, neurological, and mental; but also prepare us to expect a class of remedies and a line of treatment appropriate to the cure of each. For it appears almost necessarily to follow, if the physiological basis; the structural properties of different organs; the causes of the function; and the pathological phenomena, be distinct—that remedies and modes of cure will be found distinct also.

But without pursuing the subject further, particularly as we shall hereafter have occasion to recur to it, we propose now to confine our attention to a few remarks upon Hysteria—a neurological disorder, the symptoms of which not unfrequently complicate the signs of consumption.

"I take it to be granted," says Mr. Pritchard, speaking of hysteria, "that disturbed function in one organ is capable of inducing by sympathetic irritation diseased action in another, and that the nervous system is the agent by which the sympathy is communicated." The proposition here taken for granted, appears to be that disturbance of the function of one organ, may, by nervous sympathy, produce a morphological disease in another place, for Mr. Pritchard adduces inflammation and effusion in the brain, in infants from teething—erythema from uterine irritation; and carbuncle from disordered liver, as his illustrations. "It would be superfluous in me," says Dr. R. B. Todd, in one of his valuable clinical lectures, "to enlarge upon the importance of your having accurate views of the characteristic signs and symptoms of hysteria; you all know how frequent a malady it is, and you doubtless also know how various are the symptoms it exhibits, how apt it is to mimic other diseases affecting the most different parts of the body; and so accurately does it simulate the characters of disease of more serious import, that it will often deceive the physician requiring the greatest care and discernment, to distinguish the hysterical from the organic malady."

Now disturbed function of one organ may produce neurological disturbances in another and distant part, as when pain in a decayed tooth produces pain in its healthy fellow on the opposite side, or in the temple or ear; pain in the finger, aching in the arm and

shoulder; strong light, sneezing; and distressing intelligence, tears and sobbing; or when discordant sounds set the teeth on edge, and the pupils of both eyes contract when a strong light is applied only to one. But in all these examples there are no structural alterations in the sympathizing part, and so likewise in hysteria, correctly termed, we never find the sympathizing textures, morphologically diseased.

Anatomical changes must have for their presence, unconformable morphological elements, the reciprocal action between the blood and the texture must in all cases be the immediate antecedent of every structural alteration,—and it is only a partial view of the case that would refer inflammation in the membranes of the brain—erythema or carbuncle, to "the nervous system as the agent." "Some years ago," says Mr. Tod, "I knew a gentleman who could not hear a saw sharpened without having inflammation of the fauces."* In this case we should deem it incorrect to consider the nervous system as the agent of the inflammation, for it holds only the same relation to the morphological disturbance that other exterior agents do;—such for instance, as the heated iron to the phenomena of a burn; which we at once perceive is not the *agent* of the morphological actions which ensue.

The symptoms, pains, and complaints of the patient, are frequently alike in hysteria and morphological disease,—but the things themselves are totally dissimilar

* Tod, On the Ear.

in their anatomical elements, causes, progress, and consequences. We recognise the justness of the caution given by Dr. Todd, for it requires great judgment and experience to interpret symptoms; but our difficulties can never confound things of different natures, nor can we regard the nervous system as an agent in the phenomena of inflammation. Hysteria, though in the symptoms it may be like, is in all other respects wholly distinct from a morphological disease. The argument here, does not preclude the fact that neurological disturbances co-exist with morphological disease, nor does it deny that the pains and sensations complained of by the patient tend to confound necessary distinctions; but the pains and symptoms are but the shadows, and we are contending for the essence of things. To the superficial reader this may appear a nice and unnecessary discrimination, but let us observe that the principles of treatment and cure depend upon a correct and scientific physiological classification; our doctrines and views must be based upon anatomy, and the thin veil of symptoms must as it were be broken through that we may survey the depths beyond.

If we adopt the classification set forth in the preceding pages, and found upon it an exposition of causes, in the higher meaning of the word, then it is clearly evident that a neurological disorder can never be like a morphological disease.

CASE.—*Phenomena of Hysteria.*—" On the third of September, 1834, I was requested to visit a young lady, æt. 20, the history of whose previous state of health I ascertained to be as follows :—she had been the subject of habitual constipation, two or three weeks having frequently elapsed without her having had any dejection from the bowels. She evinced a somewhat capricious disposition, easily acted on by trivial causes. The catamenia had been little, if at all interrupted, but leucorrhœa had been more or less present for above a year past. Her present suffering consisted of symptoms resembling colic, such as acute pain in the left hypochondrium, contraction of the abdominal muscles, costiveness, no febrile excitement, tongue furred but moist, heat of skin and pulse natural. I merely, at first, cleared out the alimentary canal; but the pain continuing, I applied a few leeches, and advised the use of poppy fomentations. A few days elapsed, when the abdominal pain, &c., suddenly and completely vanished, and I found my patient suffering under considerable irregularity in the heart's action. After that, a state of dyspnœa, identical in aspect with convulsive asthma, next engaged my attention. At some periods it resembled more a fit of hooping cough, inasmuch as by frequently repeated convulsive expirations, the chest being exhausted of its contained air, and the respiration entirely arrested for the space of three or four minutes, the whole muscular system was thrown into a state of spasm, till a sense of suffocation being

induced, the convulsion has abruptly terminated by a long deep inspiration similar to that in pertussis. The whole paroxysm has varied in duration from half an hour to four hours, to which has succeeded a state of coma; that I have known continue with little interruption for two days. For three weeks these attacks of convulsive breathing recurred periodically, the interruptions being longer, as the general strength seemed to improve; there nevertheless presented at each recurrence some new feature, and scarcely a function in the whole body eluded the grasp of this singular affection. The temporal and masseter muscles have been so rigidly contracted for the space of twelve hours, that all attempts to administer anything by the mouth were perfectly useless. Amaurosis of both eyes, to the effect of total blindness, forms the next item in this description. It has continued for twelve or twenty-four hours, the pupil of the eye remaining quite passive on exposure to a lighted candle. The most peculiar feature in this mèlange, was a kind of hysterial somnambulism, under whose influence my patient has correctly performed on the pianoforte her favourite pieces; walked up stairs, undressed, and imperfectly fulfilled many accustomed duties, unconscious of all around her, with no recollection, after the paroxysm, of what had transpired.

"Some portion of this detail may appear extravagant. I will, however, pledge myself to its accuracy. It would be irksome to enumerate every remedy I have

ventured on, suffice it that valerian, hyoscyamus, morphia, camphor, quinine, and steel, with country residence on the coast of Kent, have all severally been had recourse to with variable success; but despite every measure ingenuity could suggest, the attacks, though mitigated, returned after a longer or shorter period of comparative convalescence. At the end of two years, circumstances transpired that opened a perspective of marriage to my patient. In due time she became a wife, and a period scarcely exceeding nine months made her a mother. From this time there has been no recurrence of any of the previous symptoms, and her general health has gradually improved to the natural standard."*

This instructive case of hysteria exhibits a complicated series of neurological irradiations, probably taking their origin from a leucorrhœal uterus, but unaccompanied with any morphological degenerations or structural disease in the sympathising organs. The cough, the coma, and the amaurosis, were neither of them dependent upon any organic disease or inflammation.

Case.—*Phenomena of Morphological Disease.*—"Saturday, March 11th, 1837, Elizabeth Price, æt. 31, a cook, suffering from severe pain in the head, referred more particularly to the forehead, which she describes

* See the case related by Mr. Jacob in the Medical Gazette for 1837 and 1838. Vol. i. p. 976.

as a constant throbbing, and excruciating pain. Skin cool; pulse small and slow; tongue slightly furred; bowels regular; catamenia always scanty. She states that for the last two years she has been subject to headache on exertion, and is commonly drowsy. Four months ago, after much exertion at household work, she was seized with vomiting and severe headache, which has continued to the present time.

Bleeding to 20 oz.; leeches sixteen, to the temples, and purgatives, were the remedies adopted.

"12th. Became very hot after the bleeding; no relief from headache; did not sleep; bowels freely purged; pulse 80; head hot; eyes suffused; intolerance of light.

Evening.—Much the same.

To be cupped to the extent 14 oz.; purgatives and salines.

"13th.—Complains now of intense pain over the whole head as if it were "being riven asunder;" scalp hot; pupils natural, cannot bear the light; hearing morbidly acute; no sleep; pulse 88; tongue slightly white; urine scanty; bowels purged four times.

Cupping repeated; salines, with three minims of tinct. opii. to each dose.

"14th.—Not relieved by the cuppings; continues to suffer the same intense pain in the head; groans a great deal; was slightly delirious in the night for the first time; pulse soft—100; bowels well purged; skin

soft, but not apparently perspiring ; much pain in the back and general soreness.

Calomel and antimony ; with salines ; poppy fomentations to the feet; ice to the head.

Half a grain of muriate of morphia at night ; Blisters to inner parts of the legs.

" 15th. Slept for about three hours; vomited this morning ; intense pain of the head continues ; groans much on being moved ; extremely nervous when spoken to ; hearing acute as before ; is not delirious ; pupils natural ; bowels well open ; complains of back and limbs ; universal tenderness ; urine scanty.

Calomel ; with salines and ipecacuanha.

Bread poultice to the head, instead of the ice ; salines and opiates.

" 16th. Slept for about an hour or two ; intense pain as before ; no paralysis ; pulse 108 ; tongue whitish ; countenance indicative of cerebral oppression ; pupils not so active on the approach or withdrawal of light ; urine scanty ; prefers the poultice to the ice.

Medicines continued ; combined with diuretics.

Evening.—Becoming comatose ; pupils inactive, and somewhat dilated ; groans much ; very restless ; sudden startings ; no sleep ; urine drawn off with the catheter.

Head shaved, and blister applied ; calomel continued.

" 17th. Coma increasing ; groans continue ; in other

respects the same; urine again drawn off with the catheter.

Blistered surface dressed with Ung. hydr.

"18th. Perfectly insensible; much more quiet and composed; pulse steady; abdomen tense, and urine escapes involuntarily.

Evening.—Insensibility continued; pulse 108; skin warm; bowels evacuated several times involuntarily; urine constantly escaping; eyes glassy; pupils dilated, and scarcely affected by candle-light.

"19th. Mortua est.

"*Sectio cadaveris.*—On opening the head, the dura mater appeared everywhere exceedingly turgid; the tunica arachnoidea was thickened; and the substance of the brain exhibited innumerable bloody puncta on cutting into it. The left lateral ventricle contained an ounce, or an ounce and half of serum; and the right, contained from four to five drams of pus, with flakes of coagulable lymph; gelatinous lymph was abundantly effused along the floor of this ventricle, and the substance of the brain disorganized; it was exceedingly soft and pulpy, presenting a brown reddish colour; and the fourth ventricle was filled with pus, and its floor disorganized, with the same appearances as in the right lateral ventricle." *

These two cases illustrate the broad distinctions which experience inculcates, and which our classification requires, between nervous disorders and morphological disease—hysteria and inflammation; and they

* See Medical Gazette, ante, p. 978.

corroborate the fundamental points for which we are contending. In the one case, the suddenness with which the paroxysms return, their recurrence at uncertain intervals, and their variable duration, contrast strongly with the steady onward progress of the symptoms of the other. The paroxysms of the one are like the sudden bursting forth of an emotion; the signs of the other like steady growth.

But the case of Elizabeth Price is very instructive in another point of view, and must not be dismissed without an expression of strong disapprobation of the treatment. The patient had been subject to head-ache for two years; the severe head-ache had been felt for four months; and when first seen, the skin was cool, the pulse small and slow. These were strongly marked symptoms of a chronic disease. Under such circumstances the withdrawal of twenty ounces of blood from the arm, and the application of sixteen leeches to the temples, appear at once to have taken from the system all power of recovery—and cupping afterwards, added to the mischief. The post-mortem appearances explain the result of medical interference. The ventricles of the brain were filled with serum and pus—the arachnoid membrane was thickened, and the substance of the brain disorganized. All these being anatomical changes which, in the adult, are equivalent to scrofulous disease in the young.

The causes or conditions originating a morphological disease may be but of very brief duration, or they may

be prolonged. They are very brief in burns, scalds, sprains, contusions, wounds and fractures;—in sudden terror or emotions;—they are prolonged in persons living in an unwholesome air,—in smoky cities or damp cellars,—in those following unhealthy occupations, or living habitually in luxury,—in the inmates of a prison, and in those who have mental anxiety. And it appears, in a great variety of cases, that the cure follows upon the removal of the originating causes. Thus the cure follows upon the removal of a blister,—upon the casting off the slough of a burn; and in the case of prisoners in the penitentiary before related, (p. 49;) the cure of several cases of consumption followed their removal into fresh air,—with liberty exchanged for imprisonment; and gladful emotions replacing the dejection produced by confinement. If these events always occurred, the practice of medicine would be easy, because a removal or cessation of the originating conditions would suffice for the cure. But they do not,—as the following examples will show.

The blood of pregnant women is unusually rich in nutritive materials, exhibiting, when withdrawn by venæsection, a thick layer of colourless cells and protoplasma at its surface. An unwonted amount of morphological elements circulating in the body of the parent, for the growth of the offspring. Upon the birth of the child, the object for which this provision of nutritive elements in the blood has been made, is sud-

denly withdrawn, and these elements would have nothing to expend themselves on, had not nature provided a remedy in the secretion of milk. The breasts, in two days after the labour, begin to inflame, swell, become hard and painful. This inflammation is occasioned by the nutritive elements of the blood accumulating largely in the part, which issues in a conformable product, and is, therefore, natural or healthy, and analogous to the inflammation which takes place round the fragments of a broken bone. But it sometimes happens, from various irritating agents, that this, the normal series of events is disturbed, and the nutritive elements of the blood, instead of executing their appointed function in the breasts, accumulate in other parts of the body, especially in those which have taken part in the throes of labour, whence arise asthenic forms of inflammation, or puerperal fever.

"CASE.—A young married woman, æt. 19, was delivered of her first child; the labour was natural, and she went on favourably, when her husband, returning from a fair, got seriously beaten, by which she was thrown into a state of great nervous excitement. Shortly afterwards she was attacked with numbness of the legs, shivering, pain in the head, and delirium. For several days the delirium continued to a violent degree, the skin hot and dry, no sleep could be procured, and the pulse was 120 in the minute. And it was only by a judicious treatment, combining leeches,

soothing medicines, counter-irritants, and warm fomentations, that the disorder was at length subdued on the seventeenth day."

In this case a question arises how much of the symptoms were due to neurological disturbance, and how much to morphological disease. The nervous system was clearly the originating cause,—and probably held the most prominent place throughout the illness—the patient recovering by a simple soothing treatment.

"CASE.—A married woman, æt. 26, was delivered of a child, and three days after she went out, was exposed to cold, and drank whisky. The following day she was delirious, and the milk disappeared from the breasts. She was in a constant state of agitation, raving and singing, so as to require restraint, the pulse was 120 in the minute, and she died five days from the onset of the disease."

In this case the nervous system was not the originating cause, but external agents—and therefore the symptoms were, presumably, altogether due to morphological disturbances or inflammation, and the patient did not recover. These two cases show the importance of tracing symptoms up to their originating conditions; and where we find the nervous system to have been the first engaged, it behoves us to be on our guard, lest we apply active morphological treat-

ment, bleeding, purging, and depletion, to a neurological disturbance. But to return to the particular point we seek to illustrate. Here in these two cases we have exciting or originating causes of two very distinct kinds; the one internal and psychological,—a nervous or mental shock; the other external, cold and whisky, each acted but very briefly, and was not repeated; yet the disturbance occasioned did not cease when they ceased to operate, but proceeded to the extent of originating in one a protracted, and in the other a fatal, illness. There are many women who in apparently the same condition after pregnancy, might have been subjected to the same irritating causes, and yet who, after some much more temporary disorder, would have recovered by the operation of the conservative powers of the system, without extraneous help or interference, by the operation of the vis medicatrix naturæ. It is such facts as these, that force upon our attention varieties of constitution and temperament. And it is because of the frequency with which, in certain growing persons, slight and briefly acting irritating causes are followed, as in the last case, by enduring and increasing morphological disturbances, that scrofulous diseases take their rank as a very important class.

Causation, then, as regards the phenomena of human life, exhibits practically or scientifically a fourfold character, *a*, *b*, *c*, *d*, the things of which we classify as inorganic, vegetable, animal, and human. Over these

things the will of the individual person has a certain, but limited control, which, as regards the causes and treatment of disease may be illustrated as follows. A person may or may not take unwholesome food, or follow unhealthy occupations. He may or may not resist, or encourage disturbing emotions. And he may or may not give too much time to exhausting intellectual employment.

Outward agents are necessary to the life of man, and they are also causes or conditions of disorder and disease; so the inward psychological agent is necessary to the phenomena of life, and also influential in producing disturbances and disease. The living body, the subject of the morphology, being, as it were, the connecting link of the series—standing between the visible and the invisible—having, on the one hand, exterior agents and influences, and on the other, interior powers and impulses. It is scarcely necessary to adduce particular examples to establish these almost self-evident propositions. It is well known that things from without, and emotions from within, are productive of illness, discomfort, and disease, traceable in the morphological functions of the body; and that the will of the person has, within certain limits, a control over both. It follows, these propositions being true, that in order to preserve health, outward objects,—air, water, food, climate, heat and light,—require attention, care, and selection;—that the temperament or emotions need control, governance, and cultivation; and

that the intellect or mind profits by example, experience, and education. That which is true universally, is of course true in particular instances, and therefore, in the treatment of particular diseases, and in our efforts to cure consumption, we frequently find the best endeavours opposed by unfavourable external conditions we cannot alter; by irritating emotions we cannot quell; and mental anxieties we cannot remove. In large and populous cities, where multitudes of persons live crowded together in wretched habitations, following unhealthy occupations, with insufficient food, an impure atmosphere, and bad water, health is at a low standard, and the mortality is excessive. For the sickness and mortality above the natural average, the physician knows the cure, but it is beyond his power to employ or enforce the remedy. He cannot feed the hungry, purify the atmosphere, or clothe the naked, nor alter the social position of his patient so as to admit of change of situation. It is in these instances that unfavourable external conditions cut at the root of infant life, deteriorate the morphology of the structure, and produce a dire amount of inflammatory and scrofulous disease.

In the better classes of society, who command the comforts and conveniences of life—and who, therefore, rear more of their children into youth—new sources of illness arise in the emotions, passions, and temperament; mental avocations and disposition;—whereby various nervous, hysterical, and hypochondriacal dis-

orders are produced. These neurological and mental disturbances have very often their root entirely in habits and education; and it happens, therefore, frequently, in such complaints, that unreasonable expectations are formed of the resources of medical art, when the real origin of the malady is educational and beyond its proper sphere. Medicines come within the category of external agents exercising specific influences on the morphological functions, and are therefore specially adapted for the treatment of inflammation and scrofulous diseases;—but not applicable with the exception perhaps of narcotics, to disorders springing from temperament and mind, and dependent on misdirection, misgovernance, and ignorance. Medicines hold the same relation to the human body, that manures and composts do to vegetation,—they are powerful agents, to be used only upon experience, and directed to their proper object—morphological phenomena. There are what the farmers call *hot* manures, which means that they are extremely strong, and if applied in too large a proportion, burn up vegetation; that is, cause it to droop and wither, as if fire had passed over it; but which if applied in proper quantity, act favourably, and cause the plant to grow strong and healthy. Precisely in the same sense the medicines we employ are *hot*, that is, powerful in accelerating or depressing nutritive functions, and therefore demanding judgment, care, and education, in their use.

It is therefore only when the morphological functions

are ascertainably wrong or disturbed, that drug medication—as the general rule—is applicable; and if in neurological and mental disturbances too much is expected from the medicines of the physician, disappointment ensues; this begets distrust; loss of confidence adds to the original distress, and the consequence is, that resource is often found in a lively faith in some innocent specific; a change of medicine, larger promises, and new faces change the irritating idea, and effect the cure. In this country, where so large a proportion of society is able to command the luxuries of life without labour; and where the educational standard in public schools and universities is so high, disorders from emotional or nervous causes, and from overwrought mental exertions, are very common. And if the routine of a fashionable medical practice were looked to as the criterion, it would, I think, be found that for one well-characterized idiopathic morphological disease, there will be four of simple disorder of nerves and brain from emotional and mental causes.

The influence of the higher powers of temperament and mind, imagination and belief, as exciting and continuing causes of disorder, has been generally thought too ideal to be of practical importance in the treatment. Hence emotions, faith and distrust, as hygienic or therapeutic agents, have fallen into unmerited neglect. "Physicians," says Lord Bacon, "are some of them so pleasing and conformable to the humour of the patient, as they press not the cure of the disease;

and some other are so regular in proceeding according to art for the disease, as they respect not sufficiently the condition of the patient." A gentleman was very angry with his medical attendant for telling him he was nervous, but he was afterwards pleased with another for telling him "his liver was as white as a sheet, and his mucous membrane like scarlet." The one was as good a guess as the other, but the emotion excited, was irritating and unfavourable in the former case, (for persons do not like to be thought feeble in the control of their emotions;) but soothing and favourable in the other; for the cause appeared more unquestionably beyond his own control. Admitting in its full extent the agency of temperament and mind, as disturbing causes, and knowing that it is the affectionate and warm-hearted who are most apt to be influenced by the hope of specific material remedies for complicated neurological disorders, it is our duty to strengthen their hopes of recovery by sympathy and consideration; and whilst complying with all reasonable desires, to discountenance fanciful proceedings, and measures of treatment which first annul the judgment, and are then mercenarily pursued by subjecting the intellect to the imagination. The greatest call upon the resources of medical art is made when a strongly emotional character co-exists with actual morphological disease,—hysteria with inflammation or scrofulous disease.

A great latitude is permitted in external things—

in the purity of the air—in the nature and quantity of food and drink — in the temperature of climate and mode of dress—and also in the exercise of mind—in sleep and muscular actions. Nevertheless each of these things has its limits; above or below which the comfort, health, and welfare of the body suffers. This latitude is extended, though in a less degree, to the composition of the fluids and solids of the body—the qualities of the blood, the textures, and secretions varying with the quality of the food and the exercise of the body, without sensibly interfering with the sensations of health. Customs, habits, and occupation, vary, increase, or dimiuish nutritive phenomena; the blacksmith has larger and stronger arms; the pedestrian stronger and stouter legs; and the peasant a harder hand than those who do not use their limbs. Special occupations accelerating nutrition, and adding to the power of the organs called into activity;—the individual thereby gains a greater mastery over nature in one point; but if delicate and luxurious persons are continually withdrawing or retiring before disagreeable influences—whether external, emotional, or mental—instead of withstanding and overcoming them, they become more and more like hot-house plants and will at last bear nothing.

As long, then, as life continues, its fourfold causes are in being and operation, and if not healthfully and usefully, then prejudicially, as forces in an opposing direction. Consciousness and thought will be active;

emotions and affections will arise; nutrition and secretion will go on; and external influences will operate; and if the will and experience of the individual do not regulate the several conditions of these forces, so that they may harmonize or conform to the natural morphological laws of his bodily structure, they will act not for, but against him.

"There is a wisdom in the regimen of health," says Bacon, "beyond the rules of physic; a man's own observation what he finds good of, and what he finds hurt of, is the best physic to preserve health; but it is a safer conclusion to say: 'This agreeeth not with me, therefore I will not continue it'—than to say, 'I find no offence of this therefore I may use it,' for strength of nature in youth passeth over many excesses which are owing a man till his age."

"Discern of the coming on of years, and think not to do the same things still; for age will not be defied. Beware of sudden change in any great point of diet, and if necessity enforce it, fit the rest to it; for it is a secret both in nature and state, that it is safer to change many things than one. Examine thy customs of diet, sleep, exercise, apparel, and the like; and try, in any thing thou shalt judge hurtful, to discontinue it by little and little; but so, as if thou dost find any inconvenience by the change, thou come back to it again, for it is hard to distinguish that, which is generallyheld good and wholesome, from that which is good particularly, and fit for thine own body. To be free-minded and cheerfully

disposed at hours of meat, and of sleep, and of exercise, is one of the best precepts of long lasting.

" As for the passions and studies of the mind, avoid envy, anxious fears, anger fretting inwards, subtle and knotty inquisitions, joys and exhilarations in excess, sadness not communicated. Entertain hopes,—mirth rather than joy, variety of delights rather than surfeit of them; wonder and admiration, and therefore novelties; studies that fill the mind with splendid and illustrious objects, as histories, fables, and contemplations of nature.

" If you fly physic in health altogether, it will be too strange for your body when you shall need it; if you make it too familiar, it will work no extraordinary effect when sickness cometh. I commend rather some diet for certain seasons, than frequent use of physic, except it be grown into a custom; for those diets alter the body more and trouble it less.

" DESPISE NO NEW ACCIDENT IN YOUR BODY, BUT ASK OPINION OF IT. In sickness, respect health principally; and in health, action; for those that put their bodies to endure in health, may in most sicknesses which are not very sharp, be cured only with diet and tendering. Celsus could never have spoken it as a physician, had he not been a wise man withal, when he giveth it for one of the great precepts of health and lasting, that a man do vary and interchange contraries; but with an inclination to the more benign extreme: use fasting and full eating, but rather full eating;

watching and sleep, but rather sleep; sitting and exercise, but rather exercise, and the like; so shall nature be cherished, and yet taught masteries."*

* Bacon's Essays *On Regimen of Health*.

PART II.

SYMPTOMS, CAUSES, THERAPEUTICS AND CURE OF CONSUMPTION.

CHAPTER I.

SEMEIOLOGY.

"The separation of the dissimilar,—of the general from the special, is not merely useful in facilitating the acquisition of knowledge; it further gives an elevated and earnest character to the study of Natural Science. As from a higher station we survey larger masses at once, so are we pleased to grasp, mentally, what threatens to escape the powers of our senses."—HUMBOLDT.

THE CHEST is divided vertically from front to back into two compartments, by a membranous partition or fold of the pleura. On one side of this partition is placed the right lung divided into three lobes; on the other is the left, divided only into two, the place of the third being, as it were, occupied by the heart, which

lies on this side of the chest. Into the lungs the air penetrates through the windpipe, a round tube, which may easily be felt running down the front part of the neck, and kept open by a series of cartilaginous rings passing nearly all round it for that purpose. At the bottom of the neck, opposite the narrow space between the collar bones, the windpipe divides into two principal branches, a right and a left, and these again subdivide, the right into three, and the left into two lesser branches, corresponding with the number of lobes in the lung they severally supply. In the interior of the lung, the air-tubes further divide and subdivide, until at length entering the lobules, and attaining a great degree of minuteness, they finally terminate in closed extremities—the air-spaces.

A pulmonary lobule, though it be no larger than a pea, is a perfect respiratory organ by itself, the whole lung being but a series of reduplications of the same structure—an aggregate of lobules. The form of the lobules—like that of the air-spaces—is determined by mutual pressure against each other; it is, therefore, irregular. At one of the corners or angles of a lobule, a division of the pulmonary artery, and a branch of the air-tube enter into its interior, at the same place a vein comes out; and it is principally by these three tubular structures that each lobule is connected with the rest. The practical point to be here noticed, and which will complete our account of the morbid anatomy of consumption, is that respecting the relation of

the walls of air-spaces, to air-tubes on the one hand,—and to blood-vessels—arteries and veins—on the other.

All the branches of the air-tube, and all the ramifications of the vascular system, before entering the interior of lobules, pass in the interstices between them; and here,—embedded in a loose areolar texture, arteries, veins, and air-tubes, have severally their own distinctive structure. But after sundry subdivisions within the lobules, they at length incorporate with the parenchymatous texture; and so completely are they blended in the walls of the air-spaces, that it is impossible, though we use the highest microscopical powers, to discriminate the elements continuous with the coats of arteries and veins, from those continuous with air-tubes:—that is to say, the outer surface of the transparent membrane, circumscribing an air-space,—where it comes in contact with the surface of the next adjoining,—contributes its moiety to form the walls of the capillaries; and is therefore continuous with the interior of arteries and veins; whilst its inner surface—against which the air impinges—is continuous with the interior of air-tubes. But the interior of all blood-vessels is a serous texture; and the interior of air-tubes a mucous texture; it is therefore the more particularly to be remarked, in the walls of the air-spaces, that the distinction blends and disappears, being no longer recognizable; the texture, however, is so thin and simple, that it has more the character of a serous than a mucous structure.

The microscope affords no evidence that the capillaries of the lung have naturally any elaborating spherical cells grouped around them; or that sentient elements are incorporated in the parenchyma. The latter fact possibly supplies the reason why consumption is so insidious and painless a malady during the first periods of its course; as the former does, why the pulmonary parenchyma is not naturally a secreting texture. But when disease arises, whether inflammatory or scrofulous, then cell organisms do make their appearance, not merely in the walls of the capillaries and veins, but so abundantly on their exterior as to displace the air occupying the air-spaces; and the structure thereby losing its crepitant property, becomes solid. With this change the respiratory function necessarily ceases. And a lung that has breathed, is reduced to a condition similar to that observed in the fœtus.

But the phenomenon here described cannot spread over even so limited an area as the tenth part of an inch, without involving sundry special forms of texture,—air-tubes, arteries, veins, and areolar texture, in addition to the parenchyma and its capillaries; each of which variously modifies the primary morphological elements accordingly.

Thus, in the normal nutrition of arteries and veins, it is not found that any form of cells or protoplasma is excreted or thrown off; on the contrary, the nutrient elements required by the texture in its growth, undergo the fibrous morphology, and incorporate with

it. Hence abnormal cells and protoplasma accumulated in these textures by irritation or disease, attempt here a metamorphosis of that kind; but so imperfect is the attempt in scrofulous disease, that a brittle fibro-granulous matter only is the result; which, adhering to the walls of the vessels, gradually narrows their channel and finally stops them up. It being by this process, that the natural respiratory vessels are, from twig to branch, and from branch to trunk, gradually obliterated in consumption without hæmorrhage.

On the other hand, in air-tubes, or bronchi, there is naturally a mucous structure, to which, the excretion of cells and mucus is, in a moderate degree, normal; the follicles, granulations, or papillæ of this structure having—morphologically speaking—the same type with that springing up and constituting the disease. The consequence is, there is no disposition in the air-tubes to be plugged up by the accumulated matter; on the contrary, although their outer fibrous textures may be destroyed, they remain open; and microscopical anatomy demonstrates that the arterial system which supplies the follicles and papillæ of their mucous surface, incorporates with the new texture, contributing to the energy of its morbid growth and function.

Hence, air-tubes being widely open, phthisical caverns in the lung—unless filled with purulent and mucous excretions—are occupied by air; but no respiratory function is performed, because the walls of the

cavities are clothed with granulations or villous fabrics excreting cells, and traversed by channels of arterial blood from the aortic circulation, which have supplanted the simple transparent capillaries of the natural texture, circulating venous blood. For this reason, such caverns are exceedingly injurious to the health of the individual —producing cough and spitting; largely appropriating to their own function and extension those nutritive elements naturally destined for the sustenance of the whole body.

The Lungs are freely moveable within the cavity of the chest, alternately rising and falling as the air passes in and out by respiration. Their external covering—the pleura—has therefore a smooth, glistening, and serous surface, which is opposed to, and glides readily upon another surface of the same nature, lining the interior of the chest. During the progress of consumption, the pleura, sooner or later, is implicated in the disease. The first appearances of a morphological change in the pleura consist of an increase in the calibre and number of its blood-vessels; the transparent membrane at the same time losing its smoothness and polish, becomes thicker and more dull. The first rudiments of new matter appear in the form of white or yellowish granulations, which rise above the serous surface, and roughen it. These granulations speedily coalesce, and excrete abundance of colourless cells and protoplasma, the texture changing from serous to corpuscular :—a change in all respects analo-

gous to that which has taken place in the parenchyma.* But the pleura is not the primary seat of the malady; it has, as it were, been drawn into it; we therefore here observe morphological phenomena referable to the original law of its growth;—namely, more or less imperfect attempts at the fibrous metamorphosis; whereby frequently firm adhesions are contracted between the granulations upon the walls of the chest, and those upon the lung. This fibrous metamorphosis, though conformable, and the mode in which cures take place, is yet, from the pecular function of the lung, productive of suffering and inconvenience, often very evident upon the cure of a simple, idiopathic inflammation of this texture.

MICROSCOPICAL ANATOMY assures us that the structural changes comprised in the malady termed consumption, do not become clearly visible to the unaided eye when inspecting the dead; nor evolve symptoms in the living person, until sundry forms of special texture are invaded. It also assures us that each special texture modifies the character of the primary elements derived from the blood current according to its own law of development and growth;—thus it is in the lung, air-spaces are filled with cells and granulous matter;—blood vessels plugged up with pseudo-fibrous materials; areolar-texture and lobular indusia thickened by coherent fibrous textures; and air-tubes, nar-

* See also Hasse's Anatomical Description of the Diseases of the Organs of Respiration; p. 181 and seq.; Syd. Soc. Ed. 1846.

rowed by an increased amount of mucus mixed with cells. And therefore microscopical anatomy lastly assures us that the consideration of phthisis cannot be separated from that of pneumonia, pleurisy, and bronchitis.

But in proportion as the new cell-structures grow, and new blood vessels, bounded by cells, increase; so, concurrently, special forms give way before this, which is the primary and most active form of growth. Parenchyma, respiratory capillaries, air-tubes, arteries and veins, areolar-texture and lobular indusia, being all, at length, confounded or obliterated by the increase of the abnormal structure.

The magnitude and form of those elementary parts of the new growth, which, in conformity with previous usage, we have termed granulations and villi, are unimportant and variable characters. On the pleura they are flattened; pressed between the lung and the wall of the chest, they lose their villous character, coalescing into more or less thick layers termed exudations and false membranes. In the air-spaces, they retain their granulation form until, by increase in bulk and numbers, they become confounded in a single mass. In other places, where they have space to luxuriate, they retain the shaggy characteristics of true villi. So again, their colour is a variable character dependent upon the accident of number and calibre of blood-channels. Granulations exposed to air, on the outward surface of the body, are usually red; but on the interior surfaces they are often white or colourless.

Were we asked to describe the elementary forms of the human embryo, we should say they consist of small groups of cell-organisms traversed by blood, circulating in corpuscular walled vessels; and were we asked, in like manner, to define the primary elements of the anatomical changes observed in diseased structures, we could not give a more appropriate definition. Let, therefore, the terms we may use, in describing unconformable growths, be what they may, the constantly observed character is, new blood channels bounded by cell-organisms arranged in groups—forming what we have designated villi or granulations; and, in proportion as this structural character extends, so, in like proportion, special fabrics reassume the embryonic type.

We do not of course pretend to demonstrate the primary or microscopical origin of phthisis in the living body; nor to prove identity or correlativeness in morphological elements, which, speedily altered in character by special laws, as speedily diverge from an uniform type, and constitute forms of inflammation and scrofulous disease.

We must, from the nature of the subject, be dependent for our conclusions respecting the origin of anatomical changes in the living, upon honest, careful and multiplied observations in morbid anatomy and embryology; deducing therefrom such reasonable inferences—for the interpretation of symptoms—as are warranted by a classification of facts. Aided in our

analysis by the microscope,—it is from these two fundamental departments of physiological and pathological science, that we profess to have derived the materials of the foregoing statement, descriptive of the first origin, phenomena, and progress of consumption in the living person; our intention being, to enable the reader to trace the relation subsisting between anatomical changes, and symptoms; and also, to comprehend the principles of therapeutics and cure, as related in the third chapter of this division of our work.

If we place the ear upon any part of the chest of a healthy person, we hear the sound of the air passing into and out of the lungs. These sounds are termed respiratory murmurs; the inspiratory being much louder or more distinct than the expiratory. Again, if we gently strike upon any of the bones of the chest, a clear hollow sound follows the percussion, indicative of the presence of air in the lungs beneath. There is no particular standard with which to compare these sounds in respect of clearness or loudness, except that in young children they are louder than in grown persons, in whom many varieties are noticed.

It will readily be understood, that if tubercles or any other form of consolidating matter occupy a considerable space of either lung, that the respiratory and percussion sounds over that part, are diminished or cease. But as the natural respiratory sounds, and the clearness of the percussion sound vary in different persons, so therefore it is only by comparing the quality of

sound in different parts of the chest of the same individual, that we form a probable opinion of the presence of tuberculous matter. If, for instance, the respiratory murmurs are heard natural—namely, the inspiratory long and soft, and the expiratory shorter and less distinct—in one part of the chest; and unnatural in another corresponding part on the opposite side, we infer the presence of some consolidating matter in this part; and if over a limited space the sounds cease, whilst around the soundless spot, the expiratory murmur is louder than usual,—or there is wheezing,—our suspicions are aroused. Yet still no accurate opinion can be formed as regards the existence of consumption, until we learn the diathesis of the individual;—consider the age,—and obtain a description of the neurological and other symptoms. It is only by a combination of signs, that our judgment is formed,—not as to the existence of tubercles,—but as to the quiescent or active morphological condition of the living texture in contiguity with them. The detection of tubercular disease in the lungs is easy when the consolidations are large, and the structural changes advanced; but it is very difficult when the tubercles are small, and the structural changes not extensive. The fact that tubercles occupy the upper parts of the lung by preference, is of great moment as respects the diagnosis in equivocal cases, and a careful examination of the superior regions of the chest will often decide the anxious question. When the progress of the dis-

ease has been such,—that before we see the patient, cavities are formed,—we then hear the air entering into them, and the respiratory murmurs have a loud blowing character;—and if, whilst we are listening with the stethoscope the person speaks, the voice appears to travel up the tube of the instrument, as though words were spoken directly into the ear. This phenomenon has been closely studied by Laënnec, who first discovered it: and it is now well known to be dependent upon cavities in the pulmonary parenchyma. Cough and expectoration are two most important symptoms in phthisis, but they are not necessary accompaniments of the earliest stages of the disease; and it would seem that they prominently appear only after the bronchial tubes are invaded. Cough and expectoration being then present in a degree commensurate with the amount of altered texture, and the size of the cavities from which the matter expectorated proceeds.

There is often much difficulty in forming a correct diagnosis between phthisis and bronchitis; that is to say, between a degenerate morphology of the parenchyma, and simple inflammation of the air-tubes. We have in both, a cough, with copious white expectoration, tightness of the chest, and probably some pain and fever. On applying the stethoscope we perhaps find the voice coming at once through the tube of the instrument, and various sounds accompanying the respiration. In phthisis, these signs would

indicate tubercular deposits, and excavations of the parenchyma of the lung; whereas, in bronchitis, they would indicate an enlargement in the diameter of some of the bronchial tubes—a thickening of the mucous texture, and the presence of an increased secretion. The symptoms, however, in bronchitis are usually more severe;—there is, in the early stages at least, more febrile heat, more restlessness, and greater thirst than is usual in phthisis, and the expectoration much sooner becomes copious. If in any case doubt exists as to the nature of the disease, it will be necessary to study more closely the physical signs, by percussing the front parts of the chest under the clavicles; and if, on comparing the two sides, we find more dulness on one side than the other; if the age of the patient correspond with the usual period of consumption;—if the previous history bear the stamp of a weak and delicate constitution; and especially if there are indications of previous scrofulous disease, the case is most probably one of phthisis. But if these signs are absent, and if the age of the patient be much passed the period of puberty, it is probably an instance of chronic bronchitis. The same principles guide us in our determination with respect to the pleura. In simple inflammation of the pleura, the symptoms become urgent in three or four days,—with fever, accelerated pulse, acute pain, and restlessness. Whereas, in inflammation supervening from phthisical changes, the symptoms are not so speedy nor so urgent.

Tea-sorters, furriers, brass-founders, steel-grinders, leather-dressers and others, are very liable to bronchitis and pleuritis, with symptoms resembling those of phthisis—but these persons recover upon the removal of the external irritating condition. The disease in these cases being maintained by external influences; whereas in phthisis, it is so by inherent, morphological causes.

The ordinary train of symptoms, indicative of tubercular phthisis, is well known. There is first languor, a worn expression in the countenance, with slight coughing, and the hair of the head readily falls off. The respirations are easily accelerated by slight exertion,—and the pulse is usually small, feeble, and frequent. As the disease advances, there is loss of flesh; pains are felt in the chest, the cough increases, and expectoration begins. The appetite is variable; and in women the catamenial function is usually disturbed. Afterwards, the cough is harassing, the expectoration copious, and the nights disturbed or sleepless. Finally, the disease closes with extreme emaciation, profuse night sweats, constant cough, copious expectoration, thrush, or diarrhœa.

The practical rule to be borne in mind is, that these symptoms, however light, are signs, not of the commencement, but of the continued advance and progress of the disease.

It is impossible to attempt to pourtray by any general statement the variety of symptoms met with

in different individuals. Each case stands upon its own merits, and the following ones have been selected from numerous others, not only on account of some point of interest which they severally illustrate, but because in all of them the fatal issue of the malady enabled us to prove the connexion between the symptoms and the morphological disease. To have related a series of complaints and ailments, as characteristic signs of consumption, where from the recovery of the patient this connexion could not be demonstrated, would have been a departure from the inductive method to which it has been our wish and intention in the present work to adhere.

Case I.—Some years ago, I was consulted respecting the health of a young lady aged eighteen. The mother, who brought her to me, was tremblingly alive to the horrors of consumption, which had carried off some members of her family,—and as this was her only child, she was naturally very anxious. She stated, "My daughter has frequently *a hem!* it is not a cough, but only a hem—take that dreadful noise away, and she was never better in her life." The general appearance of the patient did not denote any illness—and she said she was very well. Pulse 70 only, soft, and regular, but remarkably thrilling. The respiratory sounds were normal; the tongue clean; no feverish heat; bowels, &c. regular. Percussion gave a clear

and uniform sound on each side of the chest. She rides on horseback to the extent of eight or ten miles every day without fatigue; her appetite and sleep are good, and there is no pain anywhere. Under these apparently favourable circumstances, it is not surprising that the mother was by several members of her family thought too anxious. But now comes—according to our researches — the most important feature of the case. Six years ago, the young lady had measles, and for many months after them she was poorly, subject to relaxed throat and colds, and it was at that period 'a hem' was first noticed. Change of air, and other remedies removed these symptoms; but ever since she has been liable to a return of them—and now 'the hem' is worse. Simple remedies were prescribed by me, and after two or three interviews the visits were discontinued,—and I saw nothing more of the patient at that time. Three years after, I was requested to visit this young lady in consultation. She had now hooping-cough, with symptoms of pleuritis and other inflammatory complications, for which she had been bled, leeched, and blistered. The paroxysms of cough were distressing; she was emaciated; her hair came off, and the pulse was now frequent and irregular. A little blood had been two or three times observed in the expectoration. Percussion, and the stethoscope amply confirmed the inferences drawn from general symptoms; and it was clear that consumption was in active

progress. The temperament, naturally docile and patient, was now much disturbed with a train of fretful and hysterical symptoms. She shrank from the lightest touch with a shudder; every thing she handled was obliged to be warmed; any article in the least degree cold, produced a painful thrill and shivering. Even feeling the pulse made her hysterical. The fingers of one hand were often cold and clammy, and at the same time those of the other, hot and dry. Sometimes two fingers were observed hot, and the next two of the same hand cold. Similar variations of temperature were observed in the cheeks, which were alternately pale and red, hot and cool. All lowering measures of treatment were now abandoned, and every thing done to calm the emotions, lessen the spasmodic paroxysms of the cough, and invigorate the constitutional power. But all efforts were unavailing; the case terminated fatally, and the post-mortem examination proved the existence of an extensive scrofulous degeneration of the pulmonary parenchyma, extending its inflammatory complications to the air-tubes and the pleura.

In this case the presence of scrofulous diathesis was presumable—from the statement of the mother, that members of her family had previously died of consumption. This presumption was strengthened by the health of the patient remaining so long delicate,

by the relaxed condition of the throat, the catarrhs—and 'hem,' after measles.

It is probable that granulations or small tubercles existed at this time in the lungs; but the circumstances of her parents enabled them to command the comforts and conveniences of life, and to take their child from place to place for change of air and situation. Under these favourable conditions, and from the small amount of symptoms, we may believe the vis medicatrix, and the vis scrofulosa equally balanced, and a longer period of immunity from new disturbing events might have led to recovery,—to the ascendancy of the fibrous morphology, with absorption of useless elements. But unfortunately, at a critical juncture she became exposed to the contagion of hooping-cough,—incautiously visiting her cousins, who shortly before had the malady. This new additional irritation decided the course of the disease. With respect to its duration, dating from the attack of measles, it was nine years in threatening and in progress. The practical lesson to be deduced, is the necessity in all cases of coming early to a right conclusion as to the anatomical condition of the lungs; and the importance of estimating even so light a symptom as 'a hem' not by the inconvenience it occasions, but by the declared diathesis.

Case 2.—An unmarried lady aged thirty-seven

complains of great weakness, restlessness, and languor; loss of appetite, want of sleep, a sense of weight and oppression at the pit of the stomach after eating, and a sensation of tightness at the chest. She looks ill and thin,—and has a feeble, thrilling, and frequent pulse. She has long been an invalid, and has consulted several medical practitioners, occasionally deriving benefit from the treatment suggested, but not getting well. She attributes the origin of her illness to fatigue and anxiety, from an attendance upon a brother who died some years ago of consumption. Upon inquiry, she positively declares she has no cough; is certain there is nothing the matter with her chest, and that all her complaints arise from stomach and bile. After visiting her two or three times, I noticed that she had a 'hem,' similar to that so prominently placed before me in the last case. The 'hem,' being the noise made by clearing the throat; and by listening, it was clear to me that she thereby brought up phlegm or expectoration from the windpipe and swallowed it. With some persuasion she allowed a stethoscopic examination. On percussion, the left side of the chest sounded well, but there was a decided dulness beneath the right collar bone. The respiratory sounds were healthy, though somewhat loud in this lung; but in the right, the sounds were of a blowing or whiffling character. The expiratory murmur was louder than the inspiratory; and there was, in addition, a marked pectoriloquy; the sound of the voice coming

apparently up the tube of the instrument, directly into my ear. From these signs, the presence of tubercles, and the existence of a cavity in the upper and front part of the right lung, were inferred. With this impression, I made a point of seeing her last medical attendant, whose opinion I found coincided with my own. He stated that the lady was engaged to be married—and that her great anxiety was to get well, that the ceremony might take place. In about a month, her confidence began to diminish, and she was easily persuaded to become the inmate of a water establishment. Here, whether from the novelty incidental to the treatment, or from the hopes of recovery confidently held out to her,—she appeared better, and expressed herself to feel so. She was much in the open air, and jokingly informed me that she had become 'a show patient.' Her illness had been found to be owing to *duodenitis*, and this was interpreted to her to be an inflammation of the upper bowel, close to the stomach. She was undergoing a treatment of compresses; wet-sheets, sitz-baths, and fomentations. Her apparent amendment was however but of short duration,—and, after some weeks had elapsed, I was requested to visit her again. She had now relinquished the water cure, was very ill, and unable to walk more than a few paces in the garden. Upon inquiry, I found she had been living upon a low, innutritious diet,—no animal food, no wine, nor tonics of any kind, the object being to cure the *duodenitis*. She was,

moreover, suffering from diarrhœa In a few days, she removed to Torquay for the winter, and here she died. The body was examined after death, and the medical practitioner who there attended her, states that numerous tubercles and small cavities were found in the lungs, and that the duodenum was quite healthy.

This case possesses many points of interest. In the first place, it is an example of that class of patients who endeavour to elude a stern reality, and are prone to attribute a state of ill health, dependent upon chronic structural disease in the lungs, to functional disorder of the stomach, and bile, evincing an almost unconquerable desire to turn a medical conversation away from the real sources of their malady. Secondly, it is an instance of the influence of emotions over the uneasy feelings, arising from positive disease,—nay, perhaps even over the disease itself. A new infusion of hope, or a new confidence inspired, may be designated as a charm or a medicine; it is at least a powerful psychological remedy. It withdraws the mind from the repugnant idea, and acts as a salutary diversion. Had it not been that the practical measures of the water-cure were the worst possible in her case—the improvement might possibly have continued. A period of hopeful confidence, with more air and exercise than she had latterly been accustomed to, with good living, care and attention, would undoubtedly have prolonged her life; but a poor and sloppy diet—

with wet compresses, sheets, and baths, counteracted the influence of cheerful emotions; opportunity was lost—and the fatal issue accelerated. Thirdly, this case is an example of chronic phthisis, running through many stages of its course without a cough; and of the power sometimes acquired by the patient, from long habit of suppressing cough, and removing the morbid secretion of the lung from the windpipe, merely by 'a hem,' and then swallowing it.

Case 3.—A young lady, aged nineteen, tall, and well-proportioned, came home tired and exhausted from a public assembly. On awaking the next morning, she felt a soreness at the chest, was thirsty and feverish, with quick pulse, and some cough. At the end of three or four days, the cough continuing, it was thought proper to examine the chest with the stethoscope, especially as she had lost a brother and sister by consumption. On proposing this to her, she became very nervous, and cried; said she was "disgusted at the sight of the instrument, and would not have it done." Her mother, failing to exercise authority, the proposition for the time was reluctantly abandoned. Two days after, with a little persuasion and humouring, she consented to the examination. On the right side there was some dulness on percussion, and the inspiratory sound was less distinct and clear than on the left; and there was a loud expiratory murmur along the border of the right shoulder blade. These signs

clearly denoted the existence of tubercles—probably of long standing, and the fear therefore was, lest catarrh and fever should arouse a retrograde nutritive activity in the parenchyma around them. At the end of three weeks, the feverish symptoms, the pain at the chest, and the cough, had disappeared; further medical treatment was therefore deemed unnecessary, and she was withdrawn as a patient. The stethoscopic signs however remained the same, and precautionary measures were strongly enjoined. Twelve months after, from the same cause, a similar attack of feverishness, pain in the chest and cough recurred. On this occasion, and after combating a variety of objections, the chest was again examined; and now, in addition to the signs before mentioned, there was heard accompanying each expiration, a click along the border of the right shoulder blade. This second examination corroborated the opinion formed from the first; and further, rendered it probable that now a small cavity existed at the upper and back part of the right lung. Remedies were prescribed, and cautions most urgently reiterated. The symptoms, as before, gradually gave way, and the young lady, anxious to throw off the restraints of medical treatment, which interfered with balls and parties, and acting upon the suggestion of her feelings, without any exercise of authority from her parents, she again ceased to be a patient. I frequently saw her afterwards in society, looking remarkably well, and really stouter in person; and in answer to my inquiries, she

always said she was *quite* well. I therefore began to conclude that my diagnosis was wrong. Either I had misinterpreted the stethoscopic signs, or the disposition to consumption had really passed away. But eighteen months after, she was again my patient. The symptoms on this occasion were the same as before, but in a more aggravated form. The skin was hotter, the pulse quicker, and the cough more troublesome. On proposing to examine the chest, simply with the ear, she cried,—excited herself,—and became hysterical, resolutely refusing to permit it. Medical treatment was again successful, in removing the catarrhal and feverish symptoms—but not so in entirely eradicating the cough. Change of air and residence on the coast was recommended and adopted; but on her return the cough was not gone, and during the following winter, she lost flesh,—her hair came out copiously, and her temperament was fretful and hysterical. At this period there was a singular mixture of fear and indifference; she was terrified at the idea of consumption, and yet in the presence of all the symptoms of the complaint, her days were spent in looking over her trinkets and dresses,—in listening to the details of dances and amusements told her by her young friends, and in consultations about the colour of her dress, for the approaching spring which it was her destiny not to see. A few months after, she died of consumption, and an examination of the body proved the disease to be an extensive tubercular phthisis, with its attendant complications.

Young persons are sometimes sensitively alive to any procedure on the part of the physician, implying a suspicion of consumption, and they shrink especially from the use of the stethoscope. This feeling is often shared in by the parent, who is fearful lest some painful truth is to be communicated as the result. To escape this, it is advisable to familiarize young persons, those of a consumptive disposition especially, with the uses of the stethoscope, examining the chest from time to time in health, before the fears and suspicions of a more advanced age, or the anxieties of a tender parent are called up. The examination is thus deprived of its formidable aspect to both parties, and moreover the ear of the medical attendant, familiarized with the healthy respiratory sounds, will more readily detect any alteration. In combating the early inroads of consumption, we have need of every aid or assistance; the cheerful compliance of the patient and the hearty co-operation of the parent, should therefore be readily accorded.

A stethoscopic examination would probably have revealed the presence of tubercles in the lungs, prior to the first attack of illness; the malady certainly made progress in the intervals between them, and what was singular, it appeared to have done so even while the person was gaining in flesh.* Falling

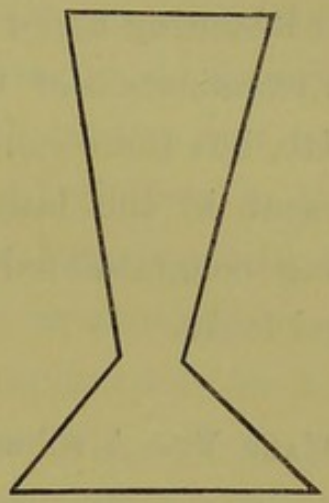
* Analogous cases of consumption are reported in the Transactions of the Edinburgh Medico-Chirurgical Society, and published in the Edinburgh Medical and Surgical Journal, for April 1835,

off of the hair of the head, has in my experience been an early attendant on pulmonary consumption—but this symptom, like cough, expectoration, and weakness, attends other forms of illness, and is therefore not pathognomic. Yet as no consumptive disease makes serious progress without it, the occurrence ought not to be overlooked.

Case IV.—A girl of 17, with long black eyelashes, dark eyes, and black hair, was labouring in the advanced stage of consumption, when I was requested to visit her. She was emaciated, with weak, small, quick pulse, frequent cough, and copious perspiration. On the front part of the chest, under the left collar bone, a loud blowing sound, with a bubbling rhonchus, was heard towards the end of the inspiration; there was no expiratory sound, but instead of it two or three bubbling gurgles. These sounds, it need scarcely be remarked, denoted the existence of a cavity partly filled with purulent matter, and partly with air, with a large air-tube opening into it. Under the right clavicle, the inspiratory murmur was heard, not, as is most usual, as a single prolonged sound, but apparently divided into two sounds, loud at the commencement, hardly

pp. 265, et seq. To these pages we particularly refer the reader, for several most important and interesting cases related by Gregory, Christison, Craigie, and Alison, the more valuable from being interspersed with the remarks and observations of these eminent persons.

heard at the middle, but loud again at the end. I have frequently noticed this variety of inspiratory murmur, and generally in connexion with other signs denotive of the presence of tubercles. Sometimes the first portion of the sound is much longer than the second, and if figures can represent sounds, the annexed one would give an idea of what I intend to describe; it represents the inspiratory murmur loud at the beginning, gradually sinking in intensity in the middle, till scarcely heard at all, and then as it were suddenly rising at the end of the inspiration to an intensity even greater than at first. Upon inquiry the following was the history of the case.



Eighteen months ago she had a chronic eruption of the scalp—scald head—for which various topical applications were had recourse to. Previously to this affection of the head, the menstrual period was regular, but since then it had been irregular. Twelve months ago the head got well, and she left home to stay with her friends for change of air, during which period menstruation was regular; and on returning she was congratulated by all who knew her on her improved appearance, and the parents were rejoicing in her increased appetite and good looks. Six months ago

she had a little cough, and did not look so well, but the family being in a humble sphere of life, and knowing nothing of the insidious nature of consumption, paid no particular regard to it. The disease, therefore, made progress, and they were painfully astonished when at length they came to know that their child was labouring under that fearful malady, consumption. An examination of the body was not permitted after death, but there can be little doubt that tubercles were present in the lungs at the very time the child was being congratulated upon her improved health and good looks.

Case V.—A robust looking young man walked three miles to the dispensary for relief "from a short troublesome cough, which plagues him at times, and pain in the left side when he coughs." There was nothing particular in the man's appearance, his muscles were remarkably large and well developed; he had not lost flesh; his respiration was not accelerated, his tongue was clean, and the pulse not more than 90.

The chest was examined by percussion and the stethoscope. The sounds on the right side were tolerably healthy, but under the left clavicle there was a marked dulness on percussion; and the inspiratory murmur could there be scarcely heard, the deficiency being very marked in a comparison with the right side. On desiring him to take a full inspiration, an obscure, deep-seated bubbling sound was heard lower down in

the lung, and on making him cough, the succussion produced a loud *splash*, which even by an uneducated ear would have been attributed to the motion of air and fluid in a hollow space. He says that two months ago he had cough and pain in the side, for which he was " bled, blistered, and got well of;" he afterwards slept in a damp room, which brought on his present attack. On closely questioning him, he declares he has no expectoration, " only a crumb or two now and then," though the bubbling and plashing noises in the lung indicated the presence of a large quantity of fluid. The prognosis was of course unfavourable;—it was evident that pulmonary consumption was far advanced in the left lung. He died at the end of six months—dreadfully emaciated—with haggard looks—bubbling râles—hectic fever—constant cough—copious expectoration—thrush—insomnolence and diarrhœa.

Great attention used formerly to be paid to the expectoration, with a view to determine whether it was pus and came from a cavity in the lung, or whether it was only mucus from the air-tubes. More recently it has been supposed that a microscopical examination would determine the point. But it is now known that the inquiry is useless—mucus and pus being only varieties of the excretion natural to all mucous or granulation fabrics. Still when a young person has had cough for some time, and the expectoration, at first transparent, changes to an opaque matter with small crumby particles, the alteration is by no means to be neglected.

Case VI.—A woman aged thirty-seven—a schoolmistress—has for years had cough and pain in the side, for which she has at various times been under medical treatment. The lungs are known to be diseased, still by attention to the rules laid down, she continues a useful member of society, teaching in the parish school. Her case is here related to show the extraordinary feelings of which persons labouring under chronic scrofulous disease occasionally complain. The following is in the patient's own words:—She feels "strings breaking at the heart; the chest so full, she hardly knows what to do; burning heats flash out all over her body, and creepings under the skin; sometimes she feels just as if pins and needles were nittling and shooting about; cold chills and pains in the chest; and wind in the head and back. The pit of the stomach feels as if it had lost something; stitches all over the bowels; and the pains, when they are not in the bowels, shoot up and dart through the chest; a dreadful beating sometimes in the head; cold shivers down the back bone; and sometimes a dashing at the chest." These and many other extraordinary sensations from time to time described, must have puzzled the medical attendant—had there not been the obvious sensible signs discoverable by the eye and ear, the countenance and the stethoscope. When at length the disease to which these sensations were referrible proved fatal, the body was examined. The left lung was firmly and largely adherent to the wall of the chest, and in its

centre was a large cavity lined with a villous fabric, and surrounded by crude tubercular material. Several groups of tubercles were disseminated in the parenchyma of the right lung. The liver was pale and fatty. The exterior of the small intestines was almost universally covered with thick layers of false membrane; and multitudes of miliary tubercles were scattered upon the abdominal peritoneum, as were also many others upon the outer surface of the bowels.

Anomalous feelings and sensations, usually referred to hysteria, are by no means uncommon in the early and obscure stages of consumption; and it is of the utmost importance to determine specifically whether they are neurological, or structural, connected with retrograde changes of texture. It is well known that emotional disturbances and annoyances will produce and aggravate what are termed nervous pains—neuralgia, tooth-ache, &c.; and it should be equally known that structural disease has sometimes very extraordinary neurological irradiations. But as this topic has been already handled, we shall not dwell upon it here.

Case VII.—A stout looking muscular man, thirty-six years of age, complains of a bad cough, which is worse at night, and prevents sleep. He says, that he spits up a great deal of greenish coloured matter, which is sometimes bloody; he perspires at night, has no

appetite, and is thirsty; the tongue is furred, the skin hot, and the pulse upwards of a hundred. These symptoms at once proclaim the existence of a formidable malady; yet this is the first time he has ever been to a doctor. The history he gives of himself is as follows: —Three months ago, he first noticed that he had a cough and cold; and a fortnight after he spat up some blood—about a tea spoonful. He did not go to any one for advice; a week after that he spat up some more blood, but as he had no pain, he consulted no one about it. Several days after, he threw up nearly half a pint of blood; this alarmed him; and he applied at a druggist's shop, and got some medicine, which did him good; but now "he is ill in himself." On examining the chest, there was dulness on percussion under the right collar-bone and in the right axilla; and with the stethoscope sundry sibilant and crepitant râles were heard throughout the whole of the right lung; there was likewise distinct pectoriloquy; and upon coughing, a deep-seated cavernous 'plash.' On the left side, although some dulness on percussion, was noticed, the respiratory sounds were here comparatively healthy. The treatment adopted, although it alleviated some of the more urgent symptoms, was of no essential benefit, and the patient died six weeks after his visit.

The body was examined after death. The right lung was studded with tubercles, and there were two large cavities, one of which was nearly full of blood and purulent matter. Sections of the lung displayed

a mottled aspect of black, grey, red, and yellow; the tints arising from the various mixtures of blood, dark pigment, and tuberculous matter. In the left lung, were several tubercles, and three small cavities. One of these, was immediately beneath the pleura, which was thickened, and adhered by a strong fibrous texture to the wall of the chest; denoting the coexistence of simple inflammation in the serous texture,—with a retrograde morphology of the parenchyma. A conformable metamorphosis in one texture, and an unconformable one in another; a curative process attempted in the pleura, with active disease in the parenchyma.

This case affords occasion, to remark upon the fearlessness or carelessness of some persons really suffering from a mortal disease; and to contrast them with others of a different temperament, who bestow an almost undivided attention upon sensations without structural change. There can be no doubt that tubercles and retrograde morphological changes of structure around them, must here have existed prior to the illness from which the patient dated the commencement of his malady; but it was not to be expected that a person, who so strangely neglected a cough, and spitting up a tea-spoonful of blood, would attend to the obscurer signs of disease; the case being an instance of as wide a departure from the right rule—in one direction—as nervous patients, sometimes, are of departure from it, in another.

It is usually said of a person who spits blood that he has broken a blood-vessel, and so in truth he has; but the rupture is not a consequence of the coughing, nor is it usually increased by vomiting. Blood is sometimes poured out all over the surface of a pulmonary cavity; the hæmorrhage, in such cases, is of the same nature with that observed in mucous membranes, and is said to occur by exhalation. That is to say, as blood frequently issues at all points, from the specific capillaries in mucous structures, which are in great part bounded by cell-organisms; so, likewise, in bleeding from the lungs, blood in some cases issues from the multitudinous capillaries of the abundant villous structure. But in other instances it flows, from very much larger vessels;—the phenomenon then occurring from the more than usually degenerate morphology of the elements which overrun and supplant the coats of the natural vessels; and which, unable to resist the impetus of the circulating current, give way, so that blood is lost in great quantity; the conditions being as if an embryonic blood-vessel were called on to sustain the force and pressure of the adult circulation. In these cases, the hæmorrhage does not occur through any mechanical violence, but as a consequence of the retrograde change of structure. Great alarm is very naturally excited by the occurrence of bleeding from the lungs, but it is fatal in a very small proportion of cases —one in forty only; and it is really of much less consequence when the quantity of blood is small, than

the change of structure of which it is the sign and consequent. The hæmorrhage may give rise to sundry secondary effects in the lungs themselves, but as they are well known, it is unnecessary here to enter upon them.

Persons who have once had spitting of blood, frequently know by experience when it is about to recur, by a saltish taste, as of blood, in the mouth;—by a sense of weight or pricking beneath the sternum; by an uneasy feeling of oppression in the chest, or a more teazing cough. And just before the blood appears, a tickling sensation is felt near the top of the windpipe. The blood must be poured out from the vessel some time before it makes its appearance, and hence the spitting of it frequently relieves the cough and oppression of the chest preceding it; but the relief lasts only for a short time; the symptoms recur, and the disease generally seems to advance afterwards with increased rapidity. Spitting of blood may be very slight, so as hardly to tinge the expectoration red, or it may be more copious; the whole *sputum* being frothy blood. It may occur from various causes, but when it appears in a person near the age of puberty, it is almost invariably symptomatic of phthisis. Hœmoptysis is subject to considerable variety in regard to the period of its first occurrence in consumptive cases; sometimes the first attack precedes all the other symptoms; at others the patient spits blood for the first time, when the disease

is far advanced, and has declared itself by other unequivocal signs. There is also great variety in regard to the course of the disease after the occurrence of the hœmoptysis, which sometimes precedes the rapid progress of the disorder for months or years; while at other times the first attack of spitting blood is immediately followed by a succession of all the well-known signs which declare the progress of phthisis; lastly, there are other persons who do not spit blood until towards the close of the disorder. Hœmoptysis, is only an occasional symptom, unless we regard under this head, the barely visible specks of blood in the expectoration; without reckoning these, it is no uncommon thing for consumption to run its whole course, unattended with this phenomenon. There are great differences in the degree of alarm excited in the patient's mind, by the appearance of a speck of blood in the expectoration, and therefore in the degree of circumspection with which the matter expectorated is examined; this, no doubt, has led to the variety observed, in estimating the number of cases of hœmoptysis; compared with those of consumption, occurring in the practice of different physicians,—very small quantities of blood being sometimes overlooked.

Case VIII.—I was requested to visit a young gentleman aged twenty-seven years. I found him seated in an arm-chair, suffering from difficulty of

breathing, cough, and copious expectoration. His face had a leaden hue—the lips were blue, the conjunctivæ red, and the veins of the hands, turgid. I observed the extremities of the thumbs and fingers were large, and the nails incurved. The pulse was quick, soft, of considerable volume, and easily compressible. The tongue was clean, the bowels open, and there was no thirst nor pain. He told me this attack was an aggravation of a long-standing asthmatic complaint, to which he had been subject for years; and he attributed the paroxysm to his journey,—the weather being wet. Upon requesting from him the history of the asthma,—he said it commenced after scarlet fever, which he had slightly and favourably when he was ten years old—but that about three months after it, he experienced a difficulty of breathing, which was relieved by emetics. From this period, similar attacks have recurred at various intervals; sometimes six weeks or two months have elapsed between them, and sometimes he has had two attacks within a fortnight. On one occasion he was free from them for a whole year, and during that interval he grew stout. This occurred when he was twenty years of age. Three years ago he caught cold—and had a bad attack of influenza. After that the asthmatic paroxysms ceased; but lately they have again troubled him. He has been residing at Hastings, but as he found himself weaker, and the asthma rather increasing, he resolved to try Malvern, He has not had any medical advice for some

weeks. On inspecting the expectorated matter, I found it of two distinct kinds—the one a homogeneous purulent mucus, entangling air-bubbles, and swimming at the surface of water; the other, a white crumby matter free from air-bubbles, sinking to the bottom. He could not sleep upon the *right* side, and his hair fell off when combed or brushed. On placing my hands over the front part of the chest, and desiring him to inspire, the *left* side was found to be nearly motionless, and I observed the subcutaneous veins on this side full and visible. Having the microscope at hand, I pricked the skin, and examined the blood—when an unusual amount of colourless cells were found in it. On a stethoscopic examination—various rattles, deep-seated cavernous noises, and wheezings, were heard in all parts of the left lung—with distinct pectoriloquy under the collar-bone, extending into the axilla. Signs of similar import, but less in amount, were heard on the right side. I now addressed his mother, who was with him, and avoiding to name the subject of consumption, I discovered there was no suspicion of disease beyond the asthma. The reader may therefore judge of the distress occasioned by the hopeless opinion, which I felt there was now no longer any plea for withholding, and which was fully justified by the event—for the patient died three days afterwards. The body was examined after death. On opening the chest, the lungs did not collapse, but remained projecting, round, and full. The right lung, at its upper and

posterior part, adhered to the wall of the chest, and there was nearly half a pint of serum on this side. The left lung was more extensively and firmly adherent to the costal wall, and on attempting to separate it, the fingers suddenly broke into an immense cavern, large enough to contain my closed fist; at the bottom of which, lay a pool of purulent matter. The thickness of the wall of this cavity, where the fingers penetrated, was scarcely greater than that of a card; and a puff of air audibly escaped upon its being opened. The texture lining the interior surface of the cavern, was not visibly of a villous or granulated structure. Nevertheless, when examined with the microscope, it was found to possess the essential characteristic of a corpuscular texture. The blood-vessels ramifying in the walls of the cavern, were in all respects different from those of the healthy lung, and their coats densely clothed with cells. The air-spaces still permeable, were unusually large, and in many parts of the lung, the interlobular areolar texture was injected with air. White purulent mucus escaped copiously from the cut extremities of the air-tubes; and their interior mucous texture was for the most part thickened and red. Transparent gelatinous matter, and semi-transparent miliary granulations were found in the parenchyma; in the interlobular spaces; — and in the new fibrous fabrics, constituting the pleuritic adhesions. This remarkable and highly interesting case—using the conventional language of the day—exhibited the anatomical con-

ditions of pneumonia, bronchitis, and| pleurisy, co-existing with those of emphysema and phthisis. But, in accordance with the results of our investigations, we would cite it as an example of Retrograde Morphology. Each special structure variously resisting the general type; impressing upon general elements—cells and protoplasma,—many different modifications.

An emphysematous condition of the air-spaces of the lung—that is to say, an increase of the area they enclose—has by some persons been thought a safeguard from the ravages of consumption. Before this can be admitted, it must be shown that a largely increased area is compatible with the integrity of the delicate capillary network on the walls of the spaces. This has not been done, and therefore we hesitate to admit the propriety of endeavouring to produce an emphysema, with a view to the cure of consumption; the endeavour being grounded simply upon the supposition, that an increased area in the air-spaces, will cause the walls of purulent cavities to cohere by pressure. But the walls of phthisical caverns are always surrounded by a belt of hardened texture; whereas, the thin walls of the natural air-spaces are readily compressible. Moreover, the air in the caverns counterbalances the pressure of air in the spaces. Wherefore then, it appears impossible to imagine that pressure, from enlarged air-spaces, can bring the more unyielding walls of caverns into contact, so as to be a means of

promoting their union; such pressure necessarily bearing as much upon the thin walls of the spaces, as upon the thicker walls of the caverns. And the pressure required for the effect under consideration, would infallibly stop the circulation of blood in respiratory capillaries.

Case IX.—C. C., a young lady aged twenty-six, came under my care for a few weeks early in the summer of 1840. She complained of weakness, indigestion, cold perspirations, and pain at the upper part of the right thigh. The pulse was small, feeble, and thrilling; she had a slight cough, without any expectoration; was very nervous, and very thin; her hair came out, and she had the appearance of a consumptive patient. I examined the chest carefully by percussion, and the stethoscope, but could not detect any signs to throw light upon the nature of the case. Nor did it appear that the illness was supposed to be connected with any disease in the lungs. The following is the previous history of the patient, as related by her sister.

"My sister's first illness commenced in the winter of 1828, and continued through the spring of 1829. Her symptoms were loss of appetite, heat and pain in the head, coldness of the feet, and suspension of the period for many months. The following summer, her health appeared to be completely restored. In 1832,

a second attack of illness occurred, lasting for several months, which gradually subsided as before. In 1833, a third attack of stomach complaint, which lasted through the whole of this winter, and the spring of 1834. Every thing she ate turned acid upon the stomach, and she suffered exceedingly from a sensation of gnawing in the bowels. Dr. Henry of Manchester recommended her a meat diet, but she suffered very much from it, getting hot, and flushed in the face, with cold feet. Mr. Lawrence, of London, and M. Chomel in Paris, where she went in April 1834, ordered her to discontinue meat. She then ate what she liked, and returned from France well. In 1836, she had a fourth attack of the stomach complaint, and in October of that year, first complained of pain at the top of the right thigh, where an abscess formed, and burst, giving vent to a large quantity of unhealthy matter, and a thin watery discharge, with clots, came from the opening for many weeks. In 1838, the abscess formed again; it again burst, and matter was discharged as before. The whole of this summer she suffered from stomach complaints, and disordered bowels—she was weak and emaciated, and had a slight cough, but greatly recovered her health by change of air in the autumn. In 1839, indigestion as before. In October, pain returned in the situation of the abscess, and she continued weak and ill the rest of that year. In January of the present year, (1840,) she had two violent attacks of inflammation in the

bowels, and since then she has been declining in strength."

In explanation of one part of the preceding narrative, I received the following account from her usual medical attendant. " The abscess, of which you have heard, formed in the *labium* and burst into the *vagina*. There have been frequent returns of inflammation in the part, particularly about the time of menstruation. She has also had stricture of the rectum, about an inch and a half above the sphincter. During the last winter she had two serious attacks of *peritonitis*, which called for active treatment, and a few months ago it was ascertained that the *uterus* was enlarged and tender to the touch both *per vaginam et rectum*. She has had frequent attacks of irritation of the mucous membrane of the whole alimentary canal, which have subsided after appropriate treatment, but leaving her affected with indigestion. Sir C. Clarke was consulted for the uterine affection, and he ordered leeches to be applied twice during the month."

This patient left Malvern and returned home at the end of August, 1840, but I did not lose sight of so interesting a case, suspecting it might prove to be one of phthisis; and the following communications received from her sister contain an account of the subsequent symptoms and their issue.

" November, 1840.

" I have the pleasure of informing you that for the last two days my poor sister has been quite herself, and though her head is still at times a little confused and excitable, she is perfectly calm and composed, and her appetite is excellent. After a long distaste for animal food, and not having touched it for weeks, she now calls for it voluntarily, and Mr. D. is satisfied of its propriety for her, and also that wine is desirable. She has been exceedingly exhausted at times since the violence of the attack subsided, but was always restored by food and wine. My father returned home yesterday, and is quite astonished to see her looking so much better than he at all expected, and we are really beginning to flatter ourselves that this has been a crisis, and that she may be better after it. She has no pain or uneasy sensation whatever, and her sleep last night was calm and tranquil; she is in excellent spirits, and is full of delightful plans of what she intends to accomplish during the coming summer. It is astonishing to see her so little suffering in body, after the *hurricane* (for I can call it by no other name) which has swept through her tender frame. She recollects distinctly every thing which she has done during the attack, and has explained the delusion which has existed in her mind, and the cause of it. I am quite aware that it is very undesirable to allow her to dwell upon it, but as she says herself, it does her more harm to lie silently thinking about it, which she cannot

help doing, than to tell me what has been passing in her mind. I therefore *occasionally*, when she is quite calm, allow her to speak of it, and am glad to find that she has no painful feeling whatever connected with her illness. Her natural sense of the ludicrous is strong, and she is much more inclined to be amused at the extravagance of her ideas, than to dwell upon the distressing part of it. I know now what is the spark that has fired the train, and without *that*, though I think the train has been laid some time, I don't believe there would have been this explosion.

"The state of her nerves for weeks before this came on, was most distressing, and to me perfectly unaccountable, for she was otherwise much better, and the local complaint less annoying than it had been for many months. Both she and I had the idea that the long-continued use of henbane—which she took in considerable quantities before going to Malvern—might have had some share in it, and on writing to Mr. D. about it, he admitted it to be possible. She discontinued the use of it, and felt better, but her head then began to be affected; this, however, I believe to have been *entirely* caused by the kind of reading and speculation in which she has latterly been occupied. Six weeks ago she got Hale Townsend's book on *Animal Magnetism*, and my brothers and myself agree in thinking that this is the cause of all the mischief. I was not in the least aware of the nature or tendency of the book, but when she had finished it, I was in-

duced by her entreaties to look into it. I regretted exceedingly that such a book should have fallen into her hands in her present state of health, but she was so perfectly calm about it, and showed so little excitement, that I was in hopes it might not prove so injurious as I feared. She saw, however, that I avoided the subject, and acknowledges that it only made her think the more about it alone, till her brain became pervaded with one idea, and her reason was upset; and she herself *conscious* of insanity for a week before it became manifest to those about her. She assures me that she spent three whole nights in her night-gown, on the floor of the bed-room, fancying that the salvation of the whole world would be insured by her so doing. Another night was spent in dancing before the glass, moving her fingers with a rapid motion, under the idea that she was casting off the mortal coil and becoming a spiritual butterfly, and she is only surprised that under that impression she did not go out at the window, for she recollects having fully intended it under the impression that she was to be absorbed in the sun.

"It is singular throughout this illness she never made the slightest allusion to Townsend, though every thing else that she had been reading for years has come out mixed up in the strangest confusion, and yet with a method that is quite wonderful. I could not help asking her, how, being in this state for so many days, she had contrived to keep so quiet before me? She

laughed, saying, 'I had cunning enough to avoid exciting your suspicions by anything outrageous,—for I saw you were watching me,—till I had accomplished the object I had in view, which was to save the world by a series of penances.' If you have seen or heard of Townsend's book, you won't wonder much at its effects upon a person in poor C's. state. The friend who lent it her, had not read it, but said it was recommended to her by Professor W——, who, with many other scientific and medical men in London, had all,—to use her expression,—'bowed before its overpowering testimony.' I think it most undesirable to make such a subject popular,—at any rate in the present state of opinion about it; for *if true*, it is too fearful a power to be trifled with, and *if not*, it can only do harm by exciting people's imagination."

Here we pause in the narrative to remark upon the sound observations and good sense of the excellent lady, the author of the above communication: these flow spontaneously from a strong well-regulated mind. With regard to the phenomena described, whether we call them insanity, hysteria, or mesmerism, they are clearly effects of imagination and fancy rioting over the intellect—the predominance of emotion over mind. Mesmeric philosophers may add this case to the list of their facts, but for ourselves, with a due sense of the exalted power of emotion, imagination, and fancy, *we* would, at all times,

discountenance conduct tending to reverse the natural order of things. In the economy of God's providence, it is clearly the rule that Mind or Intellect should govern the emotions and passions; whereas the works and practices of mesmerism reverse the order of education, and render the lower impulses of human nature predominant. But to resume:

"January, 1841.

". . . . . I must now acquaint you that all excitement has subsided, and that C. is at present very much in the same state, or perhaps a little better, than she was before the attack. You may remember that she had a great dread of being touched when at Malvern; this has disappeared, though she is still very sensitive to the least noise. She has not lost strength at all; on the contrary, her appetite since the excitement has been surprisingly good, and she has taken large quantities of milk, which appear to agree with her. It is natural that her mind should dwell a good deal upon her late illness, and what preceded it; and seeing that she could not dismiss the subject from her thoughts, I have allowed her to tell me what was passing.

"I believe both her medical attendants were surprised at the sudden and complete disappearance of all excitement; they thought it likely to be a very anxious and distressing case, and one of some standing."

"August, 1841.

"Miss N——, whom I requested to announce to you the death of our poor suffering C., would probably tell you how very rapid and unlooked for her decline was at the last. Before going to Leamington she had been for a month at Bolton Bridge in Yorkshire, a beautiful sheltered spot. It was the first attempt we had been able to make, to break in upon our invalid habits, and the change it produced was quite astonishing. She came down to breakfast at nine o'clock every morning, took a large quantity of food, and was able to bear two drives a day with the carriage open. The weather became so cold that we were obliged to return home at the end of a month, and before a week had passed, she had relapsed into all her former habits, which so distressed my father, that he determined, as the last resource, to send her to Leamington. Before she left home both Mr. D. and Mr. G. tried the chest with the stethoscope, and said there was at that time no decided disease of the lungs, though there might be cause for apprehension hereafter. Three days after, Dr. J. saw her at Leamington. He evidently considered her at first a decidedly consumptive patient, but declined giving any opinion, and would not allow us to tell him any thing of her former symptoms nor any account of the local complaint. I returned home to my father, and the report made of poor C.'s state by our friend Miss N., continued to be encouraging for about three weeks. Dr. J. had made her walk up and down

stairs, which she had not done since she left Malvern; her appetite was good, and though her cough continued, she was going out in a Bath-chair when the day was not too cold; the only unfavourable circumstance appeared to be that she was getting thinner, which certainly startled us very much, because Dr. J. said she was improving—though her state was precarious. My father had been very ill, but as soon as he was able to bear the journey we set off, and on arriving at Leamington found my poor sister in the last stage of a consumption. She died a fortnight after our arrival. In consideration of the doubt and difficulty which had always been connected with my poor sister's long-continued illness, I felt it right that there should be an examination; and having signified my wishes to that effect to Dr. J. it took place in his presence. I copy for your inspection the written statement which he gave me.

> "The right lung entirely gone; the left lung a mass of disease; the liver three times its proper size, and the right kidney much enlarged. In the small intestines extensive ulceration."

With regard to the kidney, Dr. J. said that in the whole of his practice he had never seen anything like it."

These cases embrace a general outline of the symptoms observed, or complained of, by those affected with consumption;—they pourtray the constitutional nature of the malady; the wide extent of its sympathies; together with its anatomical and other relations.

CHAPTER II.

ETIOLOGY.

"Every new discovery in science brings into view whole classes of facts which would never otherwise have fallen under our notice at all, and establishes relations which afford to the philosophic mind a constantly extending field of thought, in ranging over which it is next to impossible that he should not encounter new and unexpected principles."—HERSCHEL.

"WE anticipate," says a very recent medical writer, "but little fruit from that refinement of *post mortem* or microscopical research, which seeks to discover visual evidence of the origin and nature of tubercles. We would not discourage nor ridicule such modes of investigation, nor would we undervalue the high talent and sagacity which have been displayed in the pursuit; but we cannot help expressing our little confidence in the results, and we are not conscious that science has hitherto materially widened the extent of our mental apprehension of the real nature of disease." *

The question of the utility of microscopical analysis in

* Report of the Reading Dispensary, in the Provincial Medical and Surgical Transactions, 1846.

physiology and morbid anatomy, must be decided on general grounds. If it could have been shown, in chemistry, astronomy, or mineralogy, that no advantages had been gained by analytical proceedings; or that our mental apprehensions had not been extended by such means; we should have been prepared, with reason, to distrust the refinement of microscopical research directed to discover visual evidence of the origin and nature of tubercles. But in the absence of any such proof, analogy leads us to believe that the labour of the minutest investigation will in due time have its full reward. For it is the universal rule in all other departments of natural science, that the more extended our analysis of complex phenomena, the nearer our approach to ultimate facts. And why should anatomy and physiology form the exceptions? "How infinitely greater are the *mere chances* of discovery in chemistry," says Sir J. Herschel, in continuation of the paragraph heading our present chapter; "among the innumerable combinations with which the modern chemist is familiar, than at a period when two or three imaginary elements, and some ten or twenty substances whose properties were known with an approach to distinctness, formed the narrow circle within which his ideas had to revolve?"

Incautious or inconsiderate expectations have probably been entertained, that new elements could be brought into view;—unexpected discoveries made,—and difficulties which the discovery raises, in relation

to established doctrine and teaching, could all be got over at the same time;—an expectation that has never been realized in any science or art. In twenty years, modern microscopical analysis appears to have shaken the whole fabric of medical science; and it ought to satisfy even the most impatient, that now,—when the doctrines of pathology, one after another, are tottering to their inevitable fall,—the cultivators of the "refined investigation," are prepared with better, because more general principles.

We have adopted the quotation to which these remarks are appended, as a text for comment, because we consider them as expressing the feeling not merely of the individual but of a class,—to whom we may appropriately address a paraphrase of the concluding pages of Herschel's *Preliminary Discourse.*

Anatomical researches in relation to physiology still remain boundless; and after centuries of labour, microscopical analysis shows us to be in the situation in which Newton figured himself,—standing on the shore of a wide ocean from whose beach we may have culled some of those innumerable and beautiful productions it casts up with lavish prodigality, but whose acquisition can be regarded as no diminution of the treasures that remain. The discovery of a general law, or the inclusion of what is already known in generalizations of a still higher order, is a new acquisition; and so far as our experience has hitherto gone, every advance towards generality has at the same time been a step towards

simplification. It is only when we are wandering in the mazes of particulars, or entangled in attempts to work our way downwards in the thorny path of applications, that nature appears complicated. But this consideration, so far from repressing our efforts, or rendering us hopeless of attaining anything intrinsically great, ought rather to excite us to fresh exertion.

" It is sufficiently obvious," says Louis, in his valuable work on Phthisis, " that the lungs were not the sole organs rendered incapable, during the progress of phthisis, of performing their functions, that others were, on the contrary, the seat of anatomical changes so serious and extensive, that these would in themselves have sufficed to destroy life, and that almost all of them contributed, in a more or less obvious manner, to hasten the fatal issue of the primary disease. A rapid survey in the form of a summary of these various anatomical disorders, will give a clear notion of their mutual bearings.

" Recent inflammation, of variable extent, of one or both lungs, or of the pleura, which was invested with false membranes, sometimes of a tuberculous character, or effusion of a notable quantity of limpid serosity into the pleural cavity, co-existed in one-tenth part of the cases, with pulmonary tubercles and cavities.

" The trachea exhibited ulcerations, oftentimes of enormous size, in somewhat less than one-third of the cases.

" Ulcerations of the larynx presented themselves in

somewhat less than a fifth part of the subjects. Those of the epiglottis were scarcely less frequent.

" The pericardium contained a notable quantity of perfectly clear serosity in the tenth part of the individuals examined, and exhibited traces of former or recent inflammation in several others. The heart was pretty frequently softened, and the aorta red in the majority of young subjects.

" In one-twelfth part of the cases the stomach was very much distended, and carried lower in the abdomen than usual; its mucous membrane was red, sometimes mammillated, slightly softened and thickened on its interior surface in about the same proportionate number of cases. In a fifth part of those examined, it was softened and attenuated within a variable extent; and in the same number of individuals it was found extremely red, softened, and sometimes thickened at the fundus; ulcerated, and more or less grayish and mammillated in many others. It was perfectly healthy in but a fifth part of the cases.

" Five-sixths of the bodies examined, presented ulcerations varying in number and size in the small intestine. They were of almost as frequent occurrence in the large intestine, and the mucous membrane of this portion of the alimentary canal frequently coloured red, and thickened, was as soft as mucus throughout the entire or a greater part of its extent, in one half the cases. I found it perfectly healthy from one end to the other in but three cases.

"Transformation of the lymphatic glands into tuberculous matter was less frequent in the neck, in the lumbar region, in the meso-colon, and in the axillæ than in the mesentery, where it existed to various amounts in one fourth of the subjects. It was more frequent in the bronchial glands than in any other bodies of this class.

"The liver was fatty in one-third of the cases. The spleen was softened, and the kidneys tuberculized in a sixth part of the cases.

"All the serous membranes, the arachnoid, the pericardium, the pleuræ, and the peritoneum, were in a great number of phthisical subjects the seat of a more or less abundant secretion. These membranes were also the seat of acute inflammation at the close of life, and the false membranes investing them were sometimes tuberculous." *

"I am convinced," says Dr. Elliotson, "that I have seen cases where there were no symptoms of phthisis, and yet the patient has died of consumption in the course of three months. I recollect one instance of this in particular.

"The patient was continually examined by me on account of some anomalous symptoms in the abdomen; and on carefully examining the chest I found he was free from cough,—free from all the symptoms of phthisis generally, and from those symptoms which can only be learned by auscultation.

* Researches on Phthisis, p. 149. Syd. Soc. Ed.

"He then began to spit, showed signs of phthisis, and died in two months. On the autopsy we found the lungs extensively diseased."

I have myself notes of a case of this description in the person of a young woman, aged twenty-one years, who complained of enlargement of the abdomen, coming on without pain, and without any evident cause. The patient died of consumption; but there was dropsical effusion in the abdomen, considerable emaciation, and loss of hair, many weeks before there was cough or any other chest symptom.

The accuracy of the result of the anatomical researches of Louis and others with respect to the ramifications of disease in phthisis, has been fully substantiated by more recent observers. It may, therefore, be considered demonstrated in consumption, that it is not the lung only that is diseased and disabled in its function, but that almost every texture in the body shares more or less prominently in the malady. Daily observation of the symptoms during life corroborates this conclusion, for a consumptive patient does not suffer from cough and expectoration alone, there are always other symptoms more or less prominent,—loss of appetite,—falling off of the hair of the head,—amenorrhœa,—disturbed sleep,—hectic fever,—profuse perspiration,—thrush and diarrhœa.

"Could we divest ourselves," says an accurate medical observer, "of the prejudices of education and authority, and look upon scarlet fever with our minds free

from preconceived opinions, what do we see? The body covered externally from head to foot with redness, and internally, as far as the eye can reach, we see the redness continued;—we have at the same time all the signs of inflammation of the mucous membrane of the lungs and bowels, or of the membranes of the brain; and the sympathy of the general system proportionably excited. In a word, we have the external and internal surfaces of the body inflamed, and the accompanying sympathies greater or less according to the degree of the inflammation." *

Records of this kind are daily seen in medical publications with respect to the diseases of dentition; convulsions and diarrhœa in infants; and measles, hydrocephalus, &c. in youth. In fact, all the most recent and careful pathological investigations demonstrate in every morphological disease, particularly in children, and in such as are scrofulous, that though one organ or texture suffers more prominently or severely than the rest, and from which, therefore, the disease derives its most characteristic features and name, yet it is not there the whole disorder is to be found; anatomical changes are not confined to that organ, but are more or less extensively present in others also. The conclusions upon this point, derivable from simple visual inspection after death, are confirmed and extended by the microscope. And as our refined analysis proves

* Mr. Dewar, *On Scarlet Fever*. Edinburgh Medical and Surgical Journal.

that consumption cannot make sensible progress in the lung without involving sundry forms of texture; so in like manner it demonstrates that no serious anatomical change can take place in any organ, without analogous textures elsewhere evincing, when microscopically examined, a more or less decided disposition to similar alterations.

When, therefore, we speak of infants dying of teething, pneumonia, or diarrhœa; and of youth dying of measles, scarlet fever, or hydrocephalus, it is necessary to bear in mind that the terms convey no adequate information with regard to the extent or ramifications of the malady. They may refer us to the organ which has suffered most, but afford no information upon minor or secondary anatomical changes in the rest.

It is the universal law, that all the living should die. And it appears equally an irresistible law, that death is liable to occur at all ages,—in the infant, and the young, as well as in the adult, and the old. The necessary consequence is,—there will be incurable maladies at all ages; persons seeking a recovery of health, which it is beyond the sphere of human science or art fully to re-establish. It is no reflection therefore on the practice of medicine, that the young die, as well as the old.

The mortality of human life in infancy and childhood, is surprisingly great and uniform; and although the deaths, in accordance with received nosological arrangements, may be differently classed in different

years, still the important result, that one fourth of the children born, die before reaching the fifth year of their age, remains the same. This high rate of mortality has been repeatedly a subject of comment by those who have turned their attention to the subject, and reflections have been made unfavourable to medical science and medical practice. But the mortality is based upon natural causes:—the anatomical structure of the infant is, as we have shown, materially different from that of the adult; nutrition and growth are more energetic; all the textures are imbued with active morphological agents; the blood circulates with greater rapidity,—and the new-born sympathies of sentient elements are more alert. Whatever therefore may ultimately be our success in combating disease,—it must from the nature of things be impossible for us to place the mortality of infant structures upon a level with that of those which have attained the maturity of life. These truths forcibly place before us the necessity of considering together, the science of organization and the clinical observation of disease. Neither fettered on the one hand by the narrow views of a system, nor on the other enslaved by the limits of a nosology.

It would be difficult, perhaps impossible, to determine correctly the heads or classes under which the whole of the mortality of infancy and childhood is included in the reports of the Registrar General, nor is it important,—it may for our purpose be considered

as chiefly embraced under the heads, teething, convulsions, pneumonia, diarrhœa, hydrocephalus, measles, hooping-cough, and scarlet fever. In the year 1838, the total registered deaths in England were 342,529, and the following table exhibits the proportional numbers under each of the above-named diseases.—

Teething	4,404
Convulsions	26,047
Diarrhœa	2,480
Pneumonia	17,999
Hydrocephalus	7,672
Measles	6,514
Hooping cough	9,107
Scarlet fever	5,802

Now the sum of these numbers is 80,025, and if we allow the average mortality of the diseases enumerated, to be one in every six cases of illness—then a mortality of 80,000, will represent a sickness of 480,000;—that is to say, for 80,000 deaths, there would be 400,000 cures or recoveries.

It is from an examination of the dead, that we obtain our knowledge of the morphological effects of disease, and discover at all times, besides the organ which principally suffered, and from which the chief symptoms and sympathies were evolved, that others also were the seat of secondary anatomical changes, contributing to the fatal issue. This fact being demonstrated and admitted in the fatal forms of disease, there

is no reason for doubting it in the more numerous ones of recovery. On the contrary, what we call complications—superventions, and sequelæ,—are the more prominent and pressing of these secondary or minor anatomical changes, evolving signs, and running their course concurrently with the chief malady, or gaining strength and importance upon its decline.

In children, who have been accidentally burned or scalded, it not unfrequently happens during the inflammation occasioned by the irritant; or during the progress of the granulating sore, that a supervening malady occurs—some secondary anatomical change in distant internal organs; the brain, the lung, or the bowels. Numberless analogous instances will occur to the experienced reader. It is not necessary to determine, whether or not it be appropriate to apply the term inflammation to these supervening changes; it is sufficient our investigations prove that the phenomena are governed by the universal law of growth; —cell-organisms and protoplasma accumulate;—new textures, and secretions are formed;—ulcerations discharging pus occur in the mucous;—and granulations, degenerating into tubercles, spring up in the serous textures.

It is not, however, to complications and sequelæ, nor to anatomical changes, which evolve symptoms, and demand medical interference, that we are now directing attention;—but, to those which, without sensibly disturbing the functions of the organ in which they

are seated, are nevertheless recognizable by close attention to the constitution in the living, or a special investigation in the dead.

In a table drawn up by M. Papavoine, and inserted in his *Memoire sur les Tubercles*, it is stated that of 919 autopsies of children, from five to fifteen years of age, 518 or three-fifths were tuberculous; that is to say, from the fourth to the sixteenth year, the number of children presenting tubercles in some of the fibrous or serous textures, is actually greater than that of those free from them; and Louis affirms of the patients dying in the Hospital of "La Charité," that three-fifths are tuberculous. "I do not exaggerate," says M. Guillot, "when I state that four-fifths at least of the old men whose organs I examine after death, present evident incontestible traces of tubercular disease in the lungs,—not of recent disease, but of a former malady." The facts stated by these accurate pathologists, accord with the result of my investigations, as before stated, (p. 51,)—and from them we are entitled to conclude, that the lungs may not only be the seat of anatomical changes, constituting a chief malady with urgent symptoms—pneumonia, pleurisy or bronchitis; but, that they may also suffer minor anatomical changes without symptoms, supervening upon some malady elsewhere, or accompanying the more prominent disease of the same organ. When, therefore, we discourse of infants recovering from teething, convulsions, pneumonia, or diarrhœa; or of youth recovering from

measles, scarlet-fever, or hydrocephalus, we must bear in mind, that the term *recovery*, implies no more than the relief of the patient from the primary malady, and its prominent or pronounced complications. Latent anatomical changes, supervening without signs, may, with the recovery, return to their natural state, and the whole organism regain its pristine vigour; but it does not necessarily follow that they always do so. The cure of the principal disease does not necessarily imply the eradication of secondary anatomical changes without symptoms; on the contrary, post-mortem inspections demonstrate in the special case of tubercles in the lungs, and elsewhere, that such is not the case. There is then every reason, short of actual demonstration,—which in the living cannot possibly be had,—to conclude, in cases of slow and protracted recovery from the ordinary disorders of infancy, childhood, and youth, not only that secondary anatomical changes have supervened and persist,—but that tubercles are, probably, a form of these changes. When, therefore, we speak of a disease being cured, or of a patient recovering, it is necessary to agree upon what is implied by the terms—cure and recovery. They cannot mean that all the organs implicated in a disease, all the secondary anatomical changes, shall return to their natural state—for in the living body we may presume, but can never know, this really to be the case. The word cure must necessarily be limited to the subsidence of the known symptoms and sympathies of dis-

ease, without reference to anatomical changes which have no symptoms. Hence, himself deceived by the word, the routine practitioner is often taken by surprise, when called upon to treat the scrofulous sequelæ, or secondary anatomical changes of a fever—or some prior illness—which slowly unfold themselves after the departure, or removal of the principal malady; and when probably he had, as he thought, dismissed his patient in health.

The facts here briefly stated, naturally give rise to the following considerations. That, as in the dead, a refined analysis of morbid anatomy proves that anatomical changes are seldom, if ever, confined to one organ alone; and, as in the living, a more accurate scrutiny of the phenomena of recoveries and cures, warrants the same inference;—so, the phenomena attendant upon pulmonary consumption render it at least probable that that malady is not primary; but one consequent upon anatomical changes, of a secondary character, which precede the evolution of the symptoms. Should this be true, important consequences follow. For the previous history of the person, in respect of all former illnesses and cures, with reference to these changes, must become known, before the etiology can be understood, and before a sound basis of therapeutics can be laid down for the recovery.

The Etiology of Consumption, in the point of view here indicated, which separates by long intervals of time, the predisposing anatomical condition, and the

phenomena of tubercular phthisis, is therefore a main topic of inquiry as regards medical treatment, and cannot lightly be dismissed. Let us therefore proceed to examine the subject with that closeness, which microscopical analysis demands.

Of 1000 registered deaths occurring at all ages, 218, or nearly one-fourth, are under the age of one year :— between the age of one year and three, the mortality is 125 per thousand. Between three and five years, the deaths diminish to fifty-one; and between five and ten, they are still less, only forty-seven in 1000.

A more remarkable diminution of mortality, occurs between the ages of ten and fifteen, the deaths amounting only to twenty-seven in 1000. Between fifteen and twenty, the number rises from twenty-seven to thirty-five, being one-third greater than between ten and fifteen.

From twenty to twenty-five, the mortality reaches forty-one in 1000. After these ages there is a decrease, until the age of fifty-five.

These statistical facts prove the greater mortality of the infant and growing, as compared with the adult body; and if the mortality be greater, then upon general principles, the amount of sickness or illness is greater at the same periods.

Moreover, we cannot fail of remarking the great amount of deaths up to the third year; the smaller proportion between the ages of ten and fifteen; and then the rise of the numbers again, between fifteen

and twenty-five years;—the age at which consumption removes so many persons.

Now, putting aside all extraneous circumstances, there are natural and unavoidable causes for the mortality. And if for the mortality, then also for the illnesses followed by recoveries and cures. These we now proceed to examine.

The embryo structure before birth, is nourished and sustained within the body of the parent. The mother's blood holding a relation to it analogous to that which exterior agents do to us, living in the world. The fœtal body has its own blood and circulation; but this must reach the exterior agent,—the mother's blood,—through the placenta, for the continuance of growth. Hence, anything interfering with the mother's health, or altering the morphological properties of her blood, interferes with the well-doing of the fœtal body, upon the same grounds that impure air or improper food does after birth. Therefore the growth of the embryo and fœtus appears subject to two causes of disturbance arising out of the conditions of life. The one, inherent in itself—its own morphological properties and circulation;—the other, external, arising from its connection and dependence on the mother; the inherent morphological defect producing monstrous growths, moles and blemishes; the exterior defect or alteration, interfering with its nourishment,—producing scrofulous disease.

"In proportion," says M. Billard, "as the ovum,

the embryo, the fœtus, and the adult, become more perfect in their organization, their functions undergo changes in a state of health; and peculiarities of symptoms in disease will correspond to the different phases of organization. It is not after birth only, that man for the first time experiences the maladies which afflict his race; their origin must be sought in a remoter source; they commence with organization; and the annals of science present at this day a number of facts which attest that children may be born healthy, sick, convalescent, or recovered from former disease."*

On birth the infant body, perfect in form, is ushered into the world, and its first cry proclaims the commencement of its relations and warfare with exterior agents. At the instant of birth, the air somewhat rudely assails the lungs, rushing into their structure amidst cries and struggles, which denote the awakening of hitherto dormant neurological powers. Shortly after, food is taken; and in six or seventh months the first teeth appear protruding through the gums. At the end of the first year, the child is weaned, and novel articles of food resorted to. At the fifth year, the second dentition is actively progressing; and at thirteen, the important epoch of puberty is impending. These morphological epochs involve functional and anatomical evolutions of an unavoidable kind; and must take their rank amongst the antecedents or causes of dis-

* Vide Treatise on the Diseases of Infants &c., by C. M. Billard, M. D. Translated by Dr. Stewart, 1839.

ease. The first respiration and the anatomical changes connected with it,—the first reception of food, and the first dentition, all occur within the first year of life; and the question is, how the new-born structure will behave under the impression of new stimuli. The answer is given in the Tables of Mortality,—atelectasis, pneumonia, diarrhœa, convulsions, and teething, remove from the world twenty in a hundred before the expiration of the year; and perhaps half the remainder, suffer more or less gravely from some form of illness.

It is well known how large an amount of illness and mortality is occasioned by pulmonary disease; but the natural history of the Lung, as contributing to explain it, has not been prominently put forth.

During the first respirations of the infant, there is not only a great change in the circulation of the blood, but there is sometimes an imperfect expansion of the air-spaces of one or more pulmonary lobules—which remain in the fœtal state in the new-born child. The evil, if of moderate extent, may be surmounted in two or three days by the gradual penetration of air into the unexpanded spaces. If this does not occur, the affected texture becomes hard and dense; and anatomical changes supervene, which for ever incapacitate the undeveloped portion, from performing its natural office. Under these circumstances, the infant may die; or it may struggle against the defect, and at length surmount it or recover. But in the latter case, it is with a

damaged organ; obliterated air-spaces, and perhaps one or more condensed and useless lobules.

The disease, or evil, here described, and termed *atelectasis*,* is usually not distinguishable from pneumonia, except, in as far as, the early age of the infant renders an inference probable; and it is under this latter head of pneumonia, that the mortality, arising from it, is included in the public tables.

When an infant recovers from atelectasis, with anatomical changes, we have no positive proof that the hardened and condensed texture is transformed into, what is called, tuberculous matter; nevertheless, it bears the same relation to the surrounding healthy parenchyma that a tubercle does. And here, let it be observed, that the term tubercle is by no means strictly defined by any author; the meaning of the word not being restricted to the white bodies resulting from previous granulations. By Morgagni, Cullen, Stark, and their contemporaries, it is used to signify any hard and compact matter found in the lungs of persons cut off by consumption; and the descriptions they give, clearly include condensed and hardened lobules; which may have been the remains of an infantile atelectasis, or of more recent pneumonia. By other writers the term tubercle has been understood in a more exclusive sense, and used to denote the small, and sometimes

* From the adjective ἀτελης, imperfect, and the verb ἐκτείνω, I draw out.

microscopical, hard bodies, the remains of pre-existing semi-transparent or miliary granulations; which for the most part are confined to individual air-spaces, or to small groups of them, forming part only of a lobule:—and in this sense, we have used the term. But whether we use the term tubercle in the larger, or more restricted manner, does not vary the argument. Any hard, inelastic mass, rendering a portion of lung impermeable to air, is an anatomical change.

All those, who have minutely and carefully investigated the morbid anatomy of consumption, are agreed that granulation-tubercles are by no means uncommon in the lungs; remaining immersed in the surrounding parenchyma, without visibly disturbing the health of the individual, or giving rise to symptoms. Nor, can there be any doubt that unrecovered and hardened atelectatic and pneumonic air-spaces, when the area invaded is small or limited, do so likewise. And as the former, on subsequent occasions—when new sources of irritation are applied—become foci, or centres, from which retrograde morphological changes spread into the surrounding textures, so also may the latter. This inference is not drawn from vain suppositions, but from facts; for morbid anatomy proves that the recovery of the patient from an atelectasis at birth, or from a subsequent pneumonia, does not necessarily include the complete recovery of the lungs;—does not insure their being freed from the impress of the anatomical changes which have ensued; and my own special in-

vestigations coincide with those of others, to prove authoritatively, that retrograde changes of the parenchyma take place as well around the condensed lobules of an atelectasis, or pneumonia, as around granulation-tubercles ;—that is to say, around the anatomical changes, of a primary, as well as, of the supervening malady. In consumption, it is not the tubercles, the filled-up air-spaces and hardened lobules, which we regard, but the living respiratory texture contiguous; just as in a cavity of the lung, it is not the purulent or tuberculous matter within it, to which our attention and efforts are directed, but to the widening circle of altering texture constituting its limit or boundary. The malady, indicated by the terms phthisis and tubercular consumption, therefore, is not one arising simply, from hardened and useless portions of lung, of any particular kind or special origin ; but, from an altered nutrition,—a retrograde morphology,—with excreting properties in the pulmonary textures around it; so that, whether from an atelectasis at birth, a pneumonia, or granulations supervening upon distant maladies, we arrive at the same end,—a hardened or condensed portion of lung,—a tubercle,—a permanent anatomical change ;—an alteration from the natural, about which, if there is no nutritive activity, there are no symptoms. But, a retrograde morphology is an active change, with the properties of growth ; and with the development of that growth there is an increasing amount of signs.

To the careless eye, consumption may appear a primary malady; but a microscopical refinement of observation proves it to be a secondary or supervening disease. The anatomical state, with more or less of permanency, and therefore without increasing signs, being present, before the springing up of the new growth and its accompanying train of symptoms.

"It is seldom, if ever," says Mr. Mill, "between a consequent and one single antecedent that an invariable sequence subsists. It is usually between the consequent and the sum of several antecedents, the concurrence of all of them being requisite to produce, that is, to be certain of being followed by, the consequent. It is very common to single out one or two only of the antecedents and to denominate them the cause; whereas the real cause is the whole of the antecedents; and we have no right to give the name of cause to one of them exclusively of the others. Thus, if a man eat of a particular dish, and die in consequence, that is, would not have died if he had not eaten of it, people would be apt to say that eating of that dish was the cause of his death. There needs not, however, be any invariable connexion between eating of the dish and death; but there certainly is, among the circumstances which took place, some combination or other upon which death is invariably consequent: as for instance, the act of eating of the dish, combined with a particular bodily constitution, a particular state of present health, and perhaps even a certain state of atmo-

sphere; the whole of which circumstances perhaps constituted in this particular case, the condition of the phenomenon; or in other words,—the set of antecedents which determined it, and but for which, it would not have happened. The real cause is the whole of these antecedents.

"What in the case we have supposed disguises the error of singling out one only of the antecedents, and naming it the cause, is this; that the various conditions, except the single one of eating the food, were not *events*, (that is, instantaneous changes, or successions of instantaneous changes,) but *states*, possessing more or less of permanency, and might therefore have preceded the effect by an indefinite length of duration, for want of the event, which was requisite to complete the required concurrence of conditions; while as soon as that event,—eating the food,—occurs, no other cause is waited for, but the effect begins immediately to take place; and hence the appearance is presented of a more immediate and closer connexion between the effect, and that one antecedent—*the event*,—than between the effect, and the remaining conditions—*the states*."*

Let us apply this reasoning, in conjunction with our conclusions, to the etiology of consumption. If a man be exposed to wet and cold—to scarlet fever or pneumonia; has been to a pic-nic or an assembly, and is affected with consumption in consequence;—that is,

* A System of Logic, Ratiocinative and Inductive. By John S. Mill, Esq. Also Appendix, in the volume on the *Process of Nutrition*, 1843.

would not have had it, if these circumstances had not occurred;—we are apt to say that wet and cold—scarlet fever or pneumonia, as the case may be, was the cause of the consumption. There is not, however, any invariable connexion between wet and cold—scarlet fever or pneumonia—and consumption; but there certainly is among the circumstances some combination or other upon which consumption is consequent; for instance, wet and cold, scarlet-fever or pneumonia combined with a pre-existing anatomical state, remaining from a former malady. What in this case disguises the incorrectness of the expression, is—that the anatomical condition is not an *event*, or instantaneous change, but a *state*, possessing more or less permanency, preceding the effect by an indefinite length of duration for want of the event, or events, requisite to complete the required concurrence of conditions; whilst as soon as the event occurs, no other cause is waited for, but the effect begins,—and hence is presented the appearance of a more immediate and closer connexion between consumption, and wet, and cold, scarlet-fever or pneumonia; than between it, and the prior anatomical state.

There can be no more instructive study, in illustration of these views of the etiology of consumption, and of the imports of the words recovery and cure, than the harmony and conservation of the unimpaired and unimpeded course of nature, with reference to the welfare of special structures under adverse circumstances.

In external injuries—burns, wounds, &c.—if a por-

tion of skin be so much damaged as to be no longer within the pale of vital transformations, (the blood having ceased to circulate in it,) an increased nutritive activity arises in the contiguous parts ;—new granulation-fabrics are established, which grow,—excrete cells and protoplasma,—cast off the useless parts,—and then metamorphose into a fibrous texture, by which the part is healed.

But in the deep interior of the lung, useless parts cannot be thus cast off or discharged ; and it is most instructive to witness morphological phenomena conforming to that which cannot be altered. Instances are recorded of gun-shot wounds, in which pieces of clothing have remained for months and even years quiescent in the lung ; nay even the ball itself has been lodged in the midst of the parenchyma, and after the first conflict of the nutritive powers, nature has accommodated her morphological operations to its presence ; rendering its continuance there, compatible, not only with the continuance of life, but with a fair share of health and strength.

Let us briefly follow the history of such a cure, as substantiated by microscopical investigations. A musket-ball passes through the chest, wounds the lung, and leaves a portion of wadding or clothing behind. If in the track of the ball, a large blood-vessel be opened, the patient bleeds to death. But this not happening, the following phenomena, in appropriate times and stages, occur.

Nutrition—in conformity with the law (p. 44)—is exaggerated in the parts, wounded by the ball, and surrounding the foreign substance. The textures become much more vascular; there is more blood in the part; the alterations extend to some depth in the adjoining parenchyma; and, as a necessary consequence, the structures are swollen, numerous air-spaces being blocked up. These phenomena are comprised in the term inflammation; and life, if not at first forfeited to the passage of the ball, generally succumbs to these,—the primary morphological phenomena. Sometimes, however, recovery takes place. In such cases, granulations discharging pus spring up along the track of the ball,—as in a burn or fracture:—they meet, interlacing with each other; and, the morphology being conformable, at length metamorphose into a fibrous texture, which here, as in other examples, heals the wound. But a line of condensed and altered texture marks the course of the ball through the lung, and the contiguous parenchyma never returns to its pristine condition; innumerable air-spaces being necessarily obliterated or filled up. Nevertheless, we say correctly, that the wound is cured and the patient recovered, notwithstanding the anatomical state which remains.

Should a piece of wadding or clothing remain in the lung, the nutritive conflict is prolonged; the permanence of the source of irritation, lengthens the duration of the secreting fabrics, and it is long doubt-

ful whether the special, conformable, and conservative morphological type can possibly prevail,—the substance remaining. At length, however, the vis medicatrix appears ascendant; the texture, long habituated to the contact of the foreign body, gradually loses its prior irritable property; secreting fabrics slowly metamorphose into a fibrous or serous texture; and the piece of clothing, or even the ball itself, (should it not have passed quite through the chest,) becomes lodged, not as at first, in a secreting cavity, lined with villi or granulations excreting pus, but in a dense, smooth, and glistering fibrous cyst, formed upon the same plan, and under the same laws, as those of a natural and similar class, viz., by the metamorphosis of granulation fabrics, into fibrous-texture. When this event occurs, the discharge of purulent matter ceases; the cough and expectoration also cease; disturbed functions regain a more healthy tone, and distant neurological sympathies subside.

Here again we say the patient has recovered, notwithstanding the exciting cause,—the foreign substance —remains. But, we readily comprehend the qualification which such a fact imposes upon the terms, recovery and cure. To pursue our illustration:—

A person is attacked with rheumatic fever; blood is withdrawn, and a purgative given. The fever and pain in the joints are relieved, but the symptoms of illness remain, notwithstanding; and the physician, rendered cautious by experience, examines stethosco-

pically the region of the heart, and discovers a malady supervening within the chest.

When this is the case, the supervening malady claims more attention than the primary one for the serous textures of the heart and lungs are of more consequence than those of the joints, and they have now become involved in the mischief. If this supervention does not soon subside spontaneously, or give way to remedies, morphological results appear. Granulations or villi spring up, roughen the smooth surfaces of the heart and lungs; the sound of their rubbing against each other is now distinctly audible to the listening ear, and the friction may sometimes be felt by the hand through the wall of the chest.

These new and abnormal fabrics rapidly pour out secretions, and we seek the cure, which consists in the cessation of the secreting properties; a diminution in the number of blood-vessels; absorption of useless elements; and the concomitant metamorphosis of the corpuscular into fibrous textures. The cure may take place, but it probably confines some portion of the lung to the thorax, or unites the pericardium to the heart. These occurrences are very undesirable, but being incidental to the cure, we cannot altogether, and sometimes not at all, elude them. Nature acts by general laws. The cure is the thing sought for, and we thankfully accept it, guarding as far as possible against its attendant evils. In the healing or cure of a burn, the texture of the skin never returns to its na-

tural state. Secretion ceases, and the granulations disappear, but the fibrous cicatrix is a very different thing from the original skin, and may stiffen the elbow, cripple the fingers, or tie the chin to the chest. Nevertheless it is the cure. So in like manner the cure of pericarditis or pleurisy may leave the patient in a very different condition to that in which it found him; —with the constitution altered, and himself requiring much more care, and attention to external events, than was necessary before.

With these facts before us, two considerations arise; —first, there is no difficulty in comprehending the relation between anatomical states and events; nor need we feel surprise that large tubercles or small cavities in the lungs sometimes range in the category of states. As long as the natural textures contiguous to them remain unirritated and nutrition unaltered, no prominent signs of illness will appear. The state preceding the evolution of the symptoms, an indefinite length of duration, until some event, some new cause, a new irritation, or a succeeding malady, completes the required concurrence of conditions; and until then anatomical states,—tubercles, &c.,—are, but consumption is not, present. Secondly, we need not hesitate to admit that consumptive cavities are sometimes cured in the same way, and by the same means that cure the cavity in which a foreign substance is enclosed in the lung, namely by villous secreting surfaces metamorphosing into non-secreting fibrous textures.

In persons recovered from serious wounds, the circumstances remain in remembrance, and *we expect* that such persons will not withstand disturbing events or exciting causes of disease as they did before. But in those recovered from illness — the anatomical changes, which become states, escape our scrutiny, though nevertheless they may be present and alter the constitution. Thus, soldiers who have recovered or been cured of a serious wound in the lung, have been known to pay the forfeit of their life for the first tipsy bout after it—a thing certain to happen if any foreign substance be shut up in the lung—though they might have been drunk fifty times before, without important consequences. So in other instances, exposure to cold, a pic-nic, or an assembly, may produce consumption after a recovery from measles, hooping-cough, or scarlet-fever, which would not otherwise have been produced.

These consequences taking place, because the anatomical states we speak of, are not only subject to the same laws of nutrition as the original textures, but being in a certain sense unnatural, and formed, as it were, upon the spur of the occasion,—they are even more prone than the normal textures to fall back, upon slight events, to the condition out of which they have so recently emerged; to become in fact—more readily than the natural structure,—the *foci* of a renewed retrograde morphology. This is proved by the ready breaking out of new cicatrices upon the skin and the expression, therefore, which we often hear—'a

return of the old complaint,' is strictly and anatomically,—symptomatically and microscopically correct.

" Catamenial irregularities, which disturb and weaken the system; respiration of impure air; habitation of confined places into which the light of the sun never penetrates and in which the air is imperfectly renewed; a life of seclusion; privation of sleep, and a life of anxiety; the depressing passions; abuse of fermented liquors; habitual indigestion; food of bad quality, &c., &c., &c., &c.; all these circumstances, so many sins against hygienic laws, are," says Louis, " considered by authors as predisposing causes of phthisis.

" Assuredly," he remarks, " no one will deny that forgetfulness of all hygienic laws, entails, or may more or less promptly entail, a complete perturbation of the system; and predispose individuals to a great number of acute or chronic affections, and to phthisis among many others. It does not require any very exalted effort of the reasoning faculty to admit a proposition of the kind; the question with which we have to do is a different one.

" This question is, whether forgetfulness of hygienic laws, predispose more to phthisis than to any other chronic disease. The simple relation of a few cases, or even of a great number of cases of phthisis, in which the disease was developed under the most unfavourable hygienic conditions, does not suffice to place the influence of bad diet and infringement of hygienic laws in the position of primary causes,--for we might here

have mere coincidences likely to occur in connection with all kinds of diseases. Nor would it even suffice for the attainment of this object to show, (as M. Lombard appears to me to have very satisfactorily done in respect of the Canton of Geneva) that the development of phthisis is favoured by physical misery.

"It is really necessary, in order to ascertain the special influence of misery, and of the other conditions in question on the generation of phthisis, to compare all chronic affections with each other, and to inquire whether, all other things being equal in respect of original constitution, strength, weakness, age, sex, &c., whether any one of these affections originates more frequently under the influence of infringement of hygienic laws, than under opposite circumstances. It is obvious, that until numerous facts have been collected, comprehending all the conditions which precede the development of chronic diseases, and may predispose to them, any statements made upon the subject can be nothing more than so many assertions without proof to support them. And it is not among the least of the evils attending the dissemination of such assertions, that they habituate the physician to content himself with vague notions, and to admit heedlessly various propositions which are supported only by a little more or a little less probability. What can be more obvious than that the first step towards the real and not the fancied knowledge of the remote causes of phthisis, (and in particular, the influence of those in

question,) must be to ascertain whether the same causes would not entail the development of any other equally chronic disease?

"Many persons have no doubt made the same reflections, and nevertheless I have not thought it right to suppress the expression of them here, because the study of the etiology of diseases is generally undertaken with great levity, even by men of high acquirement. In truth, one would imagine, judging from the manner in which the subject is generally handled, that some slight general knowledge, supported by a little more or a little less common sense, is quite sufficient to fit its possessor for the discovery of the causes of disease, even of those of the chronic class;—in other words, to qualify him for the solution of the most complicated problem within the whole range of pathology." *

"How often do we see children," says Billard, "born with all the appearances of flourishing health, become feeble and sickly from diseases, which attacking them in their early infancy, leave after them organic modifications, which time can scarcely remove, and which in some individuals never disappear! It is perhaps to a congestion or a pneumonia after birth—that short breathing, husky voices, asthmas, or idiopathic coughs, with which some individuals are affected, are to be attributed."†

Since our own attention has been drawn to the sub-

* Researches in Phthisis.—Ante, p. 486.

† Treatise on the Diseases of Infants.—Ante.

ject of etiology in this point of view, we have more particularly observed persons who have suffered more or less all their life from pulmonary affections; and on one occasion our informant expressly stated, that it "was no wonder her chest was weak," for her mother had told her "she was born with a cough."

It is well known how variable is the course, and how often perplexing the complications and sequelæ, of the most common maladies in childhood,—measles, pneumonia, hooping-cough, and scarlet-fever. They vary in their stages, times, symptoms, and intensity. These variations are frequently attributed to occult states of the atmosphere,—malaria, the *constitutio anni*, or to some other external condition. But allowing for the full effect of these conditions, there are residual phenomena unaccounted for. It frequently happens that numbers of children, previously to all appearance in perfect health, become affected by epidemic disorders; enter upon dentition, pneumonia, measles, scarlet-fever, &c., under the same external conditions—at the same time and from the same source,—in the same family, and in the same house. Yet how different the symptoms, stages, and duration of the malady; and how various the complications and sequelæ. Some are speedily cured or recover; others take a longer time: some fall at once into a scrofulous or asthenic inflammatory disease; others linger, and at last succumb to some distant supervening malady. In these cases,—all other circum-

stances and conditions having been estimated,—the residual phenomena can be explained only by the previous history of the child; by difference of constitution, consequent upon anatomical states, remaining from the perfect or imperfect cure of former maladies. And here, let it be observed, that the word *imperfect*, does not refer to any thing which the physician or surgeon could have done better, but to the laws of morphology, by which the cures have been effected. From preceding facts and observations arising from the application of the microscope to morbid anatomy, we feel entitled to draw the following conclusions:—

First.—Anatomical changes or states remain after the cure of wounds and diseases, which possess more or less of permanency, and though not evolving symptoms, yet affect the future health of the person.

Secondly.—These anatomical states are *veræ causæ* for differences of constitution or diathesis,—because the aggregate expression of the whole cannot be the same when important parts are altered. And, in the lung, they are predisposing causes of consumption; because, from an universal law, the nutrition of natural textures in contact with unnatural states, is disposed upon slight events,—to go back to the general, rather than keep up to the special form.

These conclusions establish the necessity of attending, in infancy and youth especially,—not only to the symptoms or phenomena of the chief malady and its attendant complications, but to the time, progress, and

results of the cure. In dismissing a patient from medical care and treatment, no opinion can be accurately formed or expressed, concerning anatomical states without symptoms, remaining from or after the cure. The practical rule in this difficulty would seem to be,—that if, on the recovery of a person—an infant or youth—from a severe malady, the constitution be in any obvious manner changed, the fact is to be accepted as proof of the presence and operation of persistent anatomical changes. What these changes are—when there are no local or special functional signs—and when the person is living, we can go no further than presumption in deciding. But the frequency with which supervening granulations and tubercles occur in the lungs and fibrous textures, as made known to us by inspection after death, in children dying of all diseases, may be taken as a ground of the probability of these changes being a state of that nature. The facts are, that a severe illness has occurred, and a recovery taken place; but the constitution is weaker and more delicate than before. And it is safer, in doubtful cases, as leading to greater watchfulness and care, that our presumption should rather exceed, than that it should fall short of a stern reality. But whilst prepared to look danger in the face and provide against it, there is no need to run into the opposite extreme and imagine every delicate person to be threatened with consumption.

It is a practical corollary from the conclusions just

stated, that the living population, amongst whom the duties of the healing art are exercised, is divisible into two classes,—those with an undamaged organization, and those who bear within them the persistent marks of previous maladies and cures. This division has no reference to sex or age,—or position in life,—rich or poor; but to the structural changes—*the states*—which bygone diseases have from infancy upwards stamped upon the organism.

And here it is essential to the fulness necessary for practical purposes, that another point of discrimination brought out in our researches be borne in mind, namely, between the anatomical states resulting, necessarily, from the most perfect cure;—as the cicatrix of a burn —adhesions of the lung to the wall of the chest in pleurisy,—adhesion of the pericardium to the heart in pericarditis,—opacities of the cornea after ulceration,—hardened lobules in atelectasis, &c., and those supervening anatomical states, of which tubercles in the fibrous, and ulceration of the mucous membranes are types and examples. Both may be *veræ causæ* of a more or less well marked delicacy of constitution; but in the former examples, a conformable morphology has taken place, the texture has made as good a recovery as the case admitted of; whereas the latter are defects, involving the essential anatomical condition of a scrofulous diathesis. Hence, therefore, the weakly or delicate class is properly divisible into two sub-classes, —the one, delicate from the unavoidable results of a

cure; the other, from supervening anatomical retrogradation;—the former, as the general rule, will in future be liable, upon slight events, to asthenic forms of illness; the latter, peculiarly to scrofulous disease and consumption.

Here, then, are anatomical grounds for studying the history of a patient whom we are required to treat; with a view to determine,—whether the organisation be in all important parts sound and undamaged, and the constitution therefore robust; or—whether the structural changes of a former cure possibly render the constitution delicate; or lastly,—whether the defects of a cure, establish the scrofulous diathesis.

In the first class, many events or irritating causes will pass off harmless; and when disorders do occur, they are prompt and regular, easily recognized, and easily treated. In the second class, minor events or irritating causes will provoke disturbances which are tardy and irregular; nutrition in contact with the anatomical changes of cures, being disposed to general, rather than special types. In the third class, retrogradations spring up or supervene, without any noticeable event or adequate external cause, the constitution is scrofulous and consumption probable. And it may be laid down as a general rule of practice, that those active interferences as regards the abstraction of blood, purgation, &c., which may be proper and needed for inflammation in persons of the first class; will be improper and injudicious for those of the other two classes.

But it will be asked, how are we to discriminate in which class a patient is to be ranked? This important question touches upon a point that has already been discussed. There are no broad lines of demarcation in any department of nature, nor is there here between strength, delicacy, and scrofula,—they blend in different individuals into each other. There will in many cases be no difficulty, but others will indeed require patient inquiry and an acute judgment. We cannot smooth all difficulties; a reasonable basis of classification may be laid down, but it is the special duty of the physician, threading his way amidst acknowledged intricacies, to determine as respects the individual. It is not easy, for the most part, to obtain a reliable history of former conditions and illnesses, either from the patient or the parent; all that ought to be remembered is usually forgotten, or so imperfectly recollected as to be of little avail; and we have frequently to deal with obscure cases, and delicate constitutions, with nothing more of service in diagnosis than present *feelings*, whilst it is obvious that much more than present ailments in respect of the etiology of consumption, is essential to establish a valued opinion. Difficulties have sometimes been encountered in making a full inquiry into all the former circumstances of a patient, from the reluctance felt by the individual or his friends to state candidly all they know; or from a horror naturally evinced at being considered scrofulous. This obstacle may possibly be diminished, when it is more generally known

that scrofulous diseases are founded in universal laws, and that all persons are liable to them, if injurious agents be brought into operation, or adverse circumstances be present, during the growth of the body,—that *scrofula* is only a conventional term expressing forms of nutrition below the natural standard; and that the prevention and cure of consumption demand, not only the careful treatment of disease in infancy and childhood, but a correct history of the structure afterwards, with reference to anatomical states and cures.

CHAPTER III.

THERAPEUTICS AND CURE.

"We denounce unto men that they would give over trifling; and not imagine that so great a work, as the stopping and turning back the powerful course of Nature can be brought to pass by some morning draught, or the taking of some precious drug; but they would be assured that it must needs be that this is a work of labour, and consisteth of many remedies and a fit connexion of them amongst themselves. For no man can be so stupid, as to imagine, that what was never yet done, can be done, but by such ways as were never yet attempted."
—Bacon.

During the progress of our researches upon the origin, and morbid anatomy of consumption, we have several times had the question put to us—But can you cure it? And the value of the labour bestowed upon the subject has, for the most part, been estimated by the answer given to this eminently practical interrogation. The same question must now be more or less vividly present to the mind of the reader; and we purpose, after a few preliminary observations, to bring our results to bear upon this important topic.

When persons speak of the cure of consumption,

they very probably speak of the cure of a malady, the preliminary anatomical state of which may have arisen from an accident at birth,—an infantile pneumonia, or a feverish dentition; which may have been increased subsequently, by measles, scarlet-fever, or hooping-cough; but which now, with slow progress, has become a chief malady, evolving signs—cough, expectoration, loss of flesh, and debility. To fly for medical aid, for the first time only, after the appearance of these signs, is to seek assistance at the eleventh hour, and to impose upon our art the difficult task of resisting a great natural law, with but few helps and weakened resources. What then is to be done? First, let us answer:—If we watch the progress, observe the times, and study constitutional changes after the reputed cure, of all severe internal maladies, from birth to puberty, and realize the fact that the preliminary state disposing to consumption may be founded in the cradle,—*we may prevent it.* But what can be done for those now suffering from consumption in its early stage? We must find out the present condition of the lung by percussion, and the stethoscope; by the general appearance of the patient, the pulse, cough, and expectoration. We must learn the characteristics of the constitution and temperament; habits or occupation; and the history of all former maladies and cures. Lastly, we must discover whether removable irritating conditions be still present and operating. And if upon the result of these inquiries, we found judicious measures, and meet

with a hearty co-operation,—*we may stop its progress.* And here it is evident that we are in a better position for succeeding, if we discover removable irritating conditions, than if we find none,—and are therefore driven back to some long existing anatomical state. Hence, the inmates of a prison,—the inhabitants of a crowded city,—the operative working in a heated or dusty atmosphere,—the wretched and miserable,—the poor, ill-fed and half-clothed, have more probabilities of cure than the rich, the happy, and the comfortable, inhabitants of the country. Because in the former, we may have to deal with removable conditions; in the latter, only with prior anatomical states, the patient himself perhaps dating the evolution of the first ascertainable sign from the cure of a fever, measles, hooping-cough, or scarlatina, several months or years ago. Removable conditions being present, the cure may follow spontaneously upon their removal; but anatomical states only being present, the problem of cure is necessarily more difficult. Lastly, we may be asked, what assistance we can afford to those deeply affected with consumption. If we expect to discover means whereby large tubercles may be removed, and caverns healed, so as to be replaced by pulmonary texture, we must be disappointed, for no such cures take place. But if we confine our expectations within the limits of natural laws, we may hope to arrest the progress of a retrograde metamorphosis, by promoting the fibrous type in the secreting walls of cavities. When this can be accom-

plished by art, a state within the meaning of the term cure, has been effected;—concretions,—tubercles,—puckering of the parenchyma,—scars,—fibrous bands,—and cartilaginous cicatrices, may remain, limit the function of respiration, and—as in the case of foreign bodies in the lung before mentioned—alter the constitution; but the accumulation or production of cell-organisms, and the growth of granulation fabrics being abolished, unnatural secretions cease, a life of usefulness is prolonged, and health comparatively restored. Moreover, in the natural history of consumption, relative to recovery or cure, it is consolatory to know, that when persons approach the age of forty years, the morphological activity of cell-organisms, is on the decline, at least in respect of the retrogradation of the pulmonary parenchyma,—so that a disposition to active changes, in the texture surrounding old tubercles, or limiting secreting cavities, is also on the decline; such persons often living—invalids indeed, but yet enjoying life—with all the signs of cavities and tubercles to a limited extent. Cases II. and VI., before related in the chapter on Semeiology, are instances in point; and I have known, and attended persons, for several years, whose constitutional power was greatly lowered by anatomical states—presumed during life to be contingent upon the cure of a pneumonia or pleurisy; but in whom subsequent post-mortem examination has revealed tubercles and cavities in the parenchyma of the lung as the most prominent alterations.

If results derived from microscopical researches be incorporated in the science of physiology, and received in explanation of appearances in morbid anatomy, they must—to be of practical utility—also be admitted into the domain of therapeutics and cure. Therefore, that all things appertaining to our subject, and required by the severity of a minute analysis, may receive appropriate consideration, it will be necessary shortly to recapitulate;—recalling the reader's attention to the more prominent facts and demonstrations contained in the first division of our work.

Popular experience testifies that the cure of a broken bone requires more time, than the cure of a wound upon the skin. This fact is a necessary consequence, —if cures be dependent upon the law observed in the growth of special textures in the embryo; for, elements arising from the reciprocal action between blood and the textures, in virtue of the law of irritation (p. 44), have more stages to pass through, in reaching the osseous, than the fibrous form. It is demonstrable, that the fibrous cicatrix and time, which would suffice to complete the cure of a wound upon the skin, are wholly inadequate to the cure of a fractured bone. Hence, the type to be attained being further removed, the time is longer; and the time being longer, there are —*cæteris paribus*—more chances of interruption or imperfection in the longer, than in the shorter cure.

In an external wound we can see and study events; but in respect of internal diseases we are differently

situated, for we cannot see anything, except through the dark intermedium of symptoms. Under these circumstances, the great practical result of microscopical proceedings, lies in the varied proof they afford of a general law governing growth, disease, and cures; so that a texture—whether external or internal—being wounded or irritated, and the reciprocal action between blood and it, exaggerated or increased—from the same point,—the embryoniform corpuscular or granulation type, branch out either a cure or a disease. A cure if the morphology be conformable to all the standard requirements; a disease if it be otherwise.

Anatomical type, sentient functions, and motor properties are, however, very different in different parts of the body; therefore, notwithstanding the universality of the law—that irritation exaggerates nutrition—special distinctions arise. Thus among others,—from the skin and mucous surfaces, elements, unconformable or too numerous, can be discharged or removed; whereas, from the closed sacs of serous surfaces, or the interstices of fibrous textures, they can be so, only by the agency of absorption.

If we consider with the accuracy required, the events of a burn, we discriminate two orders;—one embracing the external cause, with pain and redness instantly produced by its application; the other—a series of operations dependent upon properties inherent in the injured texture. These last may be enumerated in their proper order as follows:—(1.) the accumulation

of cell-organisms and protoplasma, with enlargement and multiplication of blood currents; (2), the purulent excretion which loosens the edges of the texture killed by the heat; (3), the evolution and growth of innumerable red granulations, which detach the slough. When this last event is accomplished, then, in order that our ideas may conform to natural operations, we must regard the granulations as a form of disease, inasmuch as they are below the type of the fibrous texture on which they appear. (pp. 71 to 84.) Regarding them in this point of view, their history is the history of a disease, and may embrace either, (1), their retrogradation or ulceration—(2), their obstinate continuance beyond the natural time—or (3), their conformable metamorphosis into a fibrous cicatrix. The two former occurrences come within our category of scrofulous disease,—for ulceration is a retrogradation from the granulation; and the granulations are a retrogradation from the fibrous type; the last—the fibrous cicatrix—is the cure.

So likewise, if we consider with the same accuracy, the events of pneumonia, we discriminate, in all respects, analogous operations—(1), the inflammation, or accumulation of active morphological elements, consequent upon the action of the irritating cause; (2), the altered condition of the coats of respiratory capillaries or parenchymatous texture, consequent upon the inflammation; (3), the elements excreted from the coats of the altered vessels, (which are not, as in a burn, cast off, but deposited in the air-spaces,) consequent upon the altered

state of the capillaries; (4), the history of these elements, and the textures enveloped by them, in one of the two morphological, or in the stationary aspect, and consequent upon their living properties.

In the treatment of a burn, we immediately *aid* or assist to relieve pain—calm emotion—and dispel mental anxiety. We then have to wait some hours before it is determined to what extent the irritated texture will answer to the stimulus. If it be only in commensurate proportion, we continue our assistance by simple topical applications, to favour or promote the oncoming granulations, as upon them we are dependent for the separation of the dead part, and the final healing of the wound. But if inflammation be excessive, we *interfere*—diminish the food of the patient, —change our topical applications,—give purges, and perhaps even abstract blood. If the granulations ulcerate and fall away, we interfere to recall their growth; and if they are indolent or stationary, we interfere to stimulate them in their metamorphosis. At first we assist and encourage the granulations; but when the slough has fallen off, our views and intentions respecting them take a new direction; for as the slough has given way before the granulations, so now we expect the granulations to give way before the fibrous cicatrix. If they fail to do so, we treat them as a disease, and witness an instructive example of active interference. Strong pressure, and various astringent applications are used to repel them, and stronger caustics to arrest

their luxuriance, whereupon the fibrous morphology advances with increased rapidity. This phenomenon, which is the cure, being much sooner completed, and often apparently appearing, as a consequence of the decided, and, as it were, hostile interference with the granulations;—so that, by subduing one type, we seem to call forth the energy of another.

In this, and other examples of visible morphology and cure, experience amply proves the influence of outward conditions, and internal agents. Change of air, alteration in diet, and change of ideas or emotions, often accelerating the cure, even of wounds, burns, and fractures; whilst intemperate living, cold, poverty, and starvation, irritating passions, and mental anxiety, retard or arrest it.

From these general preliminary observations,—which open out the relations of medical treatment to cures,—we proceed with the subject of consumption,—first following, analytically, the treatment for cure of pneumonia, as kindred to, and indeed an important part of the special matter in hand.

In the treatment of pneumonia, we interfere to moderate or arrest the inflammation; (pp. 71 to 84;) and then to promote the removal of matter blocking up the air-spaces. The particular measures directed to the former end, depend upon the constitution, social position, and temperament of the individual,—being governed by general principles, operating in every example of inflammation. Sometimes the inflamma-

tory stage of pneumonia is obscure, and we are not called to the patient until all the stages of the malady are established. (p. 82.) This being the case, treatment and cure must be regarded in two distinct points of view;—one with reference to the textures and morphology; the other,—the individual and symptoms.

In the texture, cure follows inversely the order of progression of the malady. First, by natural subsidence,—expenditure of elements, or medical interference,—the exaggerated activity between blood and the texture ceases,—no more new elements accumulate;—consequently the first, or inflammatory, stage of the disease ceases. There then remain, the altered coats of the vessels, and matter blocking up the air-spaces. This matter,—termed by pathologists *hepatization*, because it increases the density of the lung,—may be entirely or only partially removed; or entirely removed in some parts, but not at others; in which cases the structure entirely or partially recovers, accordingly. When it is entirely removed,—whether by expectoration or absorption,—the air-spaces are again rendered pervious to air,—the coats of blood-vessels are restored to their normal state,—air-tubes cleared of their accumulated secretions,—natural functions resumed, and both the individual and the texture in the most stringent senses of the word, recover. When it is not entirely removed, the individual may recover, inasmuch as the symptoms recede until no more remain; but the texture is not recovered; obstructed

air-spaces, altered blood-vessels, and small, condensed portions of parenchyma remain. Viewing this incomplete removal, with reference to morphological laws, the ulterior events may be either tubercles, cure, or consumption.

If matter filling up the air-spaces, is devoid of any morphological activity, and does not irritate the surrounding parenchyma, the individual has tubercles in the lung; not as the result of prior granulations, but as a sequel to pneumonia. If the elements of the matter undergo the fibrous morphology, the textures implicated, become gradually more coherent, tougher, and more elastic; and contracting in dimensions, as all new fibrous textures do, they occupy less space; abnormal blood-vessels disappear; and useless elements are absorbed; but the mark or cicatrix is left upon the lung. Lastly, if the elements establish new growths, then the textures implicated, instead of becoming more tough and coherent, become softer and more incoherent, —cells accumulate,—blood-vessels are altered in character,—new ones arise,—and granulation fabrics spread. The energy of the new elements overcoming the properties of the natural structure.

Of these two forms of morphology, the former, or fibrous, according to analogy in outward wounds, is (where absorption does not speedily restore the texture to its pristine state) the desired occurrence;—it proclaims the right direction of the morphology; a non-secreting and simply ministerial texture is in progress

—uncomformable secretions are arrested, signs of disease diminish,—and the physician's expectations are fulfilled. There are, however, exceptional examples, where pneumonia or pleurisy has been so distressing, or so extensive, that the cure itself becomes a prominent evil, a bronchiectasis, an emphysema, or an extensive series of adhesions. Such evils, in the severest cases, we can scarcely hope to avoid, for we cannot go beyond the cure of nature. Our admiration, however, as in the example of the wounded lung, is here often excited by the display of natural resources; unexpected adaptations take place, the wishes and desires of the patient are brought down to the level of the weakened part; active exertion, and disturbing passions are instinctively shunned,—and thus health—a delicate health it must be—is restored and maintained. But if, in the example of a burn, the surgeon be frequently required to prevent or obviate the injurious influence of the cure,—the newly-formed fibrous cicatrix,—upon the function or uses of the neighbouring parts, to which the influence of its connexions has extended, how much the more, does it not behove the physician to watch the influence of his cure, and to study the constitutional changes, after the formation of an analogous new texture in internal organs.

Differing from these events, the corpuscular or retrograde morphology, presents us with a different picture. New secreting textures establishing themselves,

make other things conform to their requirements, and instead of being arrested by, they advance upon, the natural structure. Nature, in this case, pursuing her general, to the exclusion of the special course, the inherent vis medicatrix fails, consumption is in progress, and the patient without help, and without resource,—except from the expedients of science, and the interferences of medical art.

But let us recapitulate the facts.

When the inflammation—using the term in the ordinary sense—of pneumonia has ceased; or when granulations supervening upon another malady, have been stopped in their growth, the phenomena resolve themselves into one of four heads:—(1), *absorption* of unconformable materials, and the perfect restoration of the structure to its pristine condition and natural function; —(2), *persistence of unconformable elements*, which having no morphological energy, remain quiescent in the parenchyma, and constitute the anatomical state with more or less of permanency, to which the term *tubercle* has been appropriated;—(3), *the fibrous*;—and (4), *the corpuscular or retrograde morphology*.

The first of these events, is a perfect cure, both the texture and the individual recover. The third, is a conformable cure, the texture recovering by a fibrous cicatrix, the marks of which remain. The second event is a partial or incomplete cure, tubercles being present in the lung. And the fourth event is the disease under our consideration—*consumption*. The per-

fect cure (1) depends altogether, and the fibrous cure (3) in great measure, upon absorption of useless elements; the partial cure (2) indicates want of absorption; and abnormal growth (4) is the opposite of absorption. From this analysis, it is evident the objects we seek to obtain in the treatment of consumption, are absorption of useless elements, which would remove tubercles; and the arrest of an abnormal growth, which would cure consumption.

When, therefore, by any means—the vis medicatrix or medical interference—the growth of semi-transparent granulations, or the inflammatory stage of pneumonia has been stopped; the practical question is, whether the matter remaining will be absorbed,—undergo the fibrous metamorphosis,—remain stationary and form tubercles,—or spread in the form of growth, and demand special measures of interference to oppose and obstruct it.

It sometimes occurs, as an accident, that persons coughing or straining rupture a small blood-vessel in the membrane covering the front of the eye-ball; upon which blood escapes, diffuses itself in the interstices of the texture, and the eye is said to be *blood-shot*. This accident, though sometimes apparently formidable, is usually not followed by pain or inflammation, and the occurrence is noticed here as an example of the resources of normal textures in removing useless elements. In two or three weeks the redness disappears, the eye resuming its natural aspect; and it is important in

relation to consumption, the reader should know, that SPONTANEOUS ABSORPTION is a common event within the pale of the properties of healthy structure. It is by this process that the swelling of a sprain or a gland, the colour of bruises, and the excess of matter surrounding the union of the fragments of a broken bone, is removed; and it is also by this process, that air-spaces in the lung are re-opened to the access of air.

Absorption,—in the therapeutical sense—and growth, are, however, two distinct things; the one implies extension, the other diminution. It needs no argument to prove that the properties of extension and diminution cannot both appear at the same time; the continual production of cells, upon which growth depends; and the multiplication or enlargement of blood-vessels attending it, must be stopped, before absorption necessary for cure, or diminution can take place.

One of the results of our microscopical analysis, is that the constituents of disease, whether classed as inflammatory or scrofulous, cannot be set down in a single category under the head of effusions or exudations; on the contrary, it establishes a clear and undoubted distinction between *exudations* whose elements have no co-operative energy; and *products* whose elements are actively concurring to establish a new growth or fabric. The particles or elements of the former, as in the accident to the eye just mentioned, may be absorbed without supposing any intermediate operation; but those of the latter must have the properties they

possess in furtherance of extension or growth destroyed or arrested, before a diminution arising from absorption can take place. Pathologists may have overlooked this distinction, which microscopical anatomy brings prominently forth. An undivided attention to exudations or effusions, and to the phases which elements may experience in a reciprocal action between blood and the original texture, to the exclusion of the other side of the question,—the accumulative energy of elements, co-operating to establish an extending growth,—is, as if we were to regard the purulent excretions, and neglect the granulations of a burn;—or, in consumption, to look to tubercles and cavities of the lung, exclusive of the condition of the parenchyma surrounding them. But, if it be demonstrated that scrofulous disease and consumption are species of growth, and if, moreover, it be evident that absorption and cure cannot appear, whilst that growth continues, then the intention of the physician in respect of treatment for the cure, comprehends hostility and interference with growth, as well as hygiene and assistance to the person. The object being to stop the production or increase of cells, and destroy the co-operating energies by which the vascular system extends beyond its natural bounds; so that they disappearing, the fibrous morphology, in which both cells and blood-vessels diminish, may succeed.

Facts, relative to interference with health or the production of disease, have already, to some extent, en-

gaged our attention in the chapter on Psychology, and it is susceptible of various illustration. External or internal agents operating in excess or deficiency, health declines, and disorders arise. We have now to speak of the same doctrine or principle, in relation to therapeutics and cure,—where external and internal agents are brought specially into operation, in order that disease may decline, and health be restored. Let us examine the grounds and relations of this doctrine, with such examples as occur, in illustration.

If we look around us, we see on every side, the phenomena of animal life, maintained by life; the welfare of one species secured by the destruction, or at the expense of others. And it is a remarkable result of the application of the microscope to the study of physiology, that it demonstrates an analogous fact, in respect of the living body itself; morphological life being clearly maintained at the expense of the cell-elements of particular organs; so that a disposition on their part, not to conform in time and manner, to the necessities of the whole structure, is a form of disorder or disease. There is no question, for instance, respecting the anatomy of the alimentary canal, nor any doubt that nutrition, and the welfare of the body, depend upon successive ranks of cells performing their appointed functions in appointed times, and then disappearing from the field, to be succeeded by others of the like kind. Purgative agents may be beneficial or otherwise, according to circumstances, but in any case, they are in-

terfering and hostile to the elements of the texture upon which they operate; and the question of their benefit or injury to the individual depends upon whether the cells or secretions, which the purgative removes, are engaged in natural functions, or, lagging too long upon the texture, interfere with the more active ranks of cells beneath. In the former case, purgation is unnecessary or injurious; in the latter it is beneficial; but in both cases (and this is the point we have now to regard) the purgative agent is hostile and interfering in respect of the elements of the texture upon which it acts.

In the treatment of external maladies, it is the ordinary practice of the surgeon to interfere boldly with ulcerations or granulations standing in the way of cure. The interference is not the cure, but it opens the path for it, by a very decided hostility to those conditions which obstruct it.

In the disease of the eye termed *cataract*, we see the surgeon unhesitatingly plunge his needle into the interior of the organ—break up and disturb the elements of the opake lens: thus interfering with a structure, that itself interferes with vision; and the operation being effected, absorption removes the diseased elements. The phenomenon of absorption does not occur, whilst the diseased elements maintain their co-operation and relations, but when these are broken up, it then commences energetically.

A much more forcible example of the doctrine of

interference in relation to medical practice, is seen in the disease termed *iritis*, where the action of mercury in the sense of an interfering agent, is visible from day to day through the transparent cornea. We *see* abnormal textures suddenly arrested in their growth, and useless materials absorbed, at the moment when the remedy is beginning to display its interfering properties, in other ways, by disturbing natural growth, producing salivation. The only possible way by which, in this example, the remedy can reach the new growth, is through the medium of the circulating current; and the remedial action of mercury in iritis, is a *glaring instance* of a poisonous agent subduing abnormal growth, and suppressing unconformable morphological co-operations, thereby enabling the conformable energies of absorption to come into play.

In medical practice, we cannot see therapeutical operations, as we do in surgery,—but we infer the beneficial action of our remedies, when the progress of the symptoms is arrested, and especially if they rapidly decline.

The agents employed in the treatment, in their relations to healthy textures and functions, may be properly classed in the list of poisons; and indeed, it is a result of microscopical investigation, that in order to be beneficial, they must, in a certain sense, partake of that character, inasmuch as they are employed to stop diseased growth or the co-operation of elements leading to it; and thereby promote the removal of such as

are abnormal. The principle upon which, in cases of internal disease, this is effected, before materially disturbing healthy functions, appears to be, that the diseased growth has the embryoniform type, is the youngest, or last formed,—the tenderest, or most succulent, and being abnormal, is the farthest removed from the accumulated conservative powers of the whole organism—so that it is the first to fade and sink away upon the presence of unsuitable conditions,—of alterative agents taken for the express purpose of its removal.

Case.—A lad, aged 17, of delicate constitution, and subject in infancy to inflammatory croup, was attacked with symptoms, considered indicative of an ordinary bilious disturbance. He had some cough from the first, but not so severe as to cause any anxiety on the part of his medical attendant, until some days were elapsed, when, from the severity of the symptoms, it was evident the anatomical conditions of pneumonia were making rapid progress. On the sixth morning from the commencement of the symptoms, the patient was seen for the first time by the physician, who found him raised up with pillows; a countenance pale and anxious; pulse 130, and respirations 60 in a minute; the whole surface bathed in perspiration, and the alæ nasi in rapid motion. On examining the chest there was dulness on percussion over the posterior portions of both lungs; and over the same space, the respiratory

murmur was extinct. This combination of signs indicating the existence of pneumonia in the stage of hepatization, and threatening suffocation, treatment suitable to the emergency was at once adopted.

Leeches were applied between the scapulæ, followed by a blister, and the following medicines prescribed ;— *Hydrarg. Chlorid. gr. ij ; Antimon. Potass, Tart. gr.* $\frac{1}{8}$ *; Opii. gr.* $\frac{1}{4}$ *;* in a pill, every two hours. *Ammoniæ Sesquicarb. gr. viij.* every four hours in *Decoct. Senegæ.*

For the first three days of the treatment there was no obvious change, but it was evident the patient did not lose ground, a matter under the circumstances sufficiently encouraging. On the fifth, the general aspect was improved, the respirations only 40, and the pulse 100 in the minute: vesicular murmurs appearing, where before they were quite extinct. As the mercury purged the bowels, it was discontinued, and mercurial dressing instead, applied to the blister.

On the sixth day, the patient was considerably better ; salivation appearing ; on the eighth day, salivation was well pronounced,—pulse 90, and the respiratory murmur was now heard fully to the base of the right lung.

On the thirteenth day the respirations and pulse were at the natural standard ; and food was taken with appetite. On carefully examing the chest, the left side was observed flatter than the right, and it measured less by nearly an inch ; it had less extent of

motion in breathing, but air was heard penetrating to its base upon causing the patient to take a full inspiration. From this period recovery proceeded steadily without interruption.*

In this case of pneumonia it was demanded as quickly as possible to call in aid the natural resources of absorption, and this the mercury appears to have effected upon the principle we are endeavouring to enforce,—upon the same ground as in examples of iritis; destroying properties disposed in furtherance of growth, and thereby promoting the dissolution of the link obstructing absorption.

Case.—A married woman, aged thirty-nine, unable to walk or even to stand without support, applied for relief from difficulty of breathing, a very bad cough, copious expectoration, and swelled legs. The tongue was coated, she was dreadfully emaciated, the pulse 100, and the ends of her fingers were observed large and incurved. She stated—she had always been troubled with a cough in winter. Three months ago, she had severe pain in the side, with much more cough than usual; she was at that time very ill, was bled, had medical attendance, and could not leave her bed for six weeks. The pain abated, but her breath-

* See the case fully reported by Dr. Ranking in the Provincial Medical Journal, May 17th, 1848.

ing has been almost daily getting worse, and now for the last three weeks she has been unable to lie down in bed, or get any sleep;—the cough is incessant, and she feels herself weaker every day.

Upon examining the chest, respiration could scarcely any where be heard, being replaced by various crepitations and mucous râles, and on both sides there was extensive dulness on percussion. These signs, with the miserable aspect of the patient, and the quick pulse, left scarcely a hope of benefit from medical aid. She was ordered to apply a blister between the shoulders,—and the following alterative treatment by mercury was adopted.

Pilul. Hydrarg. ss.
Pilul. Scillæ comp. ℈j.
Pilul. Sapon. c. Opio. gr. xij.

to be divided into twelve pills; one of them to be taken three times a day.

Linim. Hydrarg. Comp.

to be rubbed in over the front parts of the chest night and morning,

In four days, she expressed feeling relief from the remedies; the breath was better, the cough easier, and she made more water. As the mercury did not purge her, and there were no indications of its interfering with any natural function, except in respect of the urine, it was continued. Three days afterwards, she was still improving, and in three more, was able to walk without help. There was now, too, an evident

improvement in her appearance,—the pulse was slower, the breathing easier, the cough and expectoration less, she ate with appetite, could lie down in bed, and get to sleep. I was surprised at the amendment. On examining the chest,—dulness on percussion was the same as before, hardly any respiratory murmur could be heard, and the crepitation and râles, though less prominent, were still present. She had continued taking the pills, and experienced no other effects from the mercury than those embraced in the improvement described. It was therefore continued, but in diminished quantity, a pill twice a day, and the liniment only at night. Precautions were given in case salivation should be appearing. At the expiration of a fortnight, a further improvement was noted; and in a month, she relinquished all medicine, returning to her usual employment. On examining the chest at this period, there was still dulness on percussion, and absence of respiratory murmur over extensive portions of the lung, both before and behind. The recovery of the patient was satisfactory, but the cure of the texture imperfect. And the inference was,—from the previous history,—that the recent illness arose from inflammatory disease — pneumonia, bronchitis, and pleurisy, supervening upon old standing anatomical states.

The alterative had done its duty in respect of the recent inflammatory products, whereupon the textures

had returned to their prior state. This is one case amongst many others we have seen, of the curative action of mercury, without any salivation, or inconvenience from the remedy. But, notwithstanding the cogency of these facts and analogies, we can scarcely imagine any one venturing to propose, simply upon the results of microscopical investigation, or the analogy of surgical interferences, the employment of internal agents, because they are in any sense injurious; nor could we have placed practical reliance upon the fact, that new growths being embryoniform, and the most recent, would therefore be influenced by alterative agents, before the more natural and longer formed structures are materially disturbed, as a sufficient ground for the employment of many of our remedial agents. But when universal experience has already decided the point, that things which are poisons in health, are remedies in disease, there need be no hesitation in declaring that microscopical analysis and medical interference with active alterative agents, confirm and illustrate each other. The alterative, or if you will—the injurious agent promoting the welfare of the whole structure, by interfering with the growth of an unconformable part. In the two cases we have related, the agent fulfilling the alterative indication was mercury. Of course the question might be raised whether the patients would not have recovered—simply by hygiene and assistance, without the drug;—and the period at which we are penning these

lines, may be favourable to discussions upon this point. We shall not, however, waste time by arguing with the sceptic, because nothing can be produced but the recovery ;—this we think sufficient to establish the efficacy of the medicine, if not, at all events it answers the alternative,—of injury presumed from its use. For in both cases, the patient was so rapidly approaching death, that we can scarcely conceive an additional source of mischief added to those embraced in the malady—without speedily producing the event we endeavoured to avoid ; the recovery therefore may, with reason, be attributed to the action of an agent, which it is impossible to imagine, could have been either neuter,—or injurious in respect of the welfare of the individual.

It is no objection to the doctrine of therapeutical interference that it demands a *clear distinction* between the effects of the alterative, in respect of the texture on which it operates, and the individual, because food and purging also require it. And so again, to pursue the general principle, the morphological phenomenon termed cure, requires analogous distinctions in respect of normal and abnormal textures. In the natural secreting textures, health is maintained by a constant succession of cells—and the most important forms of scrofulous disease derive their characteristics from a succession of analogous elements or cells. The continuance of the function of a normal corpuscular texture, depends upon the continuance of

this succession;—but the cure of a scrofulous disease depends upon its cessation;—wherefore, an agent effecting the same thing, would be a poison or a remedy, according to conditions and circumstances. The fibrous morphology,—unduly appearing and interfering with the succession of cell-elements, in a normal corpuscular texture, is as injurious to the welfare of the individual as a poison; but duly appearing in like manner, in an abnormal corpuscular texture, it is the cure. And as the granulations of a burn, are at one time a stage of cure, and at another a form of disease; so the fibrous morphology is a disease in a natural corpuscular texture, but the cure in an unnatural one. Therefore, morphological types being healthy or diseased, according to appropriateness in time and situation—so an agent inappropriate to the conditions of health, becomes appropriate, when misplaced morphological types have to be altered.

Something might here be said respecting the idea we attach to the word poison; but without entering upon a long discussion, it is evident,—if a person, reading a letter, or from passion, falls down in a fit and dies,—we might as reasonably argue against reading letters—or the utility of the passions—as against the therapeutical use of external agents, simply on the ground of their being poisonous.

We have already had to ask attention to the impossibility of drawing precise lines of demarcation in any natural investigation,—and the impossibility is the

more apparent from microscopical analysis. This meets us here in respect of hygiène, alteration, and interference. A purgative alters a function, increases secretion, and leaves the texture upon which it operates in the same morphological state as before. But in the cure of consumption, we demand an alterative that shall promote a change of structure, and alter a morphological type ;—that meeting with an unnatural cell-growth, shall arrest it—and give opportunity for the vis medicatrix—absorption and the fibrous cure—to come effectually into play. Abstinence from food and bleeding are alteratives,—they interfere with nutrition,—and cure inflammation, because inflammation is an exaggerated form of nutrition,—but experience decides that they will not cure scrofulous diseases or consumption,—having no special control over an embryoniform growth. On the other hand, mercury, arsenic, and agents of the like nature, readily interfere with, and stop growth. If they meet only with normal growth, and stop it, they are poisons, but if they meet with unnatural growth and stop it, they establish the preliminary of a cure, and are therapeutical. And experience decides that such agents may be so watched and guarded in their operation, as to become remedies without materially disturbing healthy functions. Water, is a hygienic agent necessary to health, we know ; that it may be rendered an interfering one by excess, is a consequence of the principle we are discussing,—and 'the crisis' spoken of by water doctors, is upon their own

showing a water-malady. When this has been produced, whether in the shape of "carbuncle, boils, cutaneous eruptions, an attack of fever, or diarrhœa," the hope or expectation is, upon intermitting hydropathy, that the vis medicatrix will cure not only the water-malady, but with it also, the real or fancied disease. We admit the fact that water may be used as an alterative,—and range within the pale of therapeutical agents, in conformity with medical practice; its alterative properties being analogous to those of purgation, abstinence, and other simple hygienic agents.

It has been said there is a fashion in medical practice, and so indeed there is, for therapeutical indications spring from social habits,—and at this moment,—a fashionable life and late hours,—give scope for the curative properties of fresh air,—plenty of water,—early hours,—free exercise, and mental relaxation. But we doubt the honesty of those, who, declaring before the public, the all-sufficiency of a water cure, have at hand homœopathy, mesmerism, and medicines, to fall quietly back upon, in what they call "exceptional cases."

Were we required to state shortly the general principles of therapeutical art, we should say they are comprised in the words—aid, alteration, and interference.

Aid, or assistance, to every morphological process which is expected to end in cure or healing; altera-

tion, to all functional disturbances; and interference, or hostility, to every morphological process which, if permitted an unchecked course, leads to retrograde change of structure, or to growth diverging from the special to the more general form.

Our aids, comprehending everything conducive to regularity or health;—our alterations, embracing the sphere of hygiène, with simple remedies;—but our interferences taking in more potent agents—the special province of medical or surgical art—having in view the security and welfare of the individual, by stopping the progress of abnormal growth.

In all cases of illness, watchfulness and care, judgment and experience, are expected on the part of the medical attendant. But neither alteration nor interference are needed,—(1), where adverse conditions are not present;—(2), where the reciprocal action between blood and the texture is no more than commensurate with the work required to be done;—and (3), where the stages of a conformable morphology are proceeding accurately in type and time; in other words, where cure is going on. On the other hand, they are demanded—(1), where adverse conditions are present;—(2), where the reciprocal action between blood and the texture exceeds or falls short of its commensurate bounds;—and (3), where morphological operations are retrograde, unconformable, or inappropriate.

The structure of the lung has been analytically described, with reference to consumption; and we have

now to consider it synthetically with reference to therapeutics and cure.

THE LUNG is an aggregate of lobules,—and a lobule, though not larger than a pea, has its own parenchyma, air-spaces and capillaries, its arteries, veins, air-tubes, and indusium; in other words, its mucous, serous, fibrous, and corpuscular textures;—and we may confidently assert, that neither tubercles, nor consumption, are discoverable by functional signs in the living person, until more than one lobule has been invaded and destroyed. Indeed it may be laid down as an universal rule,—for which we are indebted to microscopical research,—that no structural change can arrive at the stage evolving signs, and demanding medical treatment, until after it has drawn within its influence, not one only, but all the species of texture, entering into the composition of the miniature subdivisions of the diseased organ; each of which has its own appropriate elements and function.

Tubercular consumption, destroying a pulmonary lobule, does not destroy a simple uniform texture, but a miniature lung; and, extending along air-tubes, has,—before it is ascertainable,—its relation to bronchitis; extending in the direction of arteries and veins, it has its relation to phlebitis;—advancing upon the lobular indusium, it has its relation to pleuritis;—and it has these relations superadded to the special character, a disease of the parenchyma and capillaries. The same facts apply to pneumonia, they are inseparable

from the structure of the organ. Therefore there can be no unmixed phthisis or pneumonia, in respect of therapeutics; the slightest case of either disease, in a semeiological point of view, being anatomically, and really very complex. We have seen, when simple inflammation invades the textures of the lung, and the first stage has ceased,—that natural resources—summed up in the terms vis medicatrix, carry on and complete the cure, (p. 235.) Redundant, unconformable elements,—albuminous, fibrinous, and fatty;—cells, protoplasma, molecules and granules, are present in great quantity;—they fill up the air-spaces,—enter the air-tubes—lie in the interstices of the fibrous textures,—in the coats of capillaries, arteries, and veins, occupying, in fact, every vacancy in the structure;—but during cure, they all, either conform to the requirements of the natural textures, or re-enter the circulating current by absorption,—their removal in this way, being a very essential part of the cure,— the phenomenon by which the organ is enabled to resume its function. Hence in *simple* inflammation, it is therapeutically demanded on the part of the medical attendant, that he should aid in stopping the exaggerated reciprocal activity between the blood and the textures; which being accomplished, inherent and natural resources perform the rest of the cure,—by appropriate morphological changes and absorption.

Had consumption been a disease of the like nature, similar events would have followed the exercise or

employment of similar means, whether inherent and spontaneous, or extrinsic and medical; and an exaggerated reciprocal action between blood and the textures —by whatsoever term we designate it—ceasing, useless unconformable elements would in like manner be absorbed and the organ recover. Facts however prove this not to be the case, the natural structures from the first betray their weakness and insufficiency in furtherance of cure; for though abnormal nutrition or inflammation be stopped, there is notwithstanding, neither absorption of useless elements, nor an appropriate morphology, to complete the cure.

We have anxiously investigated these circumstances, in every stage of consumption, and we find them prominent in all; cavities in the lung have been described, (Case 1, p. 55,) some with red, vascular, villous walls, others with white, dry and brittle ones. In the former,—during life,—growth or secretion was evidently active, and to this activity, the order of progression in the symptoms was due. In the latter,—during life,—growth had ceased, blood-vessels had diminished or disappeared,—but we have no evidence either of absorption of useless elements, or an appropriate morphology to complete the required conditions necessary to the recovery of the organ and the individual.

The most cursory post-mortem examination, renders the facts obvious, that as originally, when granulations cease to grow or extend, they degenerate into crude

tubercles, which are neither absorbed, nor conform in any way to cure; so throughout all stages of the malady, when larger granulation groups, and the walls of secreting cavities cease to extend, they likewise change into tuberculous matter. Tubercles may be seen in the lung not larger than a pin's head, (Plate 4,) and there appears no reason, in their form, size or nature, why the useless elements of which they are composed should not have been absorbed. In normal constitutions, we know that bone and cartilage are absorbed, the heterogeneous matter of pneumonia, pleurisy, chronic swellings, and abscess, absorbed, and after the operation for cataract, or the exhibition of mercury for iritis, we see flakes and shreds of matter absorbed, even when floating in the aqueous humour of the eye. Why then should not tubercles be absorbed, and cures perfected in consumption as in other instances? This question we are unable to solve,—and are therefore compelled to regard the two phenomena,—failure of absorption, and non-appearance of the fibrous morphology—as ultimate facts which we can no more account for, than we can for difference of complexion or of colour in the hair or eyes. But being present, important distinctions arise in relation to therapeutics and cure, for they prevent the hoped for result of our treatment. Should our remedies succeed as they do in inflammation—interfere with growth and stop the extension of disease—still absorption and conformable energies failing, cure does not go on.

These characteristics of consumption have been attributed to tuberculous matter *circulating* in the blood, but the microscope throws doubt upon this interpretation, inasmuch as it discovers nothing of the kind there. Elements of growth or nutrition, derived from blood,—not meeting with a conformable reciprocal energy on the part of the natural textures, and not being absorbed, change into tuberculous matter; but this fact is not equivalent to the idea of such matter existing in the circulation. Patients suffering from consumption, begin to fall away, before the respiratory function is materially circumscribed; and they sometimes die of the disease, with a larger available area of lung, than is possessed by those recovering from pleuro-pneumonia. Such occurrences are not explicable upon the hypothesis of tuberculous matter circulating in the blood; but are reasonably accounted for, if consumption be a new growth, which extends by the expenditure of elements adapted for the sustenance of natural structures, so that the more it flourishes, the more the individual wastes away; and growth being arrested or expended, but absorption and the fibrous morphology failing—elements then change into tuberculous matter.

Microscopical anatomy points out in consumption three practically distinct conditions or states—granulations, tubercles, and cavities. Granulations (plate 3, fig. 9,) are the primary forms, and may be present without tubercles;—growth preceding the stationary

state. Granulations and tubercles may be present without cavities,—but cavities being consequent to tubercles are scarcely, perhaps never present alone.

GRANULATIONS may be few and grow slowly, supervening upon some more prominent malady elsewhere; or numerous and arise quickly, not only over extensive areas of the pulmonary parenchyma, but also at the same time, in other analogous fibrous textures. Case IV., related in the chapter on pathology, is an instance in point, and we have seen many others of a like nature. In these cases, after death, granulations are visible to the unaided eye upon the serous surface, but a special investigation, aided by a lens, is required for their detection in the spongy texture, and amidst the congested vessels of the pulmonary parenchyma.

When granulations arise rapidly and extensively, symptoms make progress with corresponding rapidity, and the malady is urgent. The patient has cough, hurried respiration, a small frequent pulse, a dry, red, or brown tongue, more or less decidedly pronounced paroxysms of fever, with a clammy skin and hectic flushes. This aggregate of signs indicates to the experienced eye an asthenic form of malady,—which a stethoscopic examination proves to be chiefly in the parenchyma of the lung,—the constitutional disturbance sometimes assuming the type of low fever. After death, the lungs present various slight adhesions to the costal pleura; great multitudes of

semi-transparent granulations and small nodules of soft tuberculous matter in the parenchyma; the neighbouring respiratory capillaries being congested. In these cases, interfering treatment is urgently demanded, with judicious nursing; for if recovery take place, it is usually slow and protracted. The patient should be placed in a warm, airy apartment, out of which carpets, boxes, and spare clothes ought to be removed. After attending to all that may require to be amended in regard to the secretions; and having premised such moderate abstraction of blood by local means, as may be demanded to relieve respiration, we commence counter-irritation on the skin, and push our interfering remedies—mercury, antimony, opium, &c., according to indications and the ascertained strength of the patient;—scarcely ever in doses larger than one-sixth or one-twelfth of a grain, but repeating them every two hours—or *every hour*, if symptoms be urgent—the object being not to excite either purging or sickness, but to effect the entrance of the remedy into the circulating fluid, so that before disturbing any natural function, it may interpose to weaken the energy of abnormal growth. The activity of these agents—or others of a like nature—must be supported by tonics, nourishment, and hygienic precautions, looking at all times to the whole state of the patient, mental and emotional, as well as morphological, for regulating our procedure.

We formerly regarded these cases as typhoid or

asthenic pneumonia, but we now coincide with Louis in recognizing the acute form of phthisis, inasmuch as the anatomical character of the disease—granulations—is only an intense degree or amount of the primary stage of consumption. And it must be borne in mind by the medical attendant, in treatment and prognosis, that though the lung is the chief seat of the malady, yet anatomical changes of a like nature may be creeping on in analogous fibrous textures elsewhere. If the recovery of the patient be long protracted, we may be morally certain that tubercles remain, and if upon grounds apart from the illness, consumption be apprehended, the person should be watched and cautioned, as one belonging to the class (p. 219) in which deficiencies of cure establish a constitutional delicacy, treatment of which comes appropriately under the head of tubercles. Normal growth, the process of healing, inflammation, and scrofulous disease, being analogous operations, traceable by microscopical analysis, to a reciprocal action between blood and texture, so that from the same point may branch out either a cure or a disease (pp. 65, 70, 73, 227, and 228); it follows necessarily that the primary phenomenon—or commencing points—of an unconformable morphological action in the pulmonary parenchyma, must be the same in all cases; and the question whether in its progress it will evolve as simple inflammation (*pneumonia*)—or a scrofulous disease, (*granulations*)—appears determinable more by properties inherent

in the structure, than by qualities in the elements of blood. In pneumonia, neurological sympathies are more intimately associated with morphological operations, than in the acute form of phthisis; there is, if we may so say, a more active alarm, and this appears referrible to properties in the textures. It would seem impossible for healing to go on in one part of the body, and disease in another, if the qualities of blood were solely the source of distinction between inflammation and consumption. Intercurrent inflammation may arise, and be cured in one part of the lung, at the very time consumption is making steady onward progress in another; this could not happen, were the distinctions between inflammation and scrofulous disease attributable to a state of blood.

Inflammation—pneumonia for example—is, as we have seen, met and combated by a strong vis medicatrix, and exaggerated action being arrested, cure follows,—useless elements are absorbed, conformable morphological operations commence, blood-vessels resume their former condition, and textures their former functions, it being this series of curative phenomena that renders the term inflammation in contradistinction to scrofulous disease appropriate. Therefore we conclude phenomena of pneumonia to be a result of special energies, neurological and morphological, in the invaded textures, appropriately disposing of elements arising from exaggerated nutrition. Of course we know that cases occur in which persons

die of pneumonia, but here special conservative energies must decline before that event take place; and when they decline, the conditions are the same as those constituting asthenic or scrofulous forms of disease.

On the other hand, scrofulous disease is from the first opposed by weaker constitutional energies, and there appears room, if we may so say, for the general species of growth—(*granulations*)—to establish itself and assume distinctive characters; the natural structures succumb before it, and should a happy combination of events arrest its course, there is still, on the part of the natural structures, at best only a slow and tardy recovery, because of the inadequacy of absorption and the fibrous morphology. It is these phenomena that render the term phthisis, or acute phthisis, morphologically appropriate, and the symptoms experienced by the patient, distinguish it during life from pneumonia. In the latter, our remedial interferences have special reference to exaggerated action of blood upon the textures, because this ceasing, the textures recover of themselves; but in acute phthisis, our remedial interferences have reference to a new growth, which must be stopped before natural textures are in a condition to recover. These *points*,—growth and absorption—warranted by microscopical anatomy, and indicated by symptoms, must be present to the mind in treatment; precise rules cannot be laid down; inflammation and scrofulous disease in their early state are not distinguishable from each other, even when closely scrutinizing morbid

textures after death ; much less can we expect precision to be marked by symptoms in the living ; it is the major or predominant that appears,—and tact and experience are our guides.

In acute phthisis, the lung, in its character of an individual organ, is invaded, and the disease, if not speedily arrested, causes death, because no large part of the respiratory area can be destroyed and life continue. But the presence of tubercles in persons to all appearance in health, proves that several miniature lungs may be destroyed without functional disturbance; and it is the long, apparently stationary interval, the state without symptoms, intervening between the malady from which tubercles date, and that afterwards consequent upon them, which creates difficulty in diagnosis and treatment, because it breaks the thread of a history which is really continuous.

The illness,—atelectasis, pneumonia, or granulation, in which tubercles form, is treated and dismissed as cured by one practitioner,—tubercular irritations following, fall perhaps as a new disorder under the notice of a second,—and consumption afterwards appearing, is witnessed and combated by a third ; the maladies seem to be distinct, whereas there is in fact a continuity,—a relation of antecedent and consequent between them.

A microscopical examination of a finely injected lung after death, proves that air-spaces, air-tubes, and blood-vessels next to tubercles, are not in their natural

state;—and our researches indicate nutrition, during life, in textures continuous with, or ending in a tubercle to be abnormal,—chronic diseased action, though limited, always fretting around tubercles. That is, where tubercles are present, there is a constant encounter between qualities or properties already founded in the pulmonary structure and the general embryoniform growth, which there is reason to believe advances deeper into the surrounding parenchyma, when the body is suffering from any other malady, enfeebled by unfavourable external conditions, or depressed by psychological influences; but which, such causes ceasing, subsides again to a state of comparative quiescence, though probably to a larger area than before. (Cases III. and IV.)

It is correct to say in respect of the individual, that tubercles do not constitute consumption (p. 77), inasmuch as they are often present without any of the signs of consumption, or any order of progression in the symptoms (Cases I., III., and IV.); nevertheless it is also true, in respect of the textures, that tubercles being present, diseased action is also present around them. Special functional symptoms,—cough, pain, and expectoration,—and the physical signs of consumption, do not indicate a new thing arising, but are at length the sensible phenomena of a long series of previous changes. (p. 144.)

Analogies between growth and structural disease

extend not to one or two only, but to all points. The embryo body, in which life resides, is at first invisible to the naked eye, and is exceedingly complex as soon as it is visible. So likewise the same is wholly true in respect of disease. Wherefore, then, the *idea* practically appropriate to the whole subject,—physiology, pathology, and medicine,—growth, disease, and therapeutics, is as follows, thus:—

Nutrition and growth arising in the embryo,—organs, members, and functions, afterwards appear; so likewise, abnormal nutrition and retrograde growth arising, disease and symptoms afterwards appear, —and symptoms disappearing, altered textures still remain to be cured. That is to say, the activity of life commences in material elements not cognizable by the senses,—the first sensible or prominent form does not indicate the first flow of the action; and in pathology and medicine, symptoms do not indicate the beginning of disease, nor does their disappearance necessarily imply the end of it.

This general exposition affords opportunity for more fully explaining what otherwise might appear incongruous or obscure. The statement of a phenomenon or fact in physiology or pathology, must be tested by rules prevailing in other branches of demonstrative science, and may be true or incontrovertible so long as it embraces all the circumstances known to our limited experience; but it may be no longer true or con-

formable, when the boundary of knowledge has been enlarged by a new analysis.* Thus, in post-mortem examinations, disease may be pronounced absent, judging by the eye alone; but the statement tested even with a common lens may prove to be incorrect. Indeed, we very often read accounts in which it is said, "there were no tubercles in the lungs," and not unfrequently the statement has been made the basis of very important inferences and conclusions; whilst what would be found by a more diligent examination, not only remains undetermined, but would probably, with a little more care, be reversed.†

Microscopical investigations thus not only affording reason for doubt, but reversing the decision in respect of negative assertions, when the parts themselves are actually before us to see and handle,—how much the more cautious ought we not to be in forming negative conclusions, when the living person is, as it were, in our hands? *Semeiology* and *Diagnosis* are very essential departments of medical science, but they would lull

* Various references might be made in illustration of the important principle here involved; and we may particularly mention Sewell's *Christian Morals*, and M'Culloch, who in his *Discourse on Political Economy*, quotes the MS. *Lectures* of Dr. Cullen upon the same point.

† We can scarcely here be accused of pushing the argument beyond its proper sphere, when it is easily demonstrable that the unaided eye necessarily answers *negatively* to what even a simple lens shows in a very *glaring* manner, may be affirmed *positively*. (Pp. 103, 104, 105.

us into a fatal security, were they not to keep pace with the advance of knowledge in collateral directions, or were not to be studied in conformity with established facts. Most certainly, at all events with respect to tubercular consumption, we commit a grievous error, and let slip the most promising period for help or assistance, if at the critical age, because no specific signs can be elicited from the chest, we pronounce negatively that no disease is present, and act upon the decision so as to neglect precautionary measures to meet and arrest it. Therefore, it is a safe rule—one appropriate to the subject, viewed in its microscopical bearings—when the signs or symptoms of granulations are prominent, that we conclude tubercles to be present;—and when these are present, that cavities are forming, our presumption ought to exceed, rather than fall short of the truth. Of course we do not say, to those unprepared by previous study and investigation, that consumption is present, when there are no prominent specific indications; nevertheless we bear in mind, that improvement in methods of treatment for prevention and cure, can spring only from an early conformity in all points to truths elicited by an extended analysis. (Pp. 104, &c.)

Tubercles constituting the condition, and symptoms having no order of progression; the general appearance and history of the patient,—scrofulous swellings or ulcerations externally,—the tardy healing of wounds by a thin unhealthy cicatrix,—slow recoveries from simple

maladies, and other circumstances, to be specially investigated, are guides in diagnosis and treatment. Children have tubercles in the lung without making any particular complaint; and persons approaching the adult period, complain not of the chest, but of "a relaxed throat,"—"a hem,"—"an obstruction,"—"weakness,"—"stomach and bile,"—of "an asthma,"—or "indigestion." (Cases I., II., VIII., and IX.)

Children, after *their* recovery from illness, are very often sent back to school before *the textures* have had time to be firmly cured; here physiological functions and constitutions are treated as fixed values, and many unfavourable circumstances are crowded together,—an impure atmosphere,—inattention to the state of the excretions,—bodily inaction,—emotional vexation,—mental toil, and perhaps an inappropriate diet; all of them conditions rendering school an unfit place for delicate children recently recovered from a severe, or irregularly pronounced malady,—cure having probably to be completed after the disappearance of the symptoms. It does not fall within our province to reconcile the demands of society, in respect of fashion or education, with laws of growth, disease, and cure; but when they are opposed to each other, it is certain, if we would avoid the penalty, that human arrangements which are alterable, must give way to ordinances which are fixed. We have purposely entered school-rooms, both in the metropolis and country, when scholars disperse at noon, and we have often found the

dark and murky air of the Strand or Cheapside "a bouquet" to the poisonous mixture which has there assailed us. It would be profitless—for the subject has been exhausted—to dwell upon pure air,—the light of heaven, wholesome diet, cleanliness, bathing, sponging and friction; healthful exercise, joyful emotions, and mental relaxation, on the one hand, to be commended; or impure air, heated rooms, tight lacing, deficient or improper food, dirt and poverty, on the other, to be avoided. But bearing in mind the difficulties of the subject we have in hand—consumption—its insidious beginnings,—the long apparently stationary state,—the inherent disposition to retrograde growth,—want of absorption, when useless elements have congregated,—and failure of the fibrous morphology,—we do urge it as a safe and practicable rule of treatment in the maladies of youth, where there has been unusual severity,—irregularity of progress —unexpected symptoms, or prolonged recovery, that two months at least be given to watching and hygiene, and if necessary, appropriate alterative remedies; so that after the disappearance of symptoms, the textures may have time to complete their cure. A person with a fractured leg may be so far recovered, as to have no other symptom than that he cannot use the limb; and if at this time he act imprudently, he may retard or prevent the completion of cure. So analogously with internal maladies, symptoms may have disappeared, and yet cure not being completed, unfavourable con-

ditions may retard or prevent it, and bring back a scrofulous disease.

No prominent or commanding success has hitherto attended any of the reputed remedies for consumption; and microscopical anatomy, like a beacon, warns us not to rest our hopes of security upon the best devised methods,—when granulations, tubercles, and cavities,—inflammation and scrofula co-existing, have rendered semeiology and diagnosis easy, by confounding all natural distinctions of structure. On the contrary, it admonishes us to look for more success, by narrowly watching the period of recovery and reputed cure in the ordinary maladies of infancy, childhood, and youth; and judiciously carrying out a plan of alterative treatment in what is popularly termed "a delicate state," when semeiology and diagnosis are difficult. If *external conditions* only are the antecedents of this state, therapeutics will be easy, because hygienic alterations without medicine are curative; the patient freely exposed to light and air, with plenty of food and exercise, a happy mind and no cares,—gets well of himself; but where *inherent resources* are prominently in fault, or where hygienic alterations and simple treatment do not produce the desired salutary effect, the life of the patient depends upon the specific influence of some active medicinal, or alterative agent.

All outward agents ranking as *vital stimuli*, act as tests to the body, some appropriately to one organ or texture, others to another. Thus light which affects

the eye, has no effect upon the skin, and sounds which arrest the ear are inappreciable by the eye. So analogously with respect to those particular articles or agents used therapeutically, some act specifically upon one organ or species of texture, others upon another. And it is now to be especially noticed, in relation to practical questions, that the action or phenomena of medicinal agents corroborate and exemplify the quadripartite basis of classification,—*inorganic*,—*morphological*,—*sensual*,—*and intellectual*, which we have assumed as most appropriate to a physiological and therapeutical view of the phenomena of life. For alcohol, and agents of the like nature, intoxicate before they benumb the senses; opium, and narcotics stupify the senses—lull pain and produce sleep without intoxication; and mercury, with its congeners, produces morphological or structural alterations without either insensibility or intoxication. It is upon the general principle, that special phenomena in special textures and functions, follow upon using special agents, that the physician's art is founded; and we frequently conjoin preparations of opium or henbane with those of mercury, antimony, or lead, because in urgent cases—as in those just related, in haemoptysis, &c.—we appear to obtain more readily the required morphological alterations by, at the same time, appeasing neurological sensibilities. It is of no consequence—considered simply in the light of a scientific hypothesis—whether we view with Oken the long series of animated beings

as so many successive grades of organization, whereby a principle of life is brought by various material superadditions into more and more extensive relation with the powers of external nature, and thus regard the human organism as the last and crowning link of the chain ;—or whether, with other men, we look upon the wide sphere of external nature as specially adapted to the requirements of the human race. Upon either view, we may regard the potent agents which surround us, or which the powers of mind extract from the womb of nature, as adapted to our daily wants, in sustenance and diet, or as remedies for disease.

In life we recognise physiologically, three normal states,—structural, emotional, and mental; pathologically, three abnormal conditions,—organic disease, hysteria, and insanity; therefore therapeutically, three methods of treatment,—medicinal or dietetic, educational, and moral. A new physiology arises with age in the person,—and new pathological conditions and symptoms with age in the disease. In infancy, fretfulness and irritability,—in youth, temper and emotions,—and in older persons, habits, opinions and occupation must be therapeutically regarded as well as the structural disease. (Vide Chap. on Psychology, pp. 85—130.)

The term *alterative* in an extended signification may be applied to any agency administering to changes connected with the functions of life. In this sense, moral treatment is alterative in mental disorders ; firmness and correction, alterative in emotional dis-

turbances,—and hygiene and medicine, alterative in organic disease. But as in physiology all distinctions incorporate in the unity of the individual, so, therefore, pathological conditions, and therapeutical means, must be relatively discussed and enforced.

The predominant phenomenon of whatsoever kind, must be dealt with in reference to the oneness of the subject in structure and person—its unity, physiologically and psychologically. In treatment for the cure of insanity, emotions and bodily functions must be considered; in the treatment of hysteria—regard must be paid to trains of thought and structural conditions; and organic disease must be opposed by a suitable attention to the diathesis in temperament and mind, as well as in bodily constitution.

These general truths run throughout the whole extent of the subject, and you cannot therapeutically interfere for cure in the simplest external scrofulous ulceration, without reference to conditions in the liver and intestinal secretions, nor treat surgically a scrofulous tumour or joint, without an active and intelligent regard to the state of the lungs. And lastly, no one can meddle, with a view to adjust any of the many links of life, without attention to diet, air, and climate.

ALTERATIVE MEDICINES employed to arrest disease, and promote absorption, must be regarded as dietetic agents, inasmuch as it is intended they should enter the circulating current, and thus reach the seat

of the malady. Tonics, purgatives, narcotics, and agents, hostile to the progress of growth, may all find therapeutical application, under the varying circumstances surrounding an organism, so full of distinctions as the human body. But, as these agents have no appropriate employment in health, so therefore,—as remedies, – we give them in exceedingly small proportions, narrowly watching their influence, and repeating them according to the state and age of the patient, or the form and character of the disease. The sensible effect we expect from them, is not—except in the case of purgatives or emetics,—a pathogenic one upon natural textures, but a gradual improvement or abatement of the symptoms, which constitutes the evidence of the decline of the disease. When this appears, we diminish the quantity of the remedy, or repeat its exhibition at longer intervals; and experience has long convinced us, that very minute doses of a specific alterative, frequently repeated, are therapeutical, promoting cure, where larger ones at longer intervals defeat the intention. This is especially true in that early state of consumptive disease, to which our researches show remedial measures ought to be directed.

Many persons evince idiosyncrasy with respect to articles of food,—some things agree with one, and disagree with another; so also with medicine,—some individuals will receive marked benefit from those agents which others cannot bear in the least degree. An

idiosyncrasy or peculiarity of this kind, may be properly styled dietetic, or morphological, to distinguish it from those singularities equally remarkable, and exhibited by individuals in respect of emotion or sensitiveness ;— those, for instance, who cannot bear a cat in the room, or who go into hysterics upon the sight of a spider ; and also from others who are peculiar upon mental grounds, —dwelling exclusively and morbidly upon one cherished idea. There being clearly morphological, emotional, and mental idiosyncrasies, in accordance with the principles of our classification, which, though not properly coming within the province either of pathology or medical discipline, lie very close upon their confines. Emotional and mental idiosyncrasies, often demanding modifications in the treatment of structural disease ; and a dietetic or morphological idiosyncrasy requiring consideration in both food and medicine.

No general rules can, of course, be laid down upon this head, where the terms of the consequent are tripartate and variable ; but in the prophylactic treatment of phthisis, when one medicinal alterative disappoints us, another must be had recourse to, for scrofulous disease, advancing in the lung, cannot be safely left to nature and hygiene, or cure trusted to what is called— " strengthening the constitution."

The functions of life, psychological, sensual, and nutritive,—intellect, irritability, and secretion, are all sustained or administered to, from a general source,— a current of embryoniform elements—the blood ; and

when degenerate growth, or scrofulous disease, is in progress, two series of actions, drawing their materials from the same source, are going on, in different parts, at the same time,—namely, the functions of life and retrograde growth.

Such being the case, a problem of difficulty occurs, to promote and encourage the one, at the very time we oppose and obstruct the other. In the solution of this problem,—or the accomplishment of both these ends,—we recognise the physiologist and talented practitioner, with whom it is often an anxious question to determine how far cure, or the putting down disease, may be trusted to hygienic alterations; or with how little active medicine, salutary treatment can be conducted. Persons accustomed to breathe the pure air of the country, and following healthy occupations, are not benefited in a hygienic point of view by confinement to bed, or the air of a sick-room; but there is a numerous class of poor, who find in the resources and comforts even of an hospital, changes powerfully contributing to cure, which, it is needless to say, it would be imprudent to disregard in medical practice; and we feel convinced, were the bath, ablution, and ventilation more attended to, that in this smoky metropolis, the additional expenditure would, in hospital practice, be saved in medicine and diet, by a more speedy cure and dismissal.

Case.—A little girl, twelve years old, was placed

under treatment for scrofulous ulcers at the back of the leg, near the ancle, and glandular swellings on both sides the neck under the chin. The previous history was as follows:—three years ago, having been before in good health, she had scarlet fever, and afterwards complained of pain in the hip. Shortly, a swelling appeared at the back of the leg, which was opened, matter discharged, but the wound has not healed since. A year ago, she had influenza, and whilst in bed with this complaint, the swellings began at the sides of the neck, and ulcerations at the same time broke out around the old sore on the leg. No complaint was made of the chest, nor was there any mention of cough. Yet on comparing the two sides, a difference in the percussion sounds and in the respiratory murmurs was perceptible. This being the case, therapeutical measures were proposed with a view to the condition of the lungs, rather than of the visible malady. The hygienic treatment comprised cold ablution, and friction to the surface,—fresh air,—exercise,—and relinquishment for a season of all scholastic duties—with suitable diet. The medicinal alteratives consisted of alcalies—a light decoction of dulcamara,—iodide of potassium, and blue pill in doses $\frac{1}{20}$th of a grain. The simplest topical applications only were recommended to the outward affection; it being a rule of our treatment—in all cases of external scrofulous disease (not implicating bones or joints) where the lungs are in the least degree ascertainably affected, to trust for cure, rather to those

general alteratives applicable to the internal disease, than be anxious for the more speedy removal by topical means; for when there are elements in the blood disposed to administer to degenerate growth, the cure of such growth in one place by topical applications, may probably give increased liability to its appearance in another; whereas cure effected by constitutional remedies is more likely to be a result of the disappearance of the disposition altogether,—the outward sore really operating as an issue, in the surgical sense, and being let alone—as regards active interference—its cure becomes an important indication.

At the expiration of three months all outward appearances of disease were removed—and the sounds of respiration, and upon percussion, were much improved. Therapeutical measures—hygienic and medicinal—have, at intervals, since been had recourse to upon precautionary grounds, and now six years having elapsed, the young lady is in perfect health, and no difference can be detected in the sounds on the two sides of the chest.

The daily routine, adopted during the first month of treatment, was nearly as follows:—sponging and friction in the morning; breakfast at half-past-eight; medicine at ten; a walk, ride, or drive; medicine at one; dinner at two; exercise and amusement; medicine at four; tea or supper at six; biscuits and water, if required, at nine; medicine at bed-time. From twelve to fifteen full or deep inspirations were also

directed to be taken as a means of exercise three or four times a day. Season of the year—May.

Case.—A young lady aged seventeen, was placed under medical care and treatment for irregularity of the catamenial function,—indigestion,—pain at the pit of the stomach after eating,—" cold feet,"—and " nervousness." The tongue was clean—the pulse weak but not frequent,—and the countenance pale. An outward manifestation of former scrofulous disease was noticed in a puckered scar at the side of the neck. Twelve years ago she had measles, and the scar is the remains of a tumour which formed after them,—burst, discharged matter, and healed very tardily. A year ago, she suffered much from tooth-ache,—the pain disordered her health,—and she has been ailing ever since. Upon further inquiry, she has no cough, nor has she any uneasiness or pain in the chest, beyond that at the pit of the stomach after eating. On examination, an inspiratory and expiratory murmur were both distinctly audible at the summit of the left lung, there being no expiratory sound at the corresponding place on the other side. There was also a harsher character, in the inspiratory sound in the left axilla, than in the right. The hygienic treatment in this case comprised fresh air and active exercise—brisk friction in the morning with a wet towel, and the hip-bath at noon. The medicinal alteratives were Plummer's pill—aloëtic decoction—infusion of dulcamara and chalybeates.

At the expiration of about a month, the symptoms *complained* of were removed, but not so the signs within the chest. Change of residence, and perseverance in medicinal alteratives were therefore recommended; and at the expiration of three months an alteration for the better was noted. Three years have now elapsed, and the expiratory murmur can no longer be heard in any part of the chest, nor is any difference perceptible in the percussion sounds on either side. The daily routine for the first three weeks of treatment was as follows:—friction with a wetted towel, and short walk before breakfast; breakfast at nine; medicine at ten; walk, ride, or drive; luncheon, and hip bath, from one to two; medicine at two; exercise, amusement, or occupation, at discretion; medicine at five; dinner at six; medicine and bed at ten. With respect to diet, we are never anxious to simplify it for scrofulous disposed persons; on the contrary, we place as much wholesome variety before them as is reasonable, and allow them to follow the bent of their own inclinations, interfering only against excess in quantity, or perseverance in the use of any article that obviously disagrees. It is a rule of nature that the diet of the higher or complex animal structures should be heterogeneous, and, as it were,—chemically speaking,—of incompatibles, so that great changes may be speedily accomplished. If we observe cattle feeding, we see them grazing, not indeed indiscriminately upon all the herbage that comes before them, but upon at least twenty

different species of plants of the most various qualities, sweet, bitter, aromatic, carminative, astringent, sour, and oleaginous. And if any one carefully note *all* the articles entering into the diet of the healthy and robust, in easy circumstances—particularly the chief meal, dinner,—it must be evident that complexity is more natural than simplicity. Nutrition in respect of diet, is not conducted upon the principles of chemical compatibility—quite the contrary; and much error has, we are convinced, been committed by too great a simplification.

Case.—A young man, aged sixteen, applied for relief from a chronic eruption on the arms, and at the bend of the elbows, which had existed, resisting various topical applications, for two years. The tongue was clean, the pulse natural, bowels regular, and sleep good, except when disturbed by itching. In answer to inquiries, he said there was nothing else the matter with him,—he had no cough, nor pain anywhere,—he seemed surprised at questions being asked him about his chest. On examination, the percussion and inspiratory sounds were both dull on the right side below the collar-bone. At the expiration of a fortnight, the patient left his residence, and I did not see him again for ten years. He then returned,—complaining of weakness, loss of appetite, and pain across the back and shoulders. To inquiry, he answered, that he had been apprenticed to a linen-draper,—was now an

assistant in the shop, but had come home for rest and change, under his present indisposition. The eruption before complained of, had ceased to trouble him, only three years since. Upon examining the chest, there could now be no doubt of the signs of tubercles in both lungs; and on being pressed with the inquiry, he reluctantly acknowledged to a *little* cough. The hygienic treatment comprised, relinquishment, for a time at least, of his situation, temporary residence in a mild climate on the coast, exercise in the open air, a milk diet with whey for drink, friction with a coarse towel night and morning, and good nourishing food. The medicinal alteratives—were Brandish's alcali,—decoction of taraxacum and dulcamara,—sesquicarbonate of iron—and blue pill in doses $\frac{1}{20}$th of a grain. Also the use of a liniment (one part Liniment. Hydrarg., and two parts Liniment. Sapon. comp.,) at bed-time, to the front parts of the chest and under the arms. These remedies were varied, intermitted, and resumed from time to time; and now, eighteen months having elapsed, he is in all respects so much improved, that he purposes returning to his employment.

Case.—A young woman, aged twenty-three, came under treatment for 'want of circulation,' 'weakness,' and 'obstruction.' No complaint was made of the chest, nor was any symptom mentioned relating to the lungs. On examination, however, there were clear indications of structural change. A course of treat-

ment, soon removed the prominent complaints, upon which neither herself nor her parents could comprehend the ground of necessity for further medical interference. 'As there was nothing now to complain of, she only required to avoid catching cold.' Her services were very useful in the family, and required in the management of household affairs. During the space of three years, I occasionally noticed her with much interest, occupied in her duties. At length she came to me for advice, complaining of pain in the back, and leucorrhœa, which had been coming on gradually for some weeks;—she looked ill and was thin. But even now no complaint was made of the chest, though on inquiry I found she had cough and expectoration; and on examination, the signs of advanced consumption were unequivocally pronounced.

Cases corresponding in material points with these, are daily occurring in extensive practice, and if we study them carefully in connection with those, of fatal issue, before related in the chapter on Semeiology, we must admit they corroborate results drawn from a microscopical analysis of the morbid textures. The whole proving that the essential anatomical condition of consumption commences before the appearance of functional signs or symptoms,—and modifications of the respiratory and percussion sounds, before the complaints of the patient. So that—as previously stated—the primary malady may fall under the notice of one practitioner,—the intermediate *state* under that of another,

—and the last result, consumption, be witnessed by a third. These conclusions being admitted, it appears only a measure of justice, that medical art should have the credit of promoting cure, in a greater number of instances than is usually supposed. Cases of pronounced consumption being—as it were—*a remainder* of the far larger number, in whom the pathological condition has existed. Nor can this conclusion be considered confined to consumption, extending, as upon general principles it does, to retrograde growth in analogous textures.

With respect to the causes or elements of cure, we follow the reasoning of Mill, and consider *cure* as a consequent, resulting from the sum of the several antecedents, hygienic and medicinal, employed in the treatment. "And we have no right—philosophically speaking—to ascribe it to one agent exclusively of the others." In the first case alcalies—mild mercurial alteratives, and Dulcamara;—in the second, Plummer's pill, Dulcamara, the hip-bath, and chalybeates; and in the third, sesquicarbonate of iron, blue pill, and mercurial frictions, were clearly prominent as adjuvants; and we believe them to have been so, upon the general ground set forth in the cases before related. (pp. 240 to 247.) Medicinal alteratives, restraining the activity of morbid growth; hygienic treatment, corroborating natural functions; and cure being consequent upon the whole interference. If—with respect to ordinary practice—we compare the sources of difficulty encountered in treatment for cure, we shall find them prepon-

derating in the hygienic department. There are no persons debarred from medical advice and medicines, for if their own resources fail, the portals of a charitable institution are open to them; but removal from an unhealthy or uncongenial atmosphere—change of climate, relinquishment of the business of life, and appropriate recreation, are within the reach of comparatively few. And how often have we felt that these are things necessary to give their true value, or proper efficacy, to specific alteratives. A remedy has frequently disappointed us,—when administered whilst all the circumstances under which the disease arose, still surround the patient; and then succeeded according to our wishes, when employed in conjunction with appropriate hygienic alterations.

A broad and general *principle*, such as we have laboured to establish in the philosophy of disease—namely, the LAW OF RETROGRADATION, would be expected, if true, to bear the test of the closest scrutiny. Throughout preceding pages, we have been careful to illustrate it in every possible way; first,—by a microscopical analysis of the morbid textures in consumption; secondly,—by the phenomena of cure in burns, wounds, and fractures; thirdly,—by serous membranes during inflammation, falling back to the prior grade of mucous or quasi-mucous textures; and lastly,—of mucous membranes degrading into incoherent cell-organisms. It remains now to review certain synthetical facts bearing practically upon the subject—

and further corroborative of the conclusions at which we have arrived.

When viewing the circulation of blood, in a transparent texture of the living animal, two distinct abnormal or morbid conditions—congestion and accumulation of colourless elements—are observed. You may see CONGESTION occur suddenly—last for a little while, and then gradually disappear before the activity of the circulation in neighbouring parts. During congestion, blood-vessels and capillaries are crowded with red elements,—all motion or current is stopped—and when—congestion ceasing—the circulation is re-established, it may be noticed that the inner boundary of the vessels has the same outline which it had before;—this observation illustrating a remark made in the last paragraph of page 75, and warranting the conclusion there stated,—that retrogradation of texture, is not a result of simple congestion.

ACCUMULATION OF COLOURLESS ELEMENTS is a very different phenomenon. The red current flows freely on, it being colourless particles only, which congregate and remain stationary; and these, mingling with elements previously forming the walls of the vessels, alter the type of the texture. (p. 41.) Accumulation of colourless particles may be readily produced by injury or irritation, and the phenomenon watched for several hours. And when accumulation ceases, the congregated particles are either received again into the circulating current,—the parts affected resuming their prior

condition,—which is equivalent to absorption and cure; or else disposed of in accordance with morphological laws—in conformable or unconformable growth, or secretion.*

Phenomena of congestion, and accumulation of colourless elements are recognised coexisting in the pulmonary textures of the human structure in all lung diseases, upon simple inspection after death; it is well known that symptoms indicate their presence during life; and we assume it to be admitted that microscopical observation (divested of all technical character) is applicable in explanation of complex phenomena.

Now colourless elements are (microscopically) very conspicuous in blood, administering to the primary architecture of the body, to a process of cure,—and to the progress of disease. It is well known too that the matter of granulations, tubercles, and pneumonia—apart from the colour given by congestion—is white or colourless. Hence there appears no need to look to any other source than the circulating current, for the elements of retrograde growth. Dismissing then from consideration the class of effects due to congestion, let us trace those of the other-mentioned condition.

Colourless elements unduly accumulating, and blood-vessels concomitantly altering in type, with excreting properties, appear as primary phenomena or events

* See *Narrative of Experiments* in the Appendix of the Second Series of EXPERIMENTAL RESEARCHES. (Ante, p. 79.)

common to granulation, tuberculosis, and pneumonia; —that is to say, to acute and chronic phthisis and inflammation; and though these forms of disease may be modified by co-existing congestion, or unusual rapidity of circulation, they have the essential characteristic here described, notwithstanding. Whilst on the other hand, colourless elements ceasing to accumulate,—blood-vessels diminishing in calibre and number, with a fibrous morphology, and absorption, are the cure. In other words, colourless elements accumulating, and blood-vessels altering their type, throwing out new matter, is a species of growth,—which in proportion as it spreads rapidly over extensive, or slowly within limited areas, so in like proportionate manner, disease assumes distinctive or recognised features,—scrofulous or inflammatory. But, when accumulation ceases, growth ceases; whereupon the conformable or unconformable disposal of the accumulated elements—with absorption or non-absorption of superfluous, useless matter, give rise to the distinctions of *perfect and imperfect cure.* In primary normal growth, it is impossible, with the best microscope, to discriminate the elements of the embryo of one animal, from those of another, widely different both in habits and species. Moreover, in the same embryo, the primary cell-groups, typical of future organs, have so uniform an aspect, that it is impossible, from any microscopical character observable in the cell-elements themselves, to tell which will issue in the growth of nerve or

muscle, or which in the growth of skin or lung. Analogously in retrograde growth, the characteristic features of disease do not arise immediately upon the grouping or accumulation of the primary cell and protoplasma elements, but from morphological changes and dispositions subsequently effected; so that when phenomena proceed rapidly, and spread extensively, the form is speedily announced, and *disease acute;*—but when they are slower or limited to spots or points, the form is longer in appearing, and *disease chronic.* And as it would—upon very intelligible grounds—be *wrong* to apply the distinctive nominal or appellation, of the perfect animal, to the uniform cell-groups, out of which it emerges; so upon the same ground it is *right* to distinguish the primary cell-grouping, or accumulation preceding every kind of growth, from those prominent retrograde forms, which we recognise in morbid anatomy under the terms—granulations, tubercles, exudations, false-membranes, ulceration, and hepatization. This distinction is therapeutically important in chronic scrofulous disease, for as, physiologically, the perfected form, or perfect animal, resists influences and agencies which would stop growth in the embryo; or, as in inflammation and growth necessary for cure in wounds and accidents, we are very careful not to disturb its primary stages;—so, upon the opposite view, there are many remedies, hygienic and medicinal, promoting cure in the early embryoniform condition of retrograde growth which an established nosological malady defies.

United efforts fail to eradicate the full-grown oak, when a child may uproot the sprouting acorn; and the same general principles attach to the laws of growth in the human organism, which are known to have place in other living structures.

CASE.—We were requested to visit a clergyman, aged thirty, who, it was reported, had been ten days ill of fever, with delirium. On arriving at the house at midnight, we found the patient in bed, with hot skin, coated tongue, intense headache, rapid pulse, intolerance of sounds, and restlessness. He was rational at the period of the visit, but had shortly before (resisting the efforts of the nurse) been out of bed,—not knowing what he did.

From a bath, and other appurtenances in the room, we presumed he was a patient under hydropathic treatment; and on inquiry, found that only two hours before he had been removed from bed by the packer, and rubbed in the shallow bath with tepid water. His father, who was in attendance, stated his resolution to have no more to do with the water-cure; measures in accordance with a rational view of the nature of simple continued fever, were therefore directed. After investigating the prominent symptoms of the malady, we proceeded to examine more particularly the state of the patient, and on uncovering the chest, were at once struck with a very obvious difference in the two sides; the left being considerably smaller and flatter than the

right. We made no remark at the time, but on the recovery of the patient from the severity of the febrile attack, the details of his case were fully entered into. The history may be abridged as follows :—He had been strong as a boy, and at thirteen had measles with a troublesome cough, recovering very slowly. Afterwards he was healthy, but not strong, and passed the period of his college-life, living quietly, without anything remarkable. Subsequently, having a large parish to attend to as curate, he had many anxieties which tried his health. Five years ago he had inflammation of the lungs,—was ill a long period, and obliged to relinquish for a time his clerical avocations, and reside in the Isle of Wight. He then resumed his duties in the parish as curate. Two years ago he experienced an attack of influenza, the cough was extremely obstinate, and he was then reluctantly forced to abandon his parish altogether. The cough at length disappeared, but he has suffered from " weakness," " nervousness," and " indigestion" ever since. Having heard extremely favourable reports of the water-cure, and having satisfied himself by the perusal of several books treating on the subject, he came to Malvern, where he was informed that his mucous membrane was congested and the ganglionic nerves affected ; by which his brain and liver were made irritable. He had been nine months under the treatment,—taking a great deal of water and exercise ; his diet had been restricted chiefly to rice, bread, biscuits, and water,—all fermented li-

quids being forbidden, but—before his feverish attack—he considered himself worse rather than better.

Without exciting apprehension, the chest was measured, and examined stethoscopically. The left side was one inch and a half less than the right; there was also a duller percussion sound, and an expiratory murmur on this side, not heard on the right. I explained to him my views of the causes of his "weakness," "nervousness," and "indigestion;" but the fear of his "mucous membrane" was, for some time an obstacle to his following out my suggestions. He was at length however prevailed on to take less water and harassing exercise,—to have no more than one bath a day,—to live more generously, and add half a pint of good home-brewed beer, or porter to his dinner. Eighteen months have now elapsed since this advice was followed, and a few days ago I received intelligence to say, he was stronger and happier, had resumed his clerical duties, was taking a full portion of animal food, and his ale daily at dinner. We have seen many cases of this description, in which persons draw unfavourable comparisons between the present and the past, not considering that anatomical conditions incidental to the cure of measles, pneumonia, and influenza, successively arising, may add the age of fifteen or twenty years to their life;—and that endeavours at regaining a former measure of robust strength, under such circumstances, must be hopeless. The lung here had made as good a recovery as could have been expected,

but a mark remained, which no water could wipe out. (p. 208, &c.) With respect to congestion of the mucous membrane, and the affection of the ganglionic or visceral nerves, rendering the brain and liver irritable, it is scarcely necessary to say, their existence was founded upon nothing more than hypothetical notions.

It is by no means unusual to be in attendance upon children with glandular enlargements about the neck, which slowly suppurate, discharge unhealthy matter, and leave behind them for many months troublesome ulcerations and morbid integument, which neither give pain, nor have attached to them any local inconvenience. In these cases, we often have to remark alternate periods of activity and quiescence,—of advance towards, and retrocession from, cure, for which no obvious reason appears. Sometimes the sores go on extremely well, inclined to heal; and then, without our knowing why, the discharge increases, and surrounding parts become more swollen, tender, red and angry. These fluctuations are very naturally a source of much solicitude to parents, whose attention, limited to what they see, does not extend to the antecedent fact of changes in the qualities of blood, of which these variations are indicative, nor to the far more serious threatenings out of sight within the body.

Again; it is a very ordinary occurrence to meet with other cases, in youth and children, marked by long periods of ill-health, without any external index to give token

of the general condition of the elements of nutrition; but where upon physiological principles we may infer, and by proper examination sometimes discover, analogous structural degeneration, without any local pain, in much more important or influential organs than the glands of the neck; for example,—

Case.—A young gentleman, aged seventeen, tall and well grown, complained of languor, debility, and incapacity for exercise. He liked to sit in doors, and was averse to any exertion. The pulse was slow and languid; the bowels inactive; countenance pallid and heavy; the tongue pale, moist, and slightly furred along the middle. His appetite was tolerably good,—he slept well, had no cough, nor was there anything apparent to account for his condition. The history was as follows:—"C. D. was in perfect health till two years ago, when he had measles favourably, with a tolerable eruption, and but little cough. At the end of three weeks, he did not appear to regain his strength, and the bowels never acted without medicine. The liver was supposed to be in fault; blue-pill was first given, and then a preparation of taraxacum. Three months afterwards, the bowels were still very inactive, with frequent headaches, bad appetite, languor, and indisposition to take walking exercise. Dr. C. was consulted, who advised blue-pill to be given again, and afterwards quinine and steel. He then went to Brighton, and for a little while seemed to derive benefit; returned to London and soon after-

wards to Eton; but after five weeks, feeling *there* unequal to any exertion either of body or mind, he left and came back to London. Bowels in the same state always requiring medicine, headache constant, pulse slow and irregular. The medicines that had been given, seeming to do no good, a homœopathic physician was consulted, and a few days after he was seized with a decided attack of ague,—cold and hot fits with a very low pulse, thirst, and no appetite. From this he recovered in about ten days, but the general health continuing the same, Sir J. C. was joined in consultation, and a residence at Tonbridge Wells recommended;—rather better there; but worse again on returning to London. Dr. D. consented to his going North and to the sea, which did *no* good. The stethoscope was used twice during this period, and the lungs supposed to be perfectly sound. No illness or delicacy of any kind till he took the measles. At five years old he broke his left leg, and was laid up for five weeks; the bone united well, and the fractured limb became as strong as the other."

Upon careful examination of the chest, by percussion and the stethoscope, there were now ample signs that morbid nutrition was present in the serous textures of the heart and contiguous lung. Treatment was therefore recommended with a view to retard or arrest it; and the constitution not being originally disposed to scrofula, there was reason to hope, this being effected, that inherent resources would be ade-

quate to cure, by absorption of useless elements, and the fibrous morphology. This expectation has been realized;—but as cure itself has often its attendant evils, so here the constitution has been rendered permanently delicate, and a diathesis, not originally present, has been established. The pulse is constantly slower than is natural to the age and conformation of the patient,—active exertion is productive of palpitation,—and should, hereafter, the mind become morbidly influenced by sensations, he may become what, in popular language, is styled, 'a nervous dyspeptic,'—seeking at the hands of quacks for cure, when he possesses all that nature has provided in such cases.

The quotation of these examples, together with the observations preceding them—afford occasion for three relevant or explanatory remarks.

First. The qualities of blood vary with diet, exercise, emotion, occupation, and the regularity of the excretions; and, as we have shown, (p. 241,) according to physiological principles, an ulceration—that is to say—the site of an abnormal nutrition, or retrograde growth, is the first to indicate or show any marked variation in the properties of the circulating current. Hence an external sore, if it be only of a trivial nature, so far from being undesirable, becomes, in a scrofulously disposed constitution, a valuable index to those who know how to consult it aright; and its cure by potent topical applications, simply removes

a useful sign, without improving antecedent conditions. The hand of a weather glass moves synchronously with the rising and falling of the column of mercury behind the dial plate; and this again with the varying density of the air. Our turning—with the finger—the index of a barometer, from *storm* to *fair*,—will not improve the weather,—nor will our healing a trivial external scrofulous sore by topical means, improve the qualities of blood, or invigorate the constitution.

Secondly. All Vital functions, physiological and pathological, are a series in progression, therefore a medical opinion can be valuable only for a time. If disease be acute, it can be relied on barely for a day; if chronic, it may hold good for a longer period. But in no case, ought a medical statement to be considered valid longer than a month. Thus in the case before us,—the stethoscope had been twice used, and the lungs pronounced healthy,—because abnormal sounds were not then evident;—but on the third examination—signs evolving—prior decisions were—in the natural course of things—reversed. This remark seems called for, because we have frequently ourselves found patients quoting opinions, and guided in their conduct by recommendations tendered to them twelve or eighteen months before; during which time circumstances and conditions are so changed, that the advice is not only not valid, but may really now be inappropriate. So again there are, we are sorry to say, medical practitioners who will grasp at a reputation for

greater knowledge and judgment than others, because they detect signs or symptoms not discoverable by those consulted before them, simply for the reason that at that time they did not exist. In morphological disease, the structural changes always commence before signs appear; and as there can be no blame attachable to him, who does not discover what does not exist, so there may be no especial merit due to him, who observes what is obvious. In apportioning censure or praise to medical men, the time elapsing between two opinions is a very important consideration.

Thirdly. Where a delicacy of constitution and uncomfortable feelings are the result of anatomical changes incidental to the cure of a severe internal malady, to expect a return of robust health, such as may have been present before the illness, is equivalent to expecting the disappearance of the pits and scars of the small-pox, or the unseemly cicatrix of a burn. An alteration in the laws of nature might cure small-pox without pitting,—ulceration of the cornea without opacity,—burns without a scar,—and internal diseases without abridgment of the enjoyments of life; but present laws prevailing, the cure of severe disease can be accomplished only with attendant limitations and inconveniences. Persons labouring under these results command our sympathy, and in the advice we tender them, a large field is open for medical integrity; but such patients would oftentimes do well to ask themselves the question,—which party is most benefit-

ed by nine or twelve months' treatment in the hands of water-doctors, mesmerisers, and homœopathists? Let them know that careful and appropriate hygienic adaptations will do much good with very little water, and very little physic.

The details of a scientific medical treatment are governed by the age, social position, occupation, constitution, temperament, education, and mental habitudes of the patient, and the same malady may require the most opposite methods in the child and in the adult—in the poor and in the rich—in the country and the city. The administration of wine, and analogous stimulants, for instance, may be demanded in the treatment of one case, and their prohibition imperative in another, though we may call the disease by the same name. The inutility of attempting to lay down rules for the treatment of a nosological disease—an *accident* or abnormal quality—must be obvious to all, when the *subject* itself—the living body—has an almost infinite number of properties, and is sensitively alive to an infinite number of agents; when cures and diseases are analogous operations, governed by the same great law of embryonic development; and when moreover the qualities of the secretion of one organ are active poisons, stopping the vital energies of the elements of another.

Case.—A young lady, aged eighteen, was attacked with hooping-cough;—in six weeks the convulsive pa-

roxysms had subsided, but a teazing, short cough, with a crumby expectoration continuing, we were requested to see her. She was in bed, looking pallid and worn, with cold, clammy hands, a weak and very thrilling pulse. The cough disturbed her rest, she had perspirations at night, and complained of soreness over the whole surface of the chest.

Her appearance is remarkable, for she has neither eye-brows nor eye-lashes; they began breaking off when she was twelve years old, and for the last two years they have discontinued growing, so that now the site of the eye-brows is as smooth as any other part of the face. She has also a scar on the left side of the cheek towards the ear. On examining the chest, a considerable diminution was noticed in the inspiratory sound under the right collar-bone, extending into the axilla, which was very marked on comparing this side with the other.

The following are the details of her history. She is delicate, but has usually enjoyed a fair state of health. At fifteen, the catamenial function was established, and she continued regular till within the last twelve months. Twelve months ago, a red swelling began at the side of the face,—it increased in size without pain,—matter formed, which was let out by the lancet,—the sore did not heal for many weeks,—and the mark has remained ever since. During this period, the hair of her head fell off, and she thought she should be bald. Five months ago, she went to Brighton for change, where

she became subject to repeated colds, and had a cough; and when she returned home, her parents were struck with her altered appearance,—she was so much thinner, and her complexion had become unnaturally white. She had not recovered her former looks when the hooping-cough came on. Her father is a great invalid, has been so for years;—he is supposed to have tubercles in the lungs, and has at different times been under *allo—hydro*, and *homœo-pathic* treatment. She has lost a brother from scrofulous disease and consumption, and another member of the family has unequivocal marks of the scrofulous diathesis.

Under medicinal and hygienic treatment, this patient has recovered both health and strength; the cough has disappeared, and she has grown fat; nevertheless the stethoscopic signs are in no degree amended. Medical attendance upon the case has ceased for the past two years, and the young lady up to the present moment appears to be perfectly well.

In illustration of this narrative, Cases I. and III. related in the chapter on Semeiology, may be usefully consulted; for if progressing signs of consumption appear at a future period, a stranger may suppose them indicating the approach or onset of the malady, when in reality, they may be ushering in the end of it.

It is perfectly clear, at least from this case as an example, that the self-same symptoms will have a different value according as they are primary or super-

vening, antecedent to, or consequent upon tubercular infiltrations. According in fact to the class before referred to (p. 219), to which the patient belongs. The prognosis will be different, and treatment should be different also. From this example, too, we can understand the reason why,—in two cases precisely similar in respect of symptoms or appearances,—results may be very different, under the same treatment. Indications, or signs in progression, may be accurately watched or noted; but their import, or probable result, can be truly estimated only by *the state* from which they take their departure. The general law governing growth, disease, and cure, as developed by microscopical analysis, is simple and harmonious; but in the thorny paths of application—with reference to symptoms, prognosis, and treatment—from the multitude of conditions to be taken into account—nature appears complicated; and difficulties on all sides surround us, to be surmounted only by unwearied energies directed to special instances.

If we have to treat therapeutically a blister on the skin,—or a wound occasioned by a blister, and wish to heal it, we remove the exciting or irritating outward cause, whereupon natural laws—promoting the removal of useless elements, and a conformable morphology, effect the cure. So, if we have a sore, kept open by some other outward irritating cause, it heals in like manner when the irritant has been removed. Analogously in prisoners, ill with scurvy, scrofula, and con-

sumption, cure sometimes follows upon their removal into fresh air, with exercise and better nourishment. In all these examples, irritating conditions being removed, natural laws spontaneously resume their course. But it frequently happens after the withdrawal of every external irritating cause, that wounds will not heal, nor will illnesses subside. This, upon investigation in outward examples, is often found to be due to an immoderate growth,—an unconformable reciprocal action between blood and the texture whereby the granulation type, the first morphological stage, luxuriates,—spreading farther, or continuing longer than it ought to do. In such cases, cure will often follow upon the application of hostile interfering agents, caustics or astringents. So in like manner—as we have shown—cure appears to follow (in internal diseases,) upon the administration of agents, inimical or inappropriate to corpuscular growth or luxuriance. But, there are cases in which cure does not follow any of these proceedings; we may withdraw every irritating external agent,—and also stop the energy of growth; cure, nevertheless, not taking place,—because, from causes deeply founded in the constitution of the individual,—there is neither adequate absorption of useless matter, nor sufficient energy in the fibrous metamorphosis, to effect it.

In the first of these classes—which includes the strong, robust, and healthy structures,—it is sufficient that medical art discover and remove the irrita-

ting cause; in the second, something more is required, —it is demanded not only that all outward or ostensible irritating agents be removed, but that we interfere with unconformable growth; in the third, (including Tubercular Phthisis,) we have to accomplish the same ends, and also, in addition to them both, to elicit the energy of absorption, and the fibrous morphology, before a perfect cure can be accomplished.

Case.—"F. M. W. was born healthy, and grew to be a remarkably fine baby; she cut her teeth late, but well; indeed nothing ailed her till she had the influenza at four years old. The complaint was going through the house, and no one had it more mildly than she had. At five years old, she had the hooping-cough, which she got through very well. All this time she was a particularly healthy looking child, tall, and large of her age, as well as very fat; her head was large, but not looking out of proportion, her body and limbs being also on a large scale. She was intelligent and forward, but not particularly fond of books. At six years old, she was taken abroad; and at Baden-Baden had a one-and-twenty days' fever, which left her weak, and after it, she lost her hair. The winter following was spent at Rome, where she appeared to be in perfect health. In the spring she went to Naples, and when the hot weather began, the family removed to Castellamare, where she had a dangerous illness—gastric fever and jaundice—which lasted three weeks, and during which

two English medical men gave her over. An Italian physician who had seen many similar cases, was called in, and he predicted she would recover. She was a long time regaining her strength after this illness, and as she got better she grew very fat. This illness took place in July, in which month she completed her seventh year. At Naples in November she had a slight return of the same illness—but it was treated promptly with calomel and James's powder, and soon reduced. On the journey from Naples to Rome in December, she complained of pain in her hip and walked lame. We put on several leeches, which relieved the pain,—and as soon as we got to Rome, we procured medical advice. It was said to be an incipient hip-complaint; more leeches were applied, and she was confined to a sofa, on which she remained for three months. As the spring approached, she began to walk about the house, but never took a regular walk out of doors, although she was allowed to run about in the garden of our villa near Florence, where she spent the early part of the summer. In July we went to the baths of Aix in Savoy, where she had douches upon the hip; but I do not think they had much effect upon her. The following winter was spent near Paris, where she was under the care of a famous Orthopœdic doctor, who made her lie down a great deal, and do gymnastics for three or four hours a day. Her health improved amazingly under this treatment, and she left Paris in August, apparently in robust health. Dr. Guérin, having ordered

her sea-bathing, we spent the autumn at Cowes; she was now nine years old, and her health continued good for two years. The winter after she completed her eleventh year, she had the measles favourably, and recovered from them quickly and well; *but after them she was much more liable to colds and cough; and was seldom altogether free from them until the summer set in.* Still her appearance was that of a child in health; she was very fat, and had a fresh colour. When she was twelve and a half, she complained of feeling heavy and torpid, and would fall asleep at any moment. The bowels became confined so that she required a great deal of opening medicine; and one day she was attacked with a violent spasm in the stomach, which lasted several hours, and was at last relieved by the application of a dozen leeches to the region of the liver. The medical practitioner thought the attack was inflammation of the liver; he gave her calomel, and applied a blister to the side. She continued very unwell for more than three months; the liver not acting without constant recourse to blue-pill and aperient draughts. She was very weak all this time, and comfortable only when she was allowed to lie still without having any one speak to her. About the end of June she began to improve, grew *immensely* fat, and had a great appetite. Still she was taking medicine, chiefly tonics, and was visited by a medical man daily. On the 8th of September she was seized with shivering fits soon after breakfast, and by noon

was in a high fever. I had seen for the week preceding that she was not quite so well, and mentioned it to her medical attendant, but he thought it was my fancy. She was alarmingly ill for a day or two, but I don't think the doctors knew either the cause or the seat of the disorder. She had a cough, but there did not appear to be any inflammation of the lungs. This illness was much more violent than the former one, and therefore, though it did not last so long, it reduced her much more. It was not accompanied with the same torpor; on the contrary, it produced a state of great irritability and restlessness. By the middle of October she was well enough to leave Cowes, and was taken to a very clever medical man at Winchester, who found her in so delicate a state, that he advised her spending the winter in Madeira. *At this time she had no cough, nor any symptom of consumption beyond a flatness of the chest; it appeared to have sunk in from being remarkably broad and full;* and the doctor considered this a bad sign. We went to Madeira accordingly, where her health improved, and again she grew very fat. As spring approached, however, she became languid, and was ordered to make an excursion up the mountains. We were most unfortunate in the weather, and during the last day of our tour, she was exposed to several hours of pouring rain, and lay wet through in the hammock for some time. As might have been expected, this was followed by inflammation of the bronchia, for which strong remedies were used; but a

troublesome cough remained, and was not benefited—as we hoped it would be—by the voyage home. In the beginning of May, I took her to Sir James Clark, whose opinion of her case was unfavourable. He found the breathing impeded in the right lung, and expressed little doubt of the existence of tubercles. Dr. Latham was of the same opinion. I should have said that Dr. R——, a famous physician at Funchal, had examined her chest with the stethoscope previous to the attack of bronchitis, and found it perfectly sound. During the summer following the return from Madeira, her general health improved, and when Sir J. Clark saw her in September, he was well satisfied with her state. Still he ordered her to Nice for the winter. Nice agreed particularly well with her general health, but seemed to increase her cough. We returned to England in the summer, and the following winter was spent at Brighton, by Sir James Clark's desire. Since that time she has grown much thinner,—her nerves have become delicate, and she appears to have less enjoyment of life than she had before,—her stomach too is often disordered. She is now seventeen, and tall; but the chest is very flat and contracted, which was not its original conformation."

A variety of remarks—suggested by this case—crowd upon our attention; but, reserving them for the present, we leave the simple narrative of an anxious mother to the study and contemplation of the reader,

and turn to the following history related by the patient himself.

CASE.—"My attack came on after a severe and protracted fit of influenza, which left me greatly debilitated, with violent, almost incessant cough and excessive expectoration,—proceeding at that time, from the mucous membrane that lines the lungs. I got better, and unfortunately returned to my official duties in London too soon, and thus brought on an aggravation of my cough and the bursting of a blood-vessel in my lungs, attended with tubercular abscesses, and that peculiar puriform expectoration, by which the doctors were for the first time alarmed, as showing the existence of tubercular consumption. This was early in June, 1844, and from that time till September, I was kept in an airy room—most of my time in bed on account of excessive weakness,—and enjoined to speak as little as possible. My voice was weaker, but not altered in tone; but I determined to give my lungs as much rest as possible, and therefore did not speak at all for six months or more, writing down every thing I wished to say in pencil, and the doctors, Chambers and Watson, and a very clever surgeon who was in constant attendance, attributed much of my improvement to that precaution. During this time my cough was subdued, but the expectoration continued excessive, and tinged with blood; occasionally exhibiting the presence of fresh tubercular matter, proving that small

tubercles were in course of softening and coming away. This was the only alarming symptom that remained at the end of August, for my pulse had been moderate throughout, and though the summer was a very hot one, I had no excessive perspirations. I was still, however, dreadfully weak, being unable to shave or dress myself. The medicines that seemed to do me good were Sulphuric Acid and Citrate of Iron. In the next month, September, the doctors were satisfied that there was no fresh mischief in progress; and that my complaint had assumed that chronic condition, which justified the hope that by cautiously confining myself to an uniform temperature during the winter in-doors,—abstaining from all stimulants—and all violent exertion of voice or muscle, I might yet live, and enjoy a moderate portion of health, liable however to be again brought into imminent peril, upon any accidental recurrence of inflammation. Mutton, bread and rice were to be my food, and Selters water my drink. By the advice of my doctors, I moved to Clifton, and there remained confined to two spacious rooms, with double windows and kept to a uniform temperature, (I now think too high,) and there I believe I should have gone on gradually improving in health and strength, if I had not been attacked by a violent inflammation of the liver, which extended upward to the lower part of the right lung, and again brought me to the gates of death. Happily, however, this attack was subdued without producing fresh tu-

bercular disease, as was also a second inflammatory attack of the pleura; although under their successive influence I was confined to my bed for three months, and brought to the last stage of helpless debility. During these attacks I was attended by a very clever physician, Dr. Bernard, to whose constant attention and skill I owe, under God, my restoration to life. By the month of June, 1845, I had recovered strength enough to bear removing from Clifton, which in the summer is too warm and relaxing for invalids who require bracing, and I moved to Tunbridge Wells, which I should say from experience affords the best air in summer for an invalid recovering from any disease of the lungs. I remained there till September, daily gaining strength, still going on with my citrate of iron; and upon the occasional return of spitting of blood with the sulphuric acid. In September, 1845, under the advice of my medical attendants I moved to Bournemouth where I remained till the following June, allowing myself more liberty in the way of air and exercise in fine weather, whenever the thermometer was above 40°, but living principally in a well-ventilated room kept at a temperature of 58° by means of double windows and constant fire. Here I gathered fresh strength gradually, and by the month of May, 1846, was able to get on horseback and take gentle rides. In June, 1846, I removed to this place, where I am fixed in a roomy, well-sheltered house, on a dry chalky soil, with extensive downs all around for air and exercise

in fine weather; and here I have regained a far larger portion of health and strength than either I or my doctors expected I should ever recover. By God's blessing I am now able to ride on horseback over the downs for five or six hours without fatigue; to walk up hill without suffering; and though I am occasionally subject to slight returns of hæmoptysis, I believe this is now confined to the mucous membrane of the bronchial tubes; and that the wounds in my lungs are healed; and that with a cautious abstinence from violent exertion—avoiding sudden change of temperature —and exposure to cold north-easterly winds, they may yet do me some service for years to come. But I am still obliged to shut myself up very much in the winter, and by constant fires to maintain as uniform a temperature as possible—as near 57° as I can; this from my experience I find better than one higher. I still live on mutton, vegetables, and light puddings, drinking nothing but cocoa and water. I have now given you —I fear with more prolixity than you will relish—the history of my passage through the fearful disease which drove me from public life, and to the incipient stage of which I fear your dear friend is approaching; first I should say she should speak very little, or rather not at all; next the throat should be braced by taking ice, and abstaining from drinking anything warm,—the night perspirations should be checked by frequent doses of sulphuric acid, and the body sponged with dilute nitric acid or with vinegar and water. The continu-

ance of cough should be checked by some occasional anodyne, but of all things the most important are a dry equable atmosphere—perfect repose of mind, and regular frequent gentle exercise of body in the open air as long as the temperature is moderate. But I am assuming a character I have no right to, and changing my crutch into a gold-headed cane; but I have suffered so much, read so much, and thought so much in connexion with this fearful malady, that I find it difficult to abstain from the intrusion of advice. I forgot to mention that I was particularly cautioned against any exposure to the night air, and that in consequence I have never, since the commencement of my illness, stayed out after sun-set; this I believe to be a very important precaution. Another recommendation I adopted was to wear calico always next my skin, with flannel over it, in the day time, and to sleep on a hard bed without curtains."

Upon this case—applauding generally the suggestions of the writer—we may repeat the observation, that inherent energies must predominate where cure is effected, and that the power of hygiene and medicine is in all cases, relative. We know our inability, in surgical practice, *to make* the smallest particle of skin, or fibrous cicatrix, to cure granulations, or repair a simple cut; and *a fortiori*, therefore, in medical practice, our inability to perform an analogous thing in internal organs. In surgery, our operations must be backed up

by inherent energies, otherwise cure does not take place; so, likewise, in medicine, if our therapeutically intended interference be not suitably answered in like manner, the intention fails.

Thus, too, on the other hand, the inherent countervailing *vis medicatrix* (the normal law of morphological operations or of growth,) having been aroused against the disease, will often overrule minor errors of treatment. Wherefore a patient recovering under a stated hygienic condition, or under the use of a particular medicine, it is not always to be concluded that that condition, or that medicine, is a *sine quâ non*, or necessary antecedent of the cure.

The quadripartite classification, upon which we have founded a practical doctrine of the causes and phenomena of human life, enables us to eliminate morphological facts,—those of growth, structure and secretion, for separate consideration, so that scrofulous disease may be treated of, as belonging to the vegetable part of man's nature; and facts observed in plants become strictly applicable to the subject. It was, indeed, with this in view, we commenced our exposition with a brief outline of the elements of vegetable structure in the Introduction; and facts there set forth, we now proceed to recapitulate as a preface to our conclusions.

It is probable, as Dr. Lindley has observed, that all plants have an individual peculiarity, which in some cases admits,—without change of structure,—of a greater range or variety of outward conditions than in

others. The two great external agents by which they are affected are soil and atmosphere; and the action of these upon plants in their natural situations will be uniform, preserving the harmonies of their configuration. But let an alteration take place,—their rootlets, for instance, penetrate to an ungenial soil,—their atmosphere change from the valley to the mountain,—the mean temperature under which they grow, fall several degrees,—or surfeit the plant in the rich soil of a garden. Under such circumstances, alterations will be produced in the structure of the plant, which will become manifest by external characters. This is what is called irregular metamorphosis. There are specific causes *inherent* in the plant, by which the metamorphosis is effected, but we know, if we replace it under more genial *outward* conditions, that natural or healthy growth may be restored, and irregularities will often disappear.

In like manner, it is probable that all human beings have an individual peculiarity which in some cases admits—without change of structure—of a greater range or variety of outward conditions than in others. The external agents by which they are affected, are food, atmosphere, temperature, climate, and situation,—and if the action of these be not in harmony with their structure, then let an alteration be effected; let their diet, climate, and situation,—their emotions and thoughts be changed. Under such circumstances, an amelioration will be produced,—the structure will resume its

normal configuration, and health will be restored. Moreover, in the culture of plants recourse is often had to extraordinary external agents—composts and manures,—which must be used in extremely small proportions, for benefit to follow from their application, and which are no more naturally aliments to vegetation, than nauseous medicines are to us.

Such are the facts upon which we would found a basis for the art of applying hygienic and medicinal alteratives or remedies in promoting the cure or removal of scrofulous disease. Nature, in the manifold and complex phenomena of structural disease in the human race, sets before us a great problem which microscopical analysis attempts to solve by bringing it within the pale of the law of retrogradation; a law which from its universality appears to reveal to us, as it were, the portals through which all compound vital structures re-enter upon their return to more general or elementary principles. This law, in the human body, is founded upon *the homogeneous nature of the primary elements of the embryo structure, and of the white or nutrient elements of blood*, so that nutrition, not from the first only, but at all times, is administered to, by embryoniform elements; and upon *the fact, that outward irritants exaggerate nutrition*, causing an unwonted accumulation of these elements in the irritated part; which if conformable, following a morphological course consentaneous with the elements of the excited texture, lead to cure; but which, if they

multiply or spread in a form which is anterior to, or below the normal type, are retrograde, and constitute disease. And it follows from all the circumstances of the case, embryonic development, growth, and nutrition, as unravelled by microscopical observations,—that if we would rid ourselves of the evils of inflammation and scrofula, we must be prepared also to resign the benefits of cure and healing. For it appears, that the primary stages of growth originally, and the first steps necessary for the healing of a wound, the repair of fractures, and the cure of a burn, are identical with those morphological operations which originate and maintain a scrofulous disease. There is nothing in the least degree wonderful or extraordinary in scrofulous disease after we have reconciled ourselves to the wonder of the existence of the living structure, the plant or animal,—to the wonder of the evolution of its organs and qualities from the embryonic basis, and their growth and preservation by blood. These physiological wonders past, and scrofulous disease is no more than early embryoniform types and structures out of place,—and cure, their eradication with a substitution of normal growth.

And now to bring these general principles to bear in final illustration of the particular subject in hand.

The terms consumption and tubercular phthisis, do not embrace an exclusive or definite idea, whereupon to found fixed therapeutical doctrines and methods of treatment for cure. Cases of consumption have all, truly, certain common features, analogously as all indi-

vidual persons have,—and because they are all included under the universal law of retrogradation. Nevertheless, they are no more alike in details, than persons are alike, who differ from one another in height and bulk, —in colour, expression, and complexion,—strength, temperament, and constitution. Consumption is a scrofulous disease, and scrofulous diseases are retrograde growths, whether the new matter cohere to the pre-existing texture, as granulations, villi, or false membranes in fibrous textures; or be extruded and fall from it, as *pus*, in ulceration or suppuration of the mucous ones. And when, by means of substantive agents, we interfere, and stop this growth, there are persons in whom inherent resources carry on and perfect the cure ;—of such we say they are of good constitution. But there are others in whom the interference and arrest of growth does not suffice for cure ; and of such we say they are of a scrofulous constitution. In simple inflammation, when therapeutical measures stopping its progress have been carried out, there is no further trouble as respects the completion of cure, absorption of useless elements, and conformable morphological operations follow spontaneously ; as in pneumonia, pleurisy, &c., where both the individual and the texture recover. In consumption, the same therapeutical operation effected, and cure—complete cure—does not follow,—tubercles, infiltrations, and consolidations remaining. This is a fundamental point of difference between inflammation and scrofulous dis-

ease; and cannot be disregarded in treatment; for interfering agents which are remedies to disease in progress, are the reverse when it is stationary. That is to say, recognising the distinction between consumption or morbid forms in progress, and tubercles which are stationary, we may conclude that the one demands a treatment different from the other, and experience confirms the conclusion. Symptoms progressing are *events* from which we infer disease to be in progress; but stationary symptoms indicate *states*, in which we infer disease to be stationary also. Medicinal alteratives are remedies in the former; but in the latter, cure and restoration lie more within the sphere of hygiene than of active medication.

Still, as in all ordinary cases of consumption, both conditions are variably present, so, therefore, it is necessary to keep both sources of remedial treatment—hygiene and medicine—steadily in view. The limit of our senses is not the limit of existences; therefore, if we prescribe hygienic alterations—change of air or climate only—we may probably be cutting off a moiety of our resources; and if we pursue an alterative course of medicine without them, when the patient is surrounded with all those conditions under which the disease arose, we may probably be doing the same thing; but by appropriately combining hygiene and medicine, we seem to call to our aid all that is within the reach of human means for recovery and cure. In some cases, the constitution being good, hygienic alterations

alone suffice to bring inherent energies into play, or give the required ascendancy to the vis medicatrix ; in other cases, medicinal agents are competent to the same end ; but in the obstinate forms, *the remainder*, which have probably resisted ordinary means, we double our therapeutical power by judicious combinations.

Consumption, lastly, is a retrogradation of the respiratory parenchyma, the lung; and it involves—to use the conventional terms of medical language—phenomena of pneumonia, pleurisy, bronchitis, and ulceration ; it derives its most prominent characteristic or specific character from the numerous and limited areas it invades, and the failure of absorption when the energy of growth has ceased ; its phases, symptoms, and progress are influenced by the inherent idiosyncrasies of age, temperament, and constitution ; it may be restrained, cured, or accelerated by climate, diet, medicine, air, and situation, and also by reciprocal actions between the blood and texture elsewhere in the body. But the great points upon which attention must be concentrated are, 1st, the primary corpuscular and protoplasmatous growth—the granulations ; 2nd, the want of absorption when that growth has ceased, which gives permanence to tubercles ; and 3rd, the vascular transformations and renewed growth, which arising in the natural textures surrounding tubercles, is confirmed consumption.

Such being the manifold conditions, coincidences, and antecedents demanding consideration, it neces-

sarily follows that consumption is a malady admitting and requiring various methods of therapeutical treatment. But this is a fact already established by experience; therefore, then, we have the more confidence in the truth of our deductions, and are the more prepared to follow out the consequences of the general law in respect of cure, in hitherto untried ways, and in cases too where—before these investigations— itmay have seemed improbable that the idea of scrofulous action ought to influence our proceedings.

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