Phthisis and the stethoscope, or, The physical signs of consumption / by Richard Payne Cotton.

until he shall have complied with this by-law; and if any member shall injure or lose a book in his possession he shall pay such sum as the Librarian shall estimate the damage to be, or he shall replace it by a new copy of the same.

3rd. PERIODICALS NOT BOUND shall be subject to the following rules:—Each number of a semi monthly or monthly may be retained ten days, and of a quarterly fifteen days; and the fine for longer detention shall be the same as for detention of books.

4th. Works of reference and valuable books with plates may be withheld from circulation at the discretion of the Library Committee.

3/6

PHTHISIS AND THE STETHOSCOPE:

OR

THE PHYSICAL SIGNS OF CONSUMPTION.

PHTHISIS AND THE STETHOSCOPE:

OR THE

PHYSICAL SIGNS

OF

CONSUMPTION.

BY

RICHARD PAYNE COTTON, M.D.,

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS, LONDON; SENIOR PHYSICIAN TO THE HOSPITAL FOR CONSUMPTION AND DISEASES OF THE CHEST, BROMPTON.

FOURTH EDITION.

LONDON:

JOHN CHURCHILL AND SONS,

NEW BURLINGTON STREET.

M.DCCC.LXIX.

PREFACE

TO THE

FOURTH EDITION.

THE fourth edition of this little book aims, like its predecessors, at brevity and conciseness. Like them, it is not designed as a complete treatise either on auscultation or on phthisis, but is a plain and simple exposition of each, so far as the one is related to the other. It is the result of a careful revision of the last edition, with such alterations and additions as further experience and observation appear to justify; and is

designed for the use of those whose time and opportunities require that such subjects should be studied rather in abstract than in detail.

46, *Clarges Street, Piccadilly,*
October 1869.

PREFACE

TO THE

THIRD EDITION.

In offering to the profession the third edition of this little book, the author would merely observe that his great object has been to make it of as simple a character as possible, and to separate it from everything hypothetical.

Practical statements, freed from whatever is either complicated or unessential, with conclusions more ample and varied than those in the former editions, are alone dwelt upon,—conclusions which have been abundantly tested by observa-

tion, and which the author cannot but hope may serve others, as they have often served him, at the bed-side of the patient.

So much ambiguity is apt to arise in consequence of physical signs being variously designated, that, in the present edition, a chapter has been added upon their classification and nomenclature. And, in accordance with the suggestion of a reviewer of the last edition,* the author has introduced an additional chapter upon the physical signs indicative of *arrest* or *improvement* in the pulmonary disease.

Clarges Street, Piccadilly,
January 1864.

* British and Foreign Med.-Chir. Review, vol. xxv, p. 167.

CONTENTS.

CHAPTER VI.

THE FIRST STAGE OF PHTHISIS—(CONCLUDED).

CHAPTER VII.

THE SECOND STAGE OF PHTHISIS.

CHAPTER VIII.

THE THIRD STAGE OF PHTHISIS.

CHAPTER IX.

ACUTE PHTHISIS: AND TUBERCULAR LARYNGITIS.

CHAPTER X.

THE

PHYSICAL SIGNS

OF CONSUMPTION.

CHAPTER I.

INTRODUCTORY.

The classification and nomenclature of physical signs.

The study of physical diagnosis has, I think, been greatly embarrassed both by an unnecessary multiplication of terms, and a want of uniformity in their employment. It would facilitate matters if we could agree upon a list of names sufficiently comprehensive to embrace all the essentials of auscultatory phenomena, but sufficiently simple to deserve and receive general adoption. In the absence of such a list, indeed, each writer on physical diagnosis seems called upon to explain the terms he employs, lest those of his readers who may have followed a different school should fail to understand him.

The general classification of physical signs

may be broadly divided into Foreign and English. Neither of these is perfect; but of the two, I am unpatriotic enough to prefer the former, partly, perhaps, from having studied in the French school of auscultation, but chiefly from what appears to me, its greater simplicity.

The *Percussion sounds* are pretty uniformly designated, and the terms generally used are both simple and appropriate. *Clearness, dulness,* with more or less variation in the resistance of the chest-walls, speak for themselves; whilst the *tympanitic, amphoric,* and *cracked-pot* sounds are in tolerably common use, and must convey to every one the same meaning. The term *wooden,* however, which has been so well described by Dr. Walsh,* and which will be found very frequently in the following pages, needs perhaps a brief explanation, since it has not been so generally adopted as it deserves. By the *wooden* character of percussion note, I understand a peculiar jarring, hard, and imperfectly dull sound, difficult to describe accurately, but quite different from simple dulness, and at the same time so often associated with tuberculous lungs, as to deserve special attention.

* Physical Diagnosis of Diseases of the Lungs.

The terms employed for expressing unhealthy qualities in the respiration are simple, and in pretty general use. *Weak, harsh, exaggerated, suppressed, jerking, bronchial, cavernous,* and *amphoric respiration,* as well as *prolonged expiratory murmur,* are terms sufficiently simple and expressive. Some, however, use the word "*puerile,*" or "*supplementary,*" in lieu of *exaggerated,* but, as it seems to me, very inappropriately; the term *puerile* being properly applied to a condition of breathing which is natural to childhood, whilst the word *supplementary* fails to describe any characteristic quality of the breathing. *Jerking* respiration also has other synonyms. My late esteemed colleague, Dr. Theophilus Thompson, faithfully described a variety of this respiration under the term "*wavy;*"* and it has sometimes been called "*cogwheel*" breathing—a highly objectionable term.

The nomenclature of the various rhonchi or râles is, unhappily, full of perplexity. The word "*rhonchus*" is by some employed to designate only *dry* sounds,—and such an application cer-

* Clinical Lectures on Consumption, p. 129.

tainly has a classical sanction; but, it is more generally used synonymously with "*râle*" or "*rattle,*" to signify any morbid sound proceeding either from the air passages or pulmonary cells, whether it be of *dry* or *moist* quality; and in this sense I prefer to employ it. *Sonorous, sibilant, crepitant, subcrepitant, dry* and *humid crackling, mucous,* and *cavernous* rhonchi, constitute the list I have adopted, not, however, because all the names are unobjectionable, but because they are simple and sufficiently expressive.

The terms *sonorous, sibilant,* and *crepitant,* are in too general use to need comment; but not so some of the others. The term *subcrepitant* is certainly not free from objection, and is apt to lead to some confusion; my colleague, Dr. S. Scott Alison, very justly remarking in reference to this rhonchus, that it is not an "under or smaller sound,"* as the prefix "*sub*" might lead many to imagine.† The word "*sub-*

* Physical Examination of the Chest, p. 148.

† The term *sub* would seem to have relation not to the *size* but to the *perfection* of crepitation; the *sub*-crepitant rhonchus being less crepitating or crackling than the *crepitant* rhonchus.

crepitant" is, nevertheless, becoming more and more used, and is, I think, preferable to the terms "*large crepitation*," or "*moist crepitation*," by which the rhonchus is designated by many auscultators. The *dry* and *humid crackling*, or, as they have been sometimes called, "*clicking*" rhonchi, are also liable to a little confusion, many writers having either included them amongst the "large crepitations," or altogether ignored them. The difference between these crackling rhonchi and the subcrepitant is, however, sufficiently manifest, and, as we shall see presently, of especial importance in relation to Phthisis. Dr. Fuller, one of the latest writers on these subjects, very correctly states that "the *crackling* or *clicking* râles or rhonchi, so little insisted upon by some authors, are, in fact, of great clinical significance."* The *mucous rhonchus* is certainly ill-named, since it may depend upon the presence of other than mucous secretion in the air passages.† I have retained it,

* Diseases of the Chest, p. 131.

† It is, for example, often met with in cases of pulmonary hæmorrhage.

however, as one in rather common use, to express a râle larger and somewhat more liquid than the *subcrepitant*, and by some writers termed "*muco-crepitant.*" *Cavernous* rhonchus is often spoken of as "*gurgling*,"—an unobjectionable term except in its unnecessarily multiplying words.

Little need be said of the terms employed to express the various morbid modifications of vocal resonance, such as *bronchophony*, *pectoriloquy*, *ægophony*, and *amphoric resonance*,—nor of the cough, such as the *bronchial*, *cavernous*, and *amphoric* coughs, as they have been generally and similarly used by all writers on the subject. The same also will apply to *metallic tinkling* and *thoracic fluctuation*. *Friction sounds*, however, have received a host of fanciful names, according to the caprice, or the auditory peculiarities of auscultators. It is, I think, sufficient to speak of them simply as *friction murmurs*, bearing in mind that they are subject, as might be expected, to an infinite number of modifications, all of which, however, may be included under the terms *grazing*, *grating*, and *creaking*.

The morbid *laryngeal sounds* are unlikely to lead to confusion, the terms used to designate them being simple and expressive.

Having found the following terms sufficient for every practical purpose, I have adopted them in the succeeding pages.

	TERMS.	SYNONYMS.
Percussion Sounds	Clearness	
	Dulness	
	Wooden character	
	Tympanitic resonance	
	Amphoric resonance	
	Cracked-pot sound	
Respiratory Murmurs	Weak	
	Harsh	
	Exaggerated	Puerile; supplementary
	Suppressed	
	Jerking	Wavy
	Expiratory murmur prolonged	
	Bronchial	
	Cavernous	
	Amphoric	
Rhonchi	Sonorous	
	Sibilant	
	Crepitant	Fine crepitation; small crepitation
	Subcrepitant	Large crepitation; moist crepitation
	Dry crackling	Dry clicking
	Humid crackling	Humid clicking
	Mucous	Muco-crepitant
	Cavernous	Gurgling
Vocal Resonance	Bronchophony	
	Pectoriloquy	
	Ægophony	
	Amphoric resonance	
Cough Sounds.	Bronchial	
	Cavernous	
	Amphoric	
	Metallic tinkling	
	Thoracic fluctuation	
	Friction murmurs	
Laryngeal Sounds	Harsh laryngeal respiration	
	Sonorous rhonchi	
	Sibilant rhonchi	
	Gurgling	

CHAPTER II.

GENERAL CONSIDERATIONS.

Connexion of physical signs with general symptoms—Relation of the thoracic and general conformation to the development of consumption.

The separation of the physical signs from the general symptoms of phthisis, must be regarded only as a convenient mode of studying either the one or the other. In practice, the two are inseparable; and any diagnosis which is not based upon a careful consideration of both, is likely to prove fallacious. Auscultation is, in fact, merely the application of another sense to the practical investigation of disease.

Phthisis is as much a *general* as a *local*—a *constitutional* as a *pulmonary* affection. At its very commencement, indeed, it is purely a constitutional one; and a person may really be consumptive without having any thoracic malady

at all. It is quite true that the stage preliminary to that of the lung affection is generally either too brief or too indistinctly marked to be detected; but, of its existence, few at the present time are altogether sceptical. The origin, the progress, the issue of the disease, alike point to the great probability of its reality; and analogy affords a strong argument in its favour. Tubercle in the lungs is, as I have elsewhere expressed it, but the effect of phthisis; and bears precisely the same relation to it as lithate of soda does to gout.* Throughout the whole course of phthisis, indeed, the chief consumptive symptoms do not depend upon either the amount or the state of the pulmonary tubercle.

From this view of the subject, it is manifest that consumption in its earliest condition—at its dawn, as it were—is not always discoverable by an examination of the chest; and that the physical signs of the disease may present themselves in connexion with every possible variety of general symptoms.

* On Consumption: its Nature, Symptoms, and Treatment. 2nd edition, p. 5.

There are a few points in the general physical characters of phthisis which demand attention.

The shape of the chest is popularly, and, even to some extent among the medical profession, considered to be closely connected with the tubercular diathesis; an ill-formed thorax, or a "pigeon-breast," or a spinal curvature, being looked upon as landmarks of consumption. I am satisfied, however, that such a notion is altogether groundless. Amongst the patients of the Consumption Hospital, a really badly-formed chest is not more commonly met with than at a General Hospital. The pigeon-breasted deformity, indeed, is anything but common; lateral curvature is occasionally seen, but not more frequently than in any other Hospital; whilst angular curvature—which is the more remarkable since this variety of disease is generally, if not always, of scrofulous origin—is very rare indeed, so much so that, during the many years I have been connected with the Consumption Hospital, I have not seen half-a-dozen cases within its wards.

I shall briefly allude to one or two practical points which have a bearing upon this

question. Consumption, for example, is a very frequent disease amongst soldiers, whose selection greatly depends upon, and whose subsequent discipline must materially contribute to, a well-formed chest. I have seen very many cases amongst Life-Guardsmen. A person, considered one of the best models at the Royal Academy, was at one time under my care, the subject of highly marked consumption. The smith and labouring mechanic, whose daily avocations tend to expand and develope the chest, are also very frequently consumptive, and form a large proportion of the applicants at the Brompton Hospital, appearing to be quite as liable to phthisis as those whose occupations have an opposite tendency. From many observations, indeed, bearing upon this subject, I have long been convinced that the form of the chest has little, if anything, to do with the development of tubercle; and that whenever a misshapen thorax occurs in connection with phthisis, it is only to be regarded as one of the evidences of that defective state of the general health under which the tuberculous diathesis may have had its origin—in other words, that it does not, of it-

self, render its possessor more liable than he would otherwise be, to consumption.

Certain peculiarities of general physical conformation also have long been popularly associated with phthisis. But upon this point, as upon the last, there is much error. Every variety of stature, form, and physical development, is found in connexion with pulmonary tuberculosis. It is a mistake to suppose that the spare and the apparently delicate are the singled out victims of this dread malady. I have known several cases of unmistakeable and advancing consumption where the height considerably exceeded six feet, and the weight varied from fourteen to sixteen stone, the general conformation being at the same time proportionate and symmetrical. Even the generally recognised distinctions of temperament offer no assistance in the diagnosis; the greatest possible variety in this respect being constantly seen amongst consumptive sufferers. In all these particulars, indeed, there is nothing in phthisis which is not as often met with in many other and very different diseases.

CHAPTER III.

THE FIRST STAGE OF PHTHISIS.

The situation of tubercle—The earliest signs of pulmonary tuberculosis—Morbid changes in the respiratory murmurs.

In chronic phthisis the apices of the lungs are well known to be the chosen seat of tubercle; and, except occasionally at an advanced stage of the disease, the morbid deposit rarely extends to the bases of these organs. In cases of acute and very rapid phthisis, however, the tubercular substance is sometimes found to be more generally diffused throughout the lungs, but even then it is usually more abundant and runs a more rapid course in the apices than in the lower parts. The only exception to this general law occurs in the few cases where the disease appears to have had its origin in low or chronic pneumonia, the bases of the lungs

in such instances being for a very long period the principal, and sometimes even the exclusive seat of mischief.

Many pathologists have stated that the left side of the chest is much oftener attacked than the right; but, from my own observations upon a thousand cases, it appeared that, although the numbers were slightly in favour of the left lung, the difference was so small as to make it a matter of curiosity only, and not of the slightest practical value in diagnosis.* It seemed, nevertheless, from the excess of cases in which softening and vomicæ were noticed on the left side, that the tubercular deposit is disposed to run through its several stages more rapidly on this side than on the other.

It is, consequently, about the summit of the chest that we are chiefly to look for the morbid changes announcing incipient tuberculosis of the lung, although, for the reasons I have given, as well as upon other grounds which will appear in the sequel, the bases of the lungs should never pass unexamined.

* On Consumption: its Nature, Symptoms, and Treatment. 2nd edition, p. 20.

The physical signs of consumption have their different stages as distinctly marked, and pass as regularly from one to the other, as the general and more visible symptoms of the disease. They may be divided into first, second, and third stages: the first corresponding with the miliary and crude tubercle; the second with its period of softening; and the third with its elimination and the formation of cavities.

What is the earliest sign of pulmonary tuberculosis? This question, one of the most important which can present itself both to the physician and the patient, has been variously answered by different writers. Flattening of the thoracic walls, diminished mobility of the chest, dulness on percussion, feebleness or harshness of the respiratory murmurs, bronchophony, increased vocal fremitus, murmurs in the pulmonary or subclavian arteries, increased audibleness of the heart-sounds, have, one or more of them, been looked upon as the most trustworthy heralds of the coming danger. My belief is that there is no one particular sign which can be invariably regarded as either the earliest, or the most important.

It is obvious that the great differences met with in the amount of tubercle,—the rate at which it has been deposited,—and its effects upon the surrounding lung, as well as the different influences of such conditions determined by the individual peculiarities of patients, must always render the first sign of the local disease variable. From my own observations, however, I should say that, in the great majority of cases, a change in the respiratory murmurs is the earliest and surest sign of incipient tuberculosis; and on this account, I shall speak of it first.

The inspiratory murmur over the affected part may be, *as compared with the other side*, weak, harsh, jerking, or bronchial; or the expiration may be prolonged. The first two are most commonly met with; jerking respiration is not quite so frequent, nor is it often heard quite so early; and bronchial breathing, although sometimes audible at an early period, is a more usual attendant of more advanced tuberculosis. Prolonged expiration is a frequent and very important sign.

I shall briefly speak of each one of these particular conditions.

Simple *weakness*, without any other alteration in the character of the murmur, may be found over the whole apex, or only in parts; in some instances, the weakness passes almost into an absence of respiratory murmur, but I have never met with a case of its entire suppression, that is to say, in which a sound more or less audible did not occur during forced breathing. Weakness of respiration may remain for almost any length of time. In unfavourable cases, it gradually passes into one of the other morbid types; but where tubercle is quiescent, and the disease latent, it may become a persistent condition. I have seen many instances in which simple feebleness, combined perhaps with slight harshness of respiration, constituted the sole evidence of former mischief.

As a general rule, the most trustworthy observations on the weakness or otherwise of the respiratory murmur are those which are made during the ordinary respiration of the patient; but when, as frequently happens, the breathing is naturally somewhat feeble on both sides, weakness, as well as other morbid changes perhaps otherwise inappreciable, may often be

made apparent if the chest be listened to whilst the patient is taking some deep and evenly performed inspirations, or still more so, perhaps, whilst he takes a deep breath after having been directed to cough once or twice.

In estimating all morbid conditions of the respiratory murmurs—but in none so especially as that of *weakness*—it is all important to compare one side with the other. No observation, indeed, can be relied on, unless this be strictly attended to, since simple weakness of the breath sounds may be a natural condition, existing on both sides; and other changes also in the quality of the murmurs may have a very different signification, if found to co-exist in both lungs.

It is very rare indeed for tubercle to be so equally deposited in each lung as to cause a morbid weakness of breathing to be overlooked, in consequence of it being present to a precisely equal degree, and at precisely corresponding places, on each side. The possibility of such an occurrence, however, should not be lost sight of, and should be guarded against by carefully considering other physical signs.

Harshness is a quality which may be com-

bined with *weakness;* or the breathing may be simply harsh, without being otherwise changed in its character. In true harsh respiration, the soft and *breezy* nature of the murmurs is lost, and both the inspiratory and expiratory sounds are rough, dry, and somewhat blowing. The more such qualities are developed, the more extensive and advanced is the local mischief. In favourable cases, harshness slowly subsides, and usually gives place to a general feebleness of the respiratory murmurs; but in cases of unfavourable tendency, it gradually increases, and after a period of uncertain duration, either passes imperceptibly into the bronchial type, or becomes associated with, and frequently masked by, certain secretion sounds, to be spoken of presently.

Jerking breathing—which is easily recognised by the uneven, broken, or divided character of the inspiratory murmur, although not so common at the very commencement of pulmonary tuberculosis as either of the preceding, is nevertheless very frequently met with during the first stage of the disease. Sometimes it is amongst the earliest indications of local mischief, but oftener, I think, it is preceded by some other

morbid change of the breathing, especially by harshness; and these two conditions are not unfrequently united. Jerking breathing is more persistent than most of the other types of morbid respiration, and either subsides into simple weakness, or passes gradually into harsh or bronchial respiration,—the one change indicating an improvement, the other an advance of the disease. With reference to this sign, it is particularly important that the two sides of the chest should be compared, since its value as an indication of phthisis is mainly dependent upon its local and limited character.

Bronchial breathing—which is easily distinguished by the peculiarly loud, harsh, dry, and blowing qualities of one or both respiratory murmurs, is, in general, the evidence of a somewhat advanced period of the first stage, and consequently, in chronic cases, is rarely met with at the commencement of the disease. The first stage, indeed, may be completely passed through without the slightest bronchial breathing.

It may occur, however, as an early physical sign, whenever the tubercular matter is either rapidly and somewhat extensively deposited, or

when it is quickly succeeded by pulmonary consolidation; hence in the acute and rapid forms of phthisis, bronchial breathing is a very common condition. It usually has its origin in the harsh type, the one passing almost insensibly into the other.

Bronchial respiration may be looked upon as presumptive evidence of phthisis, whenever it is limited to the ordinary seat of the tubercular deposit.

Prolongation of the expiratory murmur is a very frequent and sometimes a very early attendant upon the first stage of phthisis. It is seldom, however, that the expiratory murmur is morbidly increased in length without being also changed in quality or intensity; sometimes it is louder than in health, at others, harsh, or slightly bronchial.

The precise point at which any prolongation of the expiratory murmur may be declared morbid is open to much difference of opinion. In many healthy persons the act of expiration is unaccompanied by sound; whilst in those in whom an expiratory murmur is audible, it is always considerably shorter and less loud than

the inspiratory. I think, therefore, that whenever the sound of expiration at the apex of either lung very closely approaches in length that of inspiration, it may be looked upon with suspicion; and that when it actually exceeds it, it may be taken as evidence of more or less pulmonary mischief.

In estimating the value of prolonged expiration, it should ever be remembered that in some persons, the expiratory murmur is naturally a little more developed, and rather longer on the right than on the left side; so that a slight difference beneath the right clavicle is less significant than a similar change in the other lung.

I may here briefly remark that, in examining a case of supposed phthisis, it is not sufficient to place the stethoscope upon one part only, as early tubercle may be very limited in position. The whole upper region of the chest, posteriorly as well as anteriorly, should be listened to, and *compared with the corresponding parts on the other side.* The very apices of the lungs, in front above the clavicles, and behind above the spines of the scapulæ, are too commonly neglected, although they often afford the first, and

sometimes even the sole evidence of tubercular deposit.

It is important to recollect that the changes in respiration which we have been considering are not, *per se*, proofs of phthisis, since they merely indicate impaired function of the lung, or an alteration in its physical condition, which may possibly arise from some other disease. For example—*Weakness* of respiration is met with whenever any obstacle exists to the free entrance of air into the pulmonary cells; hence it is common in bronchitis, emphysema, pneumonia, pleurisy, and pulmonary congestion, as well as in many nervous affections, such as asthma, hysteria, and pleurodynia. *Harshness* of breathing occurs whenever the surface of the bronchial mucous membrane has lost its natural smoothness; hence it is found in the early state of bronchitis, as well as in emphysema, pneumonia, and pulmonary congestion. *Jerking* respiration is often heard in incipient pleurisy, pleurodynia, and asthma, and is also of frequent occurrence in hysteria, and other nervous affections. *Bronchial* respiration is found in many cases of pleurisy, in pulmonary consolidation,

and dilatation of the bronchial tubes. The *expiration is prolonged* by any mechanical impediment to the exit of air, or by diminished elasticity of the lung itself; hence it is often met with in the later stage of bronchitis, and attends most cases of pulmonary emphysema.

Three circumstances are absolutely essential to the admission of any of the morbid changes I have been considering, as evidence of phthisis; viz. (1) their limitation to the ordinary seat of tubercle; (2) their existence either exclusively on one side, or more decidedly on one side than on the other; (3) their confirmation by other physical signs, as well as by some one or more of the general symptoms of the disease.

CHAPTER IV.

THE FIRST STAGE OF PHTHISIS (CONTINUED).

Changes in the form and movements of the chest—Alterations in the percussion-sound.

NEXT in importance, perhaps, amongst the physical signs of pulmonary tuberculosis, are certain changes in the form and movement of the thoracic parietes. There is, however, much uncertainty in the time of their appearance: sometimes they are observable shortly after the commencement of the local deposit; at others, they are not evident until the tubercular disease is considerably advanced; and very often, they are delayed until the softening process has been established. The differences in amount of the tubercular deposit, and in its immediate effect upon the surrounding lung, help to account for these variations. The state also of the patient's chest-walls as to thinness or other-

wise, the age, and the various degrees to which such conditions affect the elasticity of the parietes materially influence these changes.

In some few cases, at the beginning of the disease, a slight bulging may be seen over the affected part. This condition, however, being uncertain and transient, and limited to the very commencement of tuberculosis, may easily escape observation, which accounts, perhaps, for its having been seldom noticed by medical writers. I have nevertheless seen it several times, and have pointed it out to others. Its explanation, however, is by no means easy. Possibly, it may depend upon a large and rapidly deposited amount of tubercle giving rise to considerable local pulmonary distension; or, possibly, it may be due to some emphysematous complication not necessarily of a permanent nature.

The changes more commonly observed in the exterior of the chest, consist of a falling inwards and comparatively diminished antero-posterior movement of the affected region;—changes dependent upon contraction of the lung either from atrophy of some of the air-cells, or from

secondary pleuritic or pneumonic inflammation. These changes do not always coexist, the movement—especially during a forced inspiration, being sometimes sensibly diminished before the chest-wall has fallen inwards. It is seldom, however, that the movement is *very much* lessened without a corresponding depression of the parietes.

For estimating these changes, one of the many chest-measurers may be usefully employed; but I am inclined to believe that the practised eye and the carefully applied hand are capable of affording every information worthy of influencing the diagnosis. The patient should be placed opposite the observer, who, if experienced, will at once detect any difference in the form of the two sides. He should next be directed to inspire deeply; and having carefully watched the thoracic movement, the physician should then place his hands simultaneously and lightly upon the infra-clavicular regions, when he will readily detect the slightest inequality in their expansion.

As the disease advances, both the sinking inwards of the thoracic walls, and the loss of

healthy movement become more and more conspicuous, until, in some cases of long standing, although perhaps still in the first stage, the action of the whole chest becomes changed;—when the patient takes a forced inspiration, instead of the natural and healthy progressive swelling movement of the infra-clavicular regions, the chest is elevated as it were in a mass, the antero-posterior diameter of its upper part being very little if at all increased, this being, of course, the most apparent on the side which happens to be the most diseased.

At some period—perhaps during the first stage, but oftener not until a more advanced condition of pulmonary disease—still further alterations are often noticed in the form of the thorax. The whole contour of the chest, indeed, becomes changed; the cervical and dorsal vertebræ are inclined forward, and the shoulders are rounded; the front of the chest is consequently contracted; the stature lessened; and an awkwardness given to the general appearance. If a patient in this condition be looked down upon whilst sitting, two curves are distinctly visible: the one affecting the whole

course of the cervical and dorsal vertebræ; the other crossing it, and formed by the bending forward of the shoulders.

There is, of course, great diversity in the extent of all the changes I have been describing; sometimes they are manifest both to the patient and his friends; but very often at this stage of the disease, they are so slight as scarcely to be detected even by the eye and hand of the practised physician. In regarding them as the index of tubercular disease, it must always be remembered that they can be safely employed only in conjunction with other evidence; since, not only are certain alterations in the form and action of the thorax observed in other diseases also, but, owing to peculiarities either congenital or acquired, a great number of perfectly healthy chests have their two sides unsymmetrical, and consequently dissimilar in respiratory movement.

Percussion next claims our attention. At the risk of being considered unorthodox upon this subject, I cannot help expressing my belief that percussion is a far less certain aid to the diagnosis of early phthisis than is commonly

supposed. I am convinced, not only that a small amount of tubercle may exist in the lung without producing any sensible change in the percussion sound, but also that the tubercular deposit may be present even in considerable quantity, provided it be rather widely scattered, without at first causing any appreciable deviation from the healthy resonance of the chest. In children and young patients, such an occurrence is by no means uncommon. I have met with several instances of rapid and acute phthisis in children, where, notwithstanding a percussion-sound during life, which neither myself nor others have regarded as morbid, the lungs after death have been found somewhat thickly studded with tubercles. In many such cases, there may have been a temporary hypertrophy of some of the pulmonary air-cells, or the natural sonorousness of the chest peculiar to early life may have been sufficient to counterbalance or mask the dull sound which would otherwise have occurred; but whatever be the true explanation, the fact is sufficiently evident. In adult patients also, I have many times known the local disease unequivocally

manifested by other signs, when the percussion-sound has not afforded the slightest evidence of its existence.

In some cases, however, quite at the commencement of the disease,—and in all cases, sooner or later,—careful percussion will elicit a diminution in the resonance of the affected part, becoming gradually more and more evident as the local mischief increases. At the same time, the natural elasticity of the thoracic walls is sensibly lessened, and a peculiar feeling of resistance, gradually passing, with the advance of the disease, into complete hardness, is imparted to the pleximeter finger. This dulness and resistance are seldom equally developed, and seldom travel onwards *pari passu*, much difference being met with in their association. When the sense of touch is acute, the feeling of resistance may become of equal or even more use in diagnosis than the percussion-sound itself.

As in auscultation, so in percussion, it is necessary to examine every part of the infra-clavicular region, and carefully *to compare it with the corresponding spot on the opposite side.* The value of percussion, indeed, depends en-

tirely upon this *comparative* examination, since there is no healthy standard of percussion-note, the natural and proper sound varying very considerably in different persons, according to the age, the form, and condition of the chest-walls, and other obvious causes. The supra-clavicular regions too often pass unnoticed, as do also the supra-scapular regions; both, however, are important parts, the earliest and sometimes even the sole evidence of the tubercular deposit being frequently found either in one or the other. In children, the inter-scapular region should not escape percussion, as it often happens that in early life the bronchial glands are principally affected. Where tubercles are few in number or much diffused, a difference otherwise inappreciable may sometimes be detected by percussing over a large surface with the united four fingers of the right hand, the four fingers of the other hand being employed as the pleximeter.

The evidence afforded by percussion, no less than that by auscultation, requires to be corroborated by other symptoms. In certain emphysematous states of the lungs, the dilatation of

the air-cells may be greater on one side than on the other; and by thus affording a different percussion note on each side, may give to one apex the appearance of dulness. In the few cases also in which idiopathic pneumonia or pleurisy has attacked the apices of the lungs, there may exist, even long after the disease has passed away, a comparative dulness beneath either clavicle.* Diseases of the large blood-vessels, or cancerous growths, may likewise occasion a diminution of the natural sound and elasticity in the upper parts of the chest. We have, in fine, the important conclusion again forced upon us, that no physical sign should be taken separately; but that each one, however striking, should only be used either to confirm or confute the rest.

* In such instances, the dulness is generally due to thickening of the pleura. I have known it continue for years, and I believe that it may become even a permanent condition.

CHAPTER V.

THE FIRST STAGE OF PHTHISIS (CONTINUED).

Vocal and tussive fremitus—Bronchophony and bronchial cough—Morbid extension of the heart's sounds—Arterial and venous murmurs.

When the hand is lightly applied to the apex of a tubercular lung, and the patient is directed either to speak or to cough, there will frequently be noticed a peculiar vibration or *fremitus*, depending upon increased conducting power of the part immediately beneath. Owing, however, to the varying degrees and conditions of pulmonary condensation, as well as to differences in the circumstances naturally favouring its production, as met with in different individuals, the period at which this sign may present itself is very uncertain. Sometimes it is early and well marked; but quite as often it is either absent or too feebly developed to merit

much attention. For my own part, I seldom employ it, believing that it can scarcely exist before the lung is sufficiently consolidated to give rise to other and far less equivocal indications of mischief.

In making use of this sign as a guide in diagnosis, it should be remembered that vocal fremitus is not only met with, as a natural condition, in most healthy individuals, but is subject also to much variation both in extent and degree; the tone of the voice, the distance of the bronchial tubes from the surface, and the general form of the chest, considerably modifying its development. It is always more distinctly marked in thin than in fat or muscular persons; is generally greater throughout the right than the left lung; and almost always more marked in the right than in the left infraclavicular region. From the latter circumstance, it is evident that its use in diagnosis is necessarily limited, and that it is hardly trustworthy except in examining the left side of the chest, since, in any given case, it would be absolutely impossible to say whether its greater

development beneath the right clavicle be morbid or not.

We may, I think, conclude that whenever there is an equal amount of vocal fremitus in both infra-clavicular regions, there is reason to *suspect* that the left side may be diseased; and that whenever the vibration is positively greater on the left than on the opposite side, it may be regarded as a morbid condition, probably dependent upon tuberculosis.

Bronchophony is, perhaps, of all signs the one most commonly employed, and the most trusted in the diagnosis of consumption—a circumstance, I think, less attributable to its own merits than to the comparative facility with which it may be used. For the perfect development of morbid bronchophony, there must be a considerable degree of pulmonary condensation, associated with a naturally rather loud tone of voice. For these reasons, it is very common to meet with most unequivocal proof of pulmonary tuberculosis unaccompanied by bronchophony; whilst it is scarcely possible to find bronchophony of a morbid character unassociated with other well marked evidence of pulmonary con-

solidation. I have long been in the habit of employing this sign only as an occasional auxiliary, when it has seemed that the diagnosis must be based upon the concurrence of a number of physical changes, rather than upon the well-defined character of any one in particular.

In estimating the importance of bronchophony, it must not be forgotten that it occurs as a *healthy condition* in many parts of the chest. In nearly every one, it may be heard on the sternum, above the clavicles, and between the scapulæ. In most persons it exhibits itself as a distant and indistinct sound over the chest generally; being louder in the upper than in the lower regions, and before than behind, and usually more distinct in the right than in the left lung. There is much variety in all these particulars; but it will commonly be observed that whenever natural bronchophony is much developed in the infra-clavicular regions, it is louder upon the right than upon the left side.

Morbid bronchophony varies in intensity, and is sometimes so loud as to be positively painful to the ear; but in general character, it is not

distinguishable from the natural type. As applied to the diagnosis of phthisis, I have found the following rules useful.—If there be an equal amount of bronchophony in both infra-clavicular regions, the left side is *probably*, but by no means certainly diseased, but if there be a positive excess in the left side, the apex of the left lung is *almost certainly* so: a greater development of vocal resonance, however, on the right side, is, for the reason already given, no indication of tubercular deposit, although it may be looked upon suspiciously should the excess be very highly marked.

In the majority of instances, morbid bronchophony is accompanied by bronchial respiration; but this is not necessarily the case, as it is often distinctly marked when the breathing is simply weak, harsh, or jerking.

If a person exhibiting bronchophony, instead of speaking, be directed to cough, a sound (*bronchial cough*) varying in intensity, and often painfully loud, will be communicated to the ear. Similar remarks apply to this as to the bronchial voice or bronchophony; and, for the same

reasons, it may be estimated in like manner, and tested by similar rules.

There are certain physical signs connected with the *heart and circulation*, which, although uncertain in their occurrence and equivocal in their signification, may nevertheless be occasionally brought into use as auxiliaries.

The application of the heart's sounds to the diagnosis of phthisis rests upon the general law that in the left infra-clavicular region of a perfectly healthy chest, they are rarely sufficiently loud to interfere with the auscultation of the breathing, and would generally escape observation unless particularly attended to; whilst in the corresponding part of the right side, they are very much more feeble and sometimes quite inaudible. Should there be, however, any consolidation of either apex, the cardiac sounds may be conducted with more or less intensity to that particular spot.

If the sounds of the heart, therefore, be *more distinctly* heard beneath the right than the left clavicle, it is very probable that some consolidation may exist at the apex of the right lung; and even if the cardiac sounds be heard only

equally well in both these positions, the circumstance would be *suspicious*, and would give increased weight to any other doubtful signs which might exist in the same region.

It is obvious, however, that this sign is chiefly, if not exclusively applicable to the detection of disease in the *right* lung; since, however much it may be developed at the apex of the left lung, such development, very possibly, may not be morbid, but the result either of some peculiarity connected with the conformation of the chest, or of unusual intensity of the heart's sounds themselves.

It is important, moreover, to recollect that when the heart's action is increased,—as in many cases of dyspepsia, hysteria, and other nervous affections, as well as in cases of real disease either of the heart or of some of the larger blood-vessels in its immediate neighbourhood, the cardiac sounds may be conveyed a long distance from their source, and may even be distinctly heard over the entire chest; so that *it is only in cases in which the organs of circulation are known to be neither functionally nor organi-*

cally affected, that this sign is of the least value in the diagnosis of phthisis.

A subclavian murmur, usually of a soft and blowing character, is occasionally heard in pulmonary tuberculosis even at an early stage, in consequence of the subclavian artery being more or less pressed upon by the indurated or contracted lung. When, however, we consider that the very circumstance essential to the production of such a murmur implies a condition of local disease sufficiently advanced to give rise to other and less doubtful proofs of pulmonary mischief; and when we remember, too, that vascular murmurs are common in a number of other and very different disorders, it is evident that the importance of this sign cannot be very great. Taken separately, indeed, I believe it to be valueless; but whenever a murmur limited to either subclavian artery is added to other suspicious indications, and when, as frequently happens, the diagnosis can only be based upon a number of doubtful or imperfectly developed signs, it may sometimes be of service as an auxiliary. For example:—I have met with cases in which, perhaps, slight

feebleness of breathing, or trifling differences in the percussion-sound, have been rendered more important by the addition of a subclavian murmur; the combination probably having justified a diagnosis which subsequent events proved to be correct.

I have noticed in a few cases of early phthisis that a subclavian murmur, inaudible during ordinary breathing, has become manifest towards the end of a deep inspiration; in these instances, the indurated portion of pulmonary tissue during the lung's expansion, was probably brought into contact with the subclavian artery.

A murmur in the pulmonary artery is not an uncommon attendant upon tuberculosis affecting the apex of the left lung, and is sometimes heard at quite an early period of the disease. In consequence, however, of the murmur as it occurs in a tubercular case, being in no respect distinguishable from that so frequently heard in simple anæmia, this sign is of no value by itself, although, like the preceding, it may occasionally be of use by giving greater weight to others.

CHAPTER VI.

THE FIRST STAGE OF PHTHISIS (CONCLUDED).

Dry crackling, subcrepitant, sibilant, sonorous, and crepitant rhonchi—Pleural friction murmur—Recapitulation.

THE earliest signs of pulmonary tuberculosis consist chiefly of changes which have been already considered; sooner or later, however, certain *rhonchi* or *râles* are developed in the seat of the tubercular deposit.

Chief of these in importance is the *dry crackling rhonchus*, since it is at once diagnostic of tubercle. The rest, *viz.*, the subcrepitant, sibilant, sonorous, and crepitant rhonchi, although often of great value in diagnosis, are of less import, being dependent upon inflammatory action, which may or may not arise from the presence of tubercle.

The *dry crackling rhonchus* is a short, dry,

sharp, crackling sound, heard chiefly, but not quite exclusively, during the inspiration. Its mechanism is not very easy to explain;* but *dry crackling* has been so universally and exclusively found to coexist with tubercles, as to leave no doubt of their relation to each other as cause and effect. The number of crackles varies; sometimes there is but one with each inspiration; at others, there are two, three, or even more. They are seldom heard at the very commencement of the first stage, but seem to denote rather an advanced, and advancing condition of the tubercular deposit. When once fully developed, they are generally persistent, and may be heard at nearly every subsequent examination, if not on tranquil at least on forced inspiration, until at length they pass insensibly into the *humid* crackling, which, as a sign of the second stage of consumption, will be spoken of in the next chapter. The dry crackling rhonchus either does not attend every case of phthisis, or it lasts too short a time to be detected; for I have watched many cases through their

* For a new and very reasonable explanation, see Dr. Fuller's work on "Diseases of the Chest," p. 129.

whole course without noticing it. Its duration is always variable: in some persons it is very rapidly transformed; in others it remains some little time, seldom, however, more than a few weeks. The longer it continues, the louder and more marked does it become, and the more liable to be heard with the expiratory murmur. It is, under any circumstances, an unfavourable sign, denoting the passage of tubercle from a state of latency to one of more or less activity.

The dry crackling differs so essentially from every other râle, that it only requires to be heard a few times to be ever afterwards recognised. The subcrepitant rhonchus is the only one for which it can be mistaken. The distinction, however, is sufficiently easy. The one is small, dry, clear, and *crackling* in its character; the other larger, moist, and *bubbling*.

Of the other rhonchi met with during the first stage, the most important, because the most common, is the *subcrepitant*, produced by secondary bronchitis in the smaller or capillary tubes. The value of this sign, however, is altogether dependent upon its position and the symptoms accompanying it, since, precisely

the same rhonchus also results from idiopathic or non-tubercular bronchitis. It is easily distinguished by its moist and *bubbling* character already adverted to.

The period of development of the *subcrepitant rhonchus* is subject to much variation; sometimes it is met with in an early condition of the first stage, but more generally it is delayed until the tubercular deposit has existed some little while. It is of all râles the most common, there being few, if any cases of phthisis, which fail to exhibit it at some period or other. Sometimes the rhonchi are small, few, and limited in position; sometimes they are larger, more abundant, and scattered; indeed, great variety is met with in this respect, according to the extent and severity of the accompanying bronchitis; sometimes they are sufficiently evident during ordinary breathing; but very often they require a deep and voluntary inspiration to develope them.

Subcrepitant rhonchus, when secondary to tubercular deposit, usually occurs either in one lung only, or is more developed in one lung than in the other, and principally occupies the apices

of these organs; but when it is dependent upon idiopathic inflammation, it is generally present in both lungs, and in a nearly equal degree, and is principally, if not exclusively, located at their bases. The distinction between a *local* and a *general* capillary bronchitis is, for the most part, quite as easy as it is important. *A local capillary bronchitis, indicated by more or less subcrepitant rhonchus limited to the apex of one or both lungs, may be almost certainly pronounced to be dependent upon tubercle.*

It occasionally happens that consumptive persons are attacked with capillary bronchitis, severe in its character, and pervading both lungs. In some such cases, the greater prevalence of subcrepitant râles at the apex than at the base of these organs, points at once to the diagnosis; but when, as frequently occurs, the rhonchi are somewhat equally diffused, it is very difficult, and perhaps impossible, during the height of the attack, to detect the tubercular disease. But as the inflammatory symptoms decline, the difficulty is generally removed; the subcrepitant rhonchus, instead of disappearing last, as in the

idiopathic variety of bronchitis, at the bases of the lungs, lingers about their apices, and thus tells of the tubercular complication.

Sibilant and sonorous rhonchi—likewise indicative of bronchitis, but situated in the larger bronchial tubes—are often met with in phthisis, as well in its early, as in its later stages. In consequence, however, of the purely local bronchitis of tubercular irritation being naturally situated in the smaller and not in the larger bronchial tubes, sibilant and sonorous râles when they occur, are seldom limited to the lungs' apices, but are more or less scattered throughout the chest—denoting, in fact, a *general* and not a *local* form of bronchial inflammation. Very often they are found associated either with local or general *subcrepitant* râles, complicating the case very materially, and indicating, especially in the latter instance, a more or less extensive and severe amount of bronchial complication.

Far from aiding in the diagnosis, these larger rhonchi tend oftener than not to complicate it, by obscuring, or changing the quality of, the respiratory murmurs. When this is the case, it

is safer not to hazard a decided opinion as to the presence, or otherwise, of tubercles until the bronchial attack is subsiding. If the rhonchi be then found to linger about the upper parts of the chest, there is, very probably, tubercular complication; the sibilant and sonorous râles of idiopathic bronchitis being generally last heard about the bases or the middle of the lungs.

It nevertheless happens occasionally that a sibilant rhonchus of a strictly local character is heard at the upper part of the lung. Such a circumstance is certainly unusual, but when it occurs, may be regarded as strong corroborative evidence of the presence of tubercle.

Crepitant rhonchus, or the "fine crepitation" of pneumonia—consisting of a number of minute, clear, dry, and crepitating sounds, precisely resembling each other, and regularly and rapidly produced—is much more rare in the seat of tubercle than might be supposed, owing to the local inflammation produced by the morbid deposit being much more frequently situated in the smaller bronchi than in the lung tissue itself. In the few cases in which it is met with during the first stage the disease

is usually rather advanced, the respiratory murmurs being sensibly altered, and the percussion-sound more or less dull. It is at any period an unpromising sign, far more so than the subcrepitant rhonchus of capillary bronchitis. Viewing it in relation to diagnosis, it must always be taken in connection with other physical signs; since, primary or idiopathic non-tubercular pneumonia, although usually seated in the middle or lower parts of the lungs, may possibly attack their apices.

During the second and third stages of phthisis —especially the latter—the crepitant rhonchus becomes more frequent and less limited in situation; secondary pneumonia, as I shall presently have occasion to mention, increasing in frequency with the advance of the disease.

Pleural friction murmurs localised to the seat of tubercle are uncommon during the first stage of phthisis. The acute pains so often felt in the clavicular regions at this period are unquestionably often due to local pleurisy; but whether from its evanescent nature, or from other causes, a friction-sound is seldom met with at the seat of pain. In the few cases where

I have detected it, other signs sufficiently indicated the tubercular condition, the first stage of the disease being considerably advanced. Pleural rubbing becomes more common as the disease progresses, but at no stage of phthisis does it amount to more than a help to diagnosis. When seated at the apex of either lung it may be taken as strong corroborative evidence of the existence of tubercle; but like the fine crepitation of pneumonia it requires to be considered in relation to other signs, since primary or idiopathic pleurisy also sometimes attacks the upper regions of the chest.

Having now completed the consideration of the physical signs of the first stage, I would again observe that the greatest variety will be encountered in their development and association. One patient may afford sufficient proof of the disease chiefly by the character of the respiration; another, by that of percussion, or by the presence of rhonchi; a third, by thoracic vibration and vocal resonance; and a fourth may have several or even all of these combined.

But I would again urge the necessity of not regarding any one sign as evidence of tubercles,

unless it be found to harmonise with others, as well as with some of the general symptoms of consumption.

It may be useful to recapitulate briefly all that we have hitherto discussed; and, perhaps, this cannot be done better than by describing an imaginary case of phthisis in its first stage.

We will suppose that a person presents himself with some one or more of the general symptoms of consumption, but too obscurely and equivocally marked to determine the nature of his malady. Upon examining his chest, it is possible that there may be a slight bulging beneath one of the clavicles, but far more probable either that there is no visible difference in the two sides, or that one infra-clavicular region is somewhat depressed. Either of these circumstances excites suspicion, but is not sufficient to justify any conclusion, and we proceed further. We watch the ordinary movements of the chest, and afterwards direct the patient to take some full inspirations, when, perhaps, the upper regions of the two sides are not expanded equally; and if the diminution correspond with either of the preceding signs, there is reason to suspect

phthisis; but as it may happen that no very evident difference is discoverable, or that the change is too trivial and uncertain to be depended upon, we proceed with our examination. Upon the suspected part we place the hand lightly whilst the patient speaks, when perhaps we may discover an increase of vocal fremitus; —or we ascertain whether the heart's sounds are unduly conducted to that point, recollecting that the former sign is chiefly available on the left, and the latter on the right side;—or we listen for a murmur in the subclavian artery, taking care, however, not to place too much reliance on its discovery. One or more of these will probably strengthen the idea of the case being tubercular; but we still need further proof. We next percuss, and find, perhaps, more or less dulness and resistance above, upon, or beneath the clavicle, or in the upper scapular region. The stethoscope now comes to our assistance to determine the value of the previous signs; the respiration is found perhaps weak, harsh, or jerking; or, the expiration is prolonged beyond a healthy limit; or, perhaps the case is sufficiently advanced to

render the breathing somewhat bronchial. We have now scarcely any doubt of the patient being phthisical, yet, should we discover a morbid degree of bronchophony or of bronchial cough, or a localised friction murmur, or the fine crepitation of pneumonia, the case will be still more decided. Should there be during either ordinary or deep breathing a few subcrepitant rhonchi about the lung's apex—the indication, as already explained, of a local capillary bronchitis, the evidence is yet more complete. But, should we hear the dry crackling rhonchus, it would be at once decisive.

It might happen, perchance, that the case is not quite so simple, in consequence of our patient suffering at the time from general bronchitis either of the larger or smaller tubes, or of both, which, by altering the quality of the natural breath-sounds, or by producing a mucous secretion through the lungs generally, either lessens or destroys the value of many of the signs. Should this be the case, we must not be too hasty in our diagnosis, but wait until the attack is declining, and then notice whether the rhonchi linger about the apices of

the lungs, which is pretty sure to happen should they be associated with tuberculosis.

It must not be supposed, however, that in practice it is necessary to go thus minutely into every case. To do so would be scarcely less wearisome to the physician than to the patient. It is sufficient to make out distinctly some of the more important signs, and to examine and compare them with the general symptoms.

CHAPTER VII.

THE SECOND STAGE OF PHTHISIS.

Increase of physical signs previously described—Humid crackling rhonchus—Large subcrepitant rhonchus.

An acquaintance with the physical signs denoting the commencement of the second stage or that of tubercular softening, is of great importance, because, under favourable circumstances, it sometimes happens that the first stage extends over months or even years; but so soon as softening begins, the disease commonly progresses in an increased ratio, and medical treatment becomes less effective.

Although about this time the general symptoms usually declare a considerable advance in the malady, there is nothing about them to point out with any degree of certainty, even to the most practised observer, the real state of the lungs—a circumstance showing at once the value of physical examination.

Of the majority of signs attending the second stage little more is requisite than a brief enumeration, since, with a solitary exception, they chiefly consist of a greater and more unequivocal development of those already explained as belonging to an earlier period. But even in this respect there is great diversity. Sometimes a comparatively small amount of hard tubercle —too small, perhaps, to have given rise to many well-marked physical signs, suddenly undergoes transformation ; at other times, the tubercular deposit has accumulated to such an extent, or has existed sufficiently long, to have produced decided evidence of extensive pulmonary disease, long before the softening process sets in.

Taking, however, the ordinary run of cases, a patient in the second stage of phthisis—in addition to the impaired movement and altered configuration of the thorax *generally*, which has already been described,—will exhibit the infra-clavicular region of one side more or less flattened and less capable of expansion during ordinary and forced breathing than the other. If the hand be applied to that part, both vocal and

tussive fremitus will be found more or less. On percussion, the affected part will probably exhibit more distinctly than formerly both dulness and resistance; or it will present that peculiar hard, heavy, incompletely dull, and somewhat jarring sound which has been so aptly termed *wooden*.* The respiration will probably possess some of the morbid characters already described—most frequently it will be found harsh or bronchial. The sounds of the heart will often be unnaturally loud on the diseased side; and bronchophony and bronchial cough will be much more developed. Some of the rhonchi, indicative of secondary inflammation, will very likely be present; the subcrepitant, or that of capillary bronchitis, however, being by far the most common.

* The wooden percussion-sound, as a general rule, is not thoroughly developed until about the middle period of phthisis; but to this there are numerous exceptions. Sometimes it is well marked before the commencement of the second stage. An extensively, but still incompletely consolidated lung, more or less bound to the thoracic wall by thickened pleura, seems to be essential to its production; it never attends either simple pneumonia or pleuritic effusion.

Such a catalogue of symptoms is given merely to show what may be expected, to a greater or less degree, in the majority of cases. Much variety will be found in their association; and *none of them can be regarded as any proof of the tubercles having softened.* I sometimes meet with patients, unquestionably in the second stage of phthisis, who so slightly exhibit these symptoms, that were it not for other indications, even the tubercular nature of their disease might easily be overlooked; whilst, on the other hand, I as often meet with those in whom they are so strongly developed, as to lead to the suspicion of a stage even more advanced.

We look in vain for any line of separation between the first and second stages of consumption. The one glides insensibly into the other; the only difference between them consisting in the altered state of the tubercular deposit.

Fortunately there is nothing easier than to detect even the very beginning of the softening process. The *humid crackling* rhonchus,—a sound so peculiar as to be readily distinguished,—has only to be heard at the seat of the disease, and the evidence is complete.

A knowledge of this rhonchus, therefore, being so important, I may be excused for entering rather minutely into its description. It is a moist, sharp, clear, *clicking* sound, occurring generally only once or twice, but sometimes three or even four times with each respiration, and chiefly, but not exclusively, during the inspiration. It varies in intensity, being sometimes scarcely audible, at others loud and clear. Under whatever circumstances, however, it may be developed, it never loses its *clicking* character; so constant, indeed, is this, that I am in the habit of designating the rhonchus—*the humid click*. There is but one other râle for which it can be mistaken, and that is the subcrepitant; the difference between them is, however, sufficiently obvious, the one being *bubbling*, the other *clicking*. The two are often associated, but even then it is quite easy to distinguish them.

The *humid* crackling commonly has its origin in a gradual transformation of the *dry* crackling rhonchus; but this is not necessarily the case. The dry crackling always passes into the humid; but the latter sometimes commences indepen-

dently, and without being preceded by the other. Of the accuracy of this statement, I have had several opportunities of satisfying myself.

I might illustrate, in various ways, the value of this rhonchus; but one may suffice. I was once puzzled by seeing a patient suffering under most of the general symptoms of advanced phthisis, but in whose chest I failed to detect tubercular disease, simply because it was at first carefully looked for only in the ordinary place of its occurrence, viz., the apices of the lungs. Upon examining their bases, however, the percussion-sound at the very lowest part of the ight lung was found to be quite dull, whilst only two inches above this, it seemed to be tolerably natural. The respiration was entirely absent where the sound was dull, except on deep inspiration, when it was strongly bronchial; whilst at a point scarcely three inches from the very base, it was hardly changed from that of health, all the rest of the lung seeming to be quite sound. There could be no doubt from such signs, that there was a very limited consolidation at the base of the right lung; but it became a question, whether this depended upon

simple chronic pneumonia, or upon a pneumonia secondary to tubercular deposit occurring out of its usual locality—a question of no little importance to the patient. The difficulty was at once solved by further auscultation; two or three *humid clicks* were to be heard with each inspiration, and tubercular softening was the diagnosis. Subsequent events proved its correctness, for, in the course of but a very few weeks, there were all the physical signs of an extensive vomica in the place of the former dulness, and the patient ultimately died of phthisis.

The mechanism of the *humid click* is as difficult to explain as that of the *dry* crackling rhonchus; but for all practical purposes this is immaterial; it is sufficient to know that, under all circumstances, it tells of softened tubercle. The duration of this râle is variable; but after a time it becomes larger, louder, more humid, and more or less *metallic* in its quality, and ultimately passes into the cavernous rhonchus, which characterises the third (or final) stage of the disease.

It must not be supposed, however, that the

humid crackling rhonchus always serves as a guide to the second stage of phthisis. The conditions essential to its production are sometimes wanting, as in many cases it is either very transient or perhaps never developed, appearing to be supplanted by a very liquid and large form of subcrepitant râle.* I do not regard such a râle as distinctive of the second stage, since it may accompany other pathological conditions; but whenever there is heard at the apex of a tuberculous lung one or more large, somewhat loud, and very bubbling subcrepitant rhonchi, it may fairly be concluded that the softening process is going on, more especially should the general symptoms indicate an advanced or advancing condition of general disease. Not unfrequently this variety of subcrepitant râle is combined with humid crackling, the two running on together, and ultimately passing

* This râle is very like the *mucous* rhonchus, and by some would probably be called "muco-crepitant;" but in order to avoid a multiplication of terms, I prefer to regard it simply as a large and highly developed form of the *subcrepitant*.

into the rhonchus characterising the third stage of the disease.

After softening has begun, as well as during the whole of the second stage, the neighbourhood of the tubercular deposit is more liable than before to become the seat of secondary inflammation. The *crepitation* of pneumonia, sometimes limited to the neighbourhood of the tubercular deposit—sometimes of a more general character, is occasionally met with; but the *subcrepitant* rhonchus of capillary bronchitis is by far the most common. This form of bronchitis, indeed, is almost certainly present, to a greater or less degree, during the second stage of phthisis, the softening process seeming not only to have a special tendency to excite inflammatory action in the neighbouring capillary air-tubes, but also to favour its extension to other parts of the lung. Sibilant and sonorous rhonchi likewise are frequently met with; but they merely announce a complication of bronchitis of the larger tubes, and are generally heard over the entire chest. Pleural friction murmurs also sometimes occur; the pleura also seeming at this period to have

an increased tendency to secondary inflammation.

It will generally be found that the softening process commences at that part where there were the earliest signs of tubercle; and that the neighbouring portions of lung where there was formerly no appreciable deviation from healthy condition, will now exhibit more or less evidence of incipient tuberculosis. It would seem that there is often about this period a great tendency to the further deposition of tubercle,—the effect, probably, of that same reduction of power in the patient and extension of the disease under which the earlier tubercles have become softened.

Hence, it frequently happens, that we can observe, in the same patient, the blending of the first and second stages, and at the same time, the distinctive marks of each. There is, perhaps, at the upper part of the lung* a humid *click*, which may or may not be associated either with the

* The *very apex*—above the clavicles—is a part which often escapes examination. It is, however, one of great importance, the earliest signs of tubercular softening and cavity being frequently found in that situation.

dry crackling rhonchus, or with the ordinary subcrepitant rhonchus of capillary bronchitis, or with the larger variety of this râle to which I have just now alluded, whilst lower down there may be a few *dry* crackles. The percussion-sound shows, perhaps, a corresponding gradation,—the dulness or the wooden note which may have been greatest at the summit gradually diminishing as we descend, until it becomes lost in the clear sound over the yet unaffected bases. The respiration is, perhaps, equally changed; being bronchial where the sound was dullest, and harsh, weak, or jerking lower down; until in the inferior parts it is found nearly, if not quite, healthy.

We cannot, however, expect to find every case thus clearly marked. Some patients will exhibit one change more than another, and we shall meet with almost endless variety in the grouping of the several signs; yet there will seldom be any practical difficulty, since the existence of the *humid click* at once determines the presence of the second stage; whilst the large, highly liquid, and bubbling variety of *subcrepitant* râle, of which I have spoken, is

quite enough to render it extremely probable. And thus we may rejoice that whilst the passage of the hard into the softened tubercle is of such great importance in connexion with prognosis, it is in general easily detected by auscultation.

CHAPTER VIII.

THE THIRD STAGE OF PHTHISIS.

Increase of physical signs previously described—Cavernulous rhonchus — Percussion-sound of cavities: amphoric resonance: cracked-pot sound—Cavernous respiration—Amphoric respiration—Cavernous rhonchus—Metallic tinkling and echo—Pectoriloquy—Cavernous cough — Amphoric voice and cough — Pneumothorax—Hydro-pneumothorax.

The third stage of phthisis, or that in which cavities exist in the lungs, is in general easily recognised by physical examination.

Although, at this period of the disease, the general symptoms are often so conspicuous as scarcely to leave a doubt of the pulmonary condition, it is not very uncommon to find persons whose appearance, notwithstanding the presence of large vomicæ, is so deceptive, that without the aid of physical signs, the existence even of phthisis might not be suspected. Hence

it is that a familiarity with the signs of pulmonary excavations becomes of quite as much importance as that of the earlier stages.

There is no positive line of separation between the second and third stages; one passes imperceptibly into the other; and cases sometimes occur in which it is difficult to decide between the two; but so soon as there is proof of the smallest excavation, the third stage may be said to have commenced.

It is unnecessary to enter minutely into all the physical signs belonging to this period, because the majority of them merely consist of an increase of those already described. There is generally a falling inwards at the summit of one or both lungs, the antero-posterior diameter of one or both infra-clavicular regions being more or less decreased even to the naked eye; and, on full inspiration, the movement of that part of the chest, and often of the whole side, is more or less diminished. It does not follow, however, that the side most depressed is always the most diseased; the softening and destructive process which has produced the vomica, having sometimes so liberated the

lung previously contracted and bound down by old pleural adhesions, as actually to restore some of the expansive power of the diseased part.

There is, of course, much variety both in the degree and association of these changes, according to the previous duration of the disease, the amount of the tubercular deposit, and the pathological condition of the surrounding lung. Sometimes there is little or no alteration in the form of the chest;* but in most cases the changes are sufficiently marked, and in some few instances the pulmonary contraction is so great as to produce even a lateral curvature of the spine. But however extensive such changes may be, it is manifest that they announce nothing more than an advanced condition of local disease, and that we must seek for further signs before we can safely determine the precise stage of the tubercular affection.

It was mentioned in the preceding chapter, that the humid crackling rhonchus becoming

* Such a statement may excite surprise. I have, however, seen several cases of vomicæ, even of some size, where the outward form of the chest was symmetrical and perfect.

gradually more moist, and assuming a *metallic* quality, passes almost insensibly into the *cavernous* rhonchus; and that the large and liquid variety of the subcrepitant râle, which often either supplants or is associated with the *humid crackling*, also undergoes a similar transformation.

Some auscultators speak of a *cavernulous* rhonchus as a râle intermediate between the sounds of softening tubercle and the true *cavernous* or *gurgling;* and although this has been considered by others as an unnecessary refinement, it is really not so, such a rhonchus being frequently met with. As its name implies, it is suggestive of a cavity as yet small and limited. It is a clear, liquid, bubbling, and *metallic* sound, taking place with inspiration and expiration, but more often with the former, and varying in loudness and frequency. There is generally associated with it either a bronchial or a harsh respiratory murmur; true cavernous breathing not being as yet fully developed. Its duration is variable, being, of course, dependent upon the advance or otherwise of the softening process; sometimes it is too brief or too ill-defined to be recognised, the

humid crackling, or the large, liquid *subcrepitant* rhonchus appearing to pass abruptly into the true cavernous râle.

Before describing the *cavernous* rhonchus, it will be more in accordance with the plan hitherto adopted in this little work, to consider, in the first place, other changes also indicating pulmonary excavation. I shall therefore take, in their order, the *percussion-sound*, the *respiration*, the *rhonchi*, and the *vocal resonance* which distinguish this stage of the disease.

Percussion-sound. Every variety of sound, from absolute dulness to that degree of morbid resonance which is termed amphoric, may attend percussion over a cavity, according to its size, position, and the state of the surrounding parts; the force employed, also, makes a considerable difference, since, if the stroke be gentle, the sound will proceed from the superficial, and if hard, from the deeper parts. Positive dulness, or else the peculiar *wooden* percussion-sound previously described, together with a resisting and inelastic state of the thoracic wall, is by far the most common. Cases, however, now and then occur where the clear-

ness of the cavity seems so to counterbalance the dulness of the neighbouring induration, that the percussion-sound is scarcely altered from that of health, and it is only by the sense of resistance to the stroke, and the marked inelasticity of the thoracic walls, that the pulmonary mischief is suspected. When the cavity is very large, and either seated close to the surface or separated from it only by indurated lung or thickened pleura, the percussion note is often morbidly clear, or, as it is termed, *amphoric*,—a character very peculiar, and closely imitated by filliping the cheek when the mouth is inflated. Between the *wooden* and *amphoric* note there is no distinct line of separation, the one gradually and insensibly passing into the other.

Whenever the percussion note has even the slightest approach to the amphoric quality, it frequently happens, especially if the stroke be given sharply and rather abruptly, that a new sound is developed, so peculiar in its character, as to decide at once the state of the case. Laennec first described this under the name of "bruit de pot fêlé." It is impossible by any

description to do justice to its peculiarity,—it can only be learned by the ear; but it exactly resembles the sound produced by striking an empty and cracked pipkin. For the perfect development of this *cracked-pot sound*, it is necessary that the cavity should be large, tolerably dry, and freely communicating with the bronchial tubes. The mouth of the patient also should be widely opened whilst the chest is being percussed, and his head turned towards the auscultator. Except in some rare instances, there is no "*bruit*" if the mouth be kept closed. The bruit often ceases to be heard after the first or second percussion stroke, and can by no effort be reproduced until after an uncertain but sometimes considerable interval; occasionally it requires several strokes to produce this result; but even in those cases where the *cracked-pot sound* is most fully and continuously developed, it will generally be found that repeated percussion fails to elicit it so distinctly as at first.

It sometimes happens that the percussion-sound over a lung much contracted by thickened pleura—although very slightly or perhaps

not at all excavated, closely resembles the *bruit de pot fêlé*—so closely, indeed, that it requires some amount of practical experience to distinguish the difference. This, however, is only the *wooden* sound highly developed, and is free from the metallic and *ringing* quality so characteristic of the *cracked-pot* sound. I have been accustomed to speak of it to students as the *pot sound* simply, the better to distinguish it from the real *cracked*-pot sound, which I believe is at once diagnostic of pulmonary cavities, and never exists, *at least in the adult*, under any other pathological condition.* In many children, however, even when in perfect health, the natural percussion note now and then bears a very close, or even a complete resemblance to the cracked-pot sound; so that, in patients who are young—say, under ten, or at most, twelve years of age, this sign may be considered as of no value in diagnosis, unless it be strictly limited to one lung, and at the

* To the confusion of these two varieties of sound is probably due the statement of some auscultators that the *bruit de pot fêlé* is quite as often heard in *consolidated* as in *excavated* lungs.

same time accompanied by other evidence of the presence of a vomica.*

Respiratory-sound. Cavernous respiration, which is in general easily recognised by its dry, hollow, blowing, and *metallic* qualities, usually commences in the gradual increase of the bronchial type; but it may succeed any other morbid variety of breathing, or it may begin in spots, where scarcely any respiratory murmur could be previously heard.

Intense bronchial respiration sometimes closely resembles the cavernous; and the confusion of the two has often given rise to unnecessary alarm, and thrown undeserved discredit upon auscultation. To the practised ear, however, the differences between them are generally pretty evident; the one being rough and more or less blowing and diffused; the other, distinctly hollow and *metallic*. It is only, indeed, in the absence of secretion in a cavity that a mistake is likely to happen, since in doubtful cases, if the chest be listened to whilst the patient is either coughing or taking

* For fuller information upon this subject, see a paper by the author in the *Lancet*, April 4th, 1857.

a forced inspiration, the production of a *cavernous* rhonchus would at once decide the question.

Where the cavity is of some extent, the respiration may assume the character termed *amphoric*, which is easily recognised by its *metallic* quality, and its close resemblance to the sound caused by blowing into an empty bottle. Amphoric respiration is generally, but not invariably, attended by *amphoric resonance* on percussion; and the *bruit de pot fêlé* is its very frequent accompaniment.

It is a question of some interest, whether, from the quality of the respiration, we can form a tolerably correct estimate of the size of a cavity. To a certain degree, I believe it to be possible, by its loudness, tone, and extent; but where there is much surrounding consolidation, we may easily be misled by the sound of what is, in reality, but a small vomica, becoming more diffused. After a little experience, however, the respiratory sound becomes in a great measure indicative both of the extent and situation of the cavity. How *small* an excavation may cause cavernous respiration, is a question upon which it is not easy to decide; much must, of

course, depend upon its position,—but I have several times seen one diagnosed, which, after death, was found of less size than a walnut; although I believe that vomicæ of this size will, oftener than not, pass undetected.

Cavernous breathing is sometimes temporarily absent, even in vomicæ of considerable size. This may arise from several causes,—such as the blocking up of the bronchial tubes opening into the cavity; or from the vomica itself being completely filled with its own secretion; or even from the feeble respiratory power of the patient. In cases also of extreme emaciation, partly owing to a difficulty in closely applying the stethoscope, and partly perhaps to the loud blowing character of the general breathing, the cavernous respiration, even in a vomica of some size, may now and then escape detection.

Rhonchi. Cavernous rhonchus has many varieties, according to the amount and consistence of the secretion, and the size of the cavity; sometimes it resembles the bursting of large bubbles,—at others, the agitation of some thick and viscid substance—whence it is often termed *gurgling,* and very frequently it is clear and

ringing, appearing as though there were something actually *metallic* within the vomica; but in all instances it conveys the idea of *metallic hollowness*, and can scarcely fail, even to the most inexperienced, to tell at once of the seat of its production. Its loudness varies in every possible degree; occasionally it may be distinguished at some distance from the patient's chest; and not unfrequently it is heard by the patients themselves, enabling them to point out the situation of the cavity. It is most commonly heard with the inspiration, but it may accompany either murmur.

Cavernous rhonchus very often completely masks the cavernous breathing. Either of these may exist without the other; and sometimes the rhonchus is the sole evidence of the pulmonary cavity.

The secretion of cavities situated near the heart is sometimes so agitated by the action of this organ, as to give a peculiar ticking sensation, which is compared by the patient to that of a clock. To the auscultator this sound, which is usually clicking, metallic, and syn-

chronous with the cardiac pulsation, is very singular and characteristic.

Sometimes there is heard in vomicæ a peculiar plaintive creaking sound, rather of a dry quality, and more like the sibilant than the cavernous rhonchus. Of its mechanism, I will not hazard an opinion; but whenever I have noticed it, the pulmonary disease has been chronic and quiescent, and the cavity itself apparently undergoing contraction. I shall have occasion to speak of this again in a subsequent chapter.

In some rare cases, where the amphoric character of the physical signs denotes a vomica of very large size, when the patient coughs or speaks or breathes rather forcibly, and sometimes even when he is quite tranquil, *metallic tinkling* becomes developed.

It would be useless to enter into the many speculations as to the cause of this phenomenon; it will suffice to state that metallic tinkling is a clear, abrupt, and ringing sound closely resembling that of a sharp metallic substance falling into a glass or metal jar; and

that it declares the existence of a hollow space containing a fluid.

My own experience would lead me to the conclusion that true metallic tinkling is very rarely met with in tuberculous cavities, even when they are of considerable size. Some auscultators have regarded it as far from uncommon; but I much suspect it is often confounded with the clear metallic variety of cavernous rhonchus. The two certainly have some characters in common; but it is only necessary to hear once the peculiar *ring* of metallic tinkling, as it occurs in some cases of hydro-pneumothorax, to distinguish the differences between them.

Vomicæ of the left lung very frequently cause great disturbance of the heart's action, and in this way add materially to the distress of the sufferer; in such cases this organ is usually found more or less displaced upwards, having been drawn in that direction by the progressive contraction of the lung's apex. Displacement of the heart, however, is not limited to cavities upon the left side; it is also sometimes met with in cases of large contracted

vomicæ of the right lung; and I have seen several instances of the heart beating on the right side of the sternum from this cause.*

During the third stage of phthisis, other rhonchi of secondary origin are very generally present, not only in the vicinity of the cavity, but also in distant parts of the lung. The *subcrepitant* is especially common, and indicates the amount and extent of secondary capillary bronchitis. The *crepitant* rhonchus of pneumonia also, although far less common than the subcrepitant, is not unfrequently met with, particularly about the lung's base. *Pleural friction* murmurs likewise are more common than in the earlier stages, secondary pleurisy

* Whenever a vomica with the neighbouring portion of the lung undergoes contraction, one of two things happens; either the ribs and thoracic parietes over the diseased part fall inwards, or the heart or some other organ rises upwards to fill up the vacant space. In some cases the one occurs, in other cases the other; and in many instances, probably, there is a combination of the two. The heart being the most moveable organ is the most commonly affected in this manner; but the liver, and in a less degree other abdominal organs, also doubtless contribute to the general result.

being at this period not only frequent, but oftentimes essential to the patient's safety, by causing thickening and adhesions of the pleura, and thus preventing rupture into the pleural cavity, and its consequence—pneumothorax.

Vocal resonance. The cavernous voice, or *pectoriloquy*, is distinguished from bronchophony by the words being articulate, and seeming to arise from the stethoscope itself; so much, indeed, is this the case, that very often it appears as if the patient were actually speaking into the ear of the auscultator. For its perfect production it is necessary that the cavity should be only of moderate size, tolerably empty, not far from the surface, and communicating somewhat freely with the bronchial tubes. Unlike bronchophony, the tone of the voice does not affect its development; "*whispering* pectoriloquy," or that produced when the patient whispers, being even more characteristic, although of course less loud, than that attending the natural voice.

Of all the signs of pulmonary excavations, I believe pectoriloquy is the least to be depended upon. *Perfect* pectoriloquy, indeed, is of very

infrequent occurrence; and, unless it is perfectly developed, this sign is hardly to be distinguished from some of the varieties of bronchophony. The many circumstances just now spoken of as being essential to its production, sufficiently explain its rarity. I have seen more errors in the diagnosis of cavities from mistaken pectoriloquy, than from any other cause. Very often it is entirely absent when other signs unmistakeably point out the existence of a vomica; whilst it is seldom, if ever present, unless accompanied by other and better marked signs of the pulmonary excavation. For these reasons, therefore, I have long regarded pectoriloquy as a sign second in importance to many others, and have sought for it only on certain occasions, when perhaps other evidence has seemed incomplete.

In cases which exhibit pectoriloquy, the resonance produced by coughing is similarly modified, and we hear what is called the *cavernous cough*. This is a ringing, hollow, and metallic sound, apparently produced close to the ear, and often with sufficient intensity to cause a very painful sensation to the auscultator; it

is of the same value in diagnosis as the cavernous voice, and, when fully developed, is, perhaps, even more characteristic.

When the cavity is of very large size, and under circumstances favourable to the production both of the amphoric sound on percussion and amphoric respiration, the resonance of the voice and cough is very frequently attended by still further modification. When the patient speaks, the voice, instead of being close to the ear and articulate—as in pectoriloquy, has more the character of bronchophony, but is hollow and metallic, and from resembling the sound produced by speaking into an empty vessel, is termed *amphoric voice*. Precisely the same quality of sound attends the act of coughing, and the *amphoric cough* and *voice* will generally be found together.

Notwithstanding the numerous signs of pulmonary cavities which we have been considering, it is really not uncommon for many—nay, even all of them, to be so masked or so little developed, as to make it very possible for vomicæ even of considerable size to escape detection. I have, for example, on many oc-

casions, failed to discover any sufficiently marked physical signs of their presence in cases where, from previous examinations, I was satisfied of their existence. The absence of cavernous râles ; the feeble respiratory power of the patient ; the temporary occlusion of the cavity by its own secretions ; the co-existence either of emphysema, or of considerable bronchitis particularly of the larger tubes—indicated by loud sonorous rhonchi, are conditions likely to render the diagnosis of vomicæ sometimes obscure and difficult even to the most practised auscultators. In every case, therefore, in which we fail to discover a vomica, although other physical and general indications render its existence highly probable, it is a safe rule not to decide upon the actual stage of the disease until after a second, or even a third examination.

Coughing, or a few deep inspirations, will often develope the physical signs peculiar to cavities, when these had previously been either obscure or equivocal.

It is not always easy to detect the vomicæ of children. In early life the natural respira-

tion over the entire chest is usually so loud and blowing that it may very easily mask the cavernous character of any particular spot. All the physical signs, indeed, but especially those derived from percussion and the auscultation of the breathing, are, in children, at their very minimum. Cavernous rhonchus, when it exists, is, perhaps, the best help to diagnosis, being less likely than any other sign to be either obscured or overlooked; but it should ever be remembered that the more simple secretion sounds are frequently so modified in children by the natural loudness and rapidity of the breathing as to greatly resemble the cavernous râles. I have seen several cases both of acute bronchitis and of pneumonia in young patients, where, for such reasons, it was at first very difficult indeed to diagnose between these diseases and the lung softening and excavation of acute phthisis.

The only condition at all likely to be mistaken for vomicæ, from the evidence afforded by cavernous respiration, is extreme dilatation of the bronchial tubes; but this is a comparatively rare disease, more common in the centre

than at the apex of the lung, and in its general history and symptoms very different from the last stage of phthisis.

Pneumothorax is an occasional complication of phthisis, and may occur at any time after tubercular softening has commenced, but is most usual at a rather advanced period of the third stage. Its physical signs vary according to its extent, and the pathological conditions with which it is associated. When there is much previous adhesion of the pleura to the thoracic walls, the escape of air is often very limited both in situation and amount; but when the lung is less closely attached to the parietes of the chest, the pneumothorax is of a more general character, and may even occupy more or less of the entire side. It frequently happens, too, that what was at first but a limited pneumothorax becomes, by degrees, a more general one, owing to the giving way of some slight or recently formed pleural adhesions, which had previously bound down the lung.

In proportion to the extent of the pneumothorax there will be found a greater or less distension or bulging of the intercostal spaces,

together with lessened or absent respiratory movement, and a morbidly clear or *tympanitic* sound on percussion. The respiratory murmur will be found either very feeble, or inaudible, or else amphoric, according to the extent of the pneumothorax and the kind of opening into the pleura. When the newly formed pleural cavity is but small, the breathing will be either altogether suppressed or simply weak, according to the character of the opening; but when the pneumothorax is considerable, the respiration will be either completely absent, or else amphoric, depending upon the same cause. The respiratory sounds indeed are altogether determined by the circumstance of the opening being *oblique* or *direct*. If it be oblique, it acts the part of a valve, which by preventing the escape of air from, and its re-admission into, the newly opened cavity, entirely does away with the respiratory murmur; but when direct, the air freely passing in either direction causes the respiratory sound, whenever the pleural cavity is sufficiently large, to be amphoric. In some cases these opposite conditions are found to alternate; at one exa-

mination, the breathing being perhaps weak or suppressed, at another, amphoric; and I have known them thus change even during the *same* examination. As regards prognosis, the direct opening is by far the most promising; air when confined in the pleura giving rise, as might be supposed, to more grave symptoms than when it has the means of free ingress and egress.

When the pleural cavity is of considerable size, *metallic tinkling* may be heard, either attending the ordinary respiration, or as the effect of the patient coughing, or speaking, or suddenly moving. It is an abrupt, clear, sharp, metallic, *ringing* sound, which cannot be easily mistaken for any other; of uncommon occurrence; rarely persistent; and appearing and disappearing at different examinations. Sometimes, instead of simple *tinkling*, the sound is more prolonged and diffused, and from seeming to vibrate and re-vibrate within the pleural cavity, is termed *metallic echo*.

One of the common and curious effects of pneumothorax is the alteration which it often induces in the previously existing physical

signs. If, for example, there had been a well defined vomica, immediately upon the occurrence of the perforation, all signs of a tubercular cavity may possibly disappear; and so of other indications of less advanced tubercular disease, these may either temporarily or permanently cease, or their local position may be changed. Such alterations, are of course, dependent upon the pressure of the escaped air upon the parts in its vicinity.

In cases of pneumothorax of the left side the heart is generally more or less displaced, according to the amount and situation of the escaped air. The displacement for the most part takes place *suddenly*, and not by slow degrees as in displacement from other causes. I have many times found the heart immediately after the seizure beating completely on the right side of the sternum. In pneumothorax of the right lung also, if the escape of air be to any great amount, the position of the heart is very frequently changed, although, of course, in a much less degree; in a right pneumothorax the liver also is sometimes displaced

downwards in proportion to the extent of the escaped air.

Both the duration and the consequences of pneumothorax depend upon its amount and the state of the opposite lung. When the other lung is but little diseased, the patient, after recovering the first shock, is sometimes relieved, and has his life prolonged by the seizure, the physical signs of the perforation slowly and gradually diminishing; but, on the other hand, when the lung upon the opposite side is already much disabled, the consequences to the patient may be severe and rapidly fatal;—and between these extremes there is, as might be expected, every conceivable shade of difference. Hence, in all cases of pneumothorax, it is very important to ascertain correctly the physical condition of the opposite side of the chest.

It is surprising how long a time a pneumothorax of moderate size may sometimes escape discovery, in consequence of the absence of its general symptoms. I have seen many cases in which it was detected only by auscultation, no previous symptoms in the patient having excited even the least suspicion of its presence.

Hydro-pneumothorax. After pneumothorax has existed some little time, and especially if it be rather extensive, the pleural cavity very frequently becomes more or less occupied by fluid, and the physical signs of *hydro-pneumothorax* are the result. These ordinarily consist of a mixture of those of simple pneumothorax, with those of pleuritic effusion. There is dulness on percussion, with absence of respiratory murmur at the base of the lung, changing its limits as the patient changes his position; the percussion sound above this point is *abruptly* clear or tympanitic, and the breathing either feeble or deficient, or else amphoric. *Metallic tinkling* or *echo* is very frequently heard. On gently agitating the patient's chest, a distinct *splashing* noise is sometimes audible. This, which is at once characteristic of hydro-pneumothorax, is of some interest, as the earliest known physical sign of pulmonary disease, having been noticed by Hippocrates. It is readily produced either by the auscultator or the patient, the slightest backward and forward or side to side motion of the chest being ordinarily sufficient to develope it, and sometimes

even with sufficient loudness to make it audible to bystanders. Very frequently this splashing sound, or *thoracic fluctuation*, as it is termed, is associated with metallic tinkling and echo. It may exist for a very long period, disappearing and reappearing according to the presence or absence of secretion in the pleural cavity.

CHAPTER IX.

ACUTE PHTHISIS: AND TUBERCULAR LARYNGITIS.

Acute phthisis differs from the chronic form of the disease mainly in its greater severity and shorter duration; it is, therefore, unnecessary to enter minutely into all its physical signs, since these consist chiefly of a modification of those already discussed.

Little value can be attached in really acute phthisis to the evidence afforded by percussion. In some instances, perhaps, the lungs' apices may furnish early proof of consolidation, but this is not generally the case. Oftener than not, the percussion note, at least at the commencement of the disease, will not serve to distinguish the attack from one of ordinary bronchitis. This is particularly the case in children, who, far more frequently than adults, are the subjects of this form of phthisis. I have seen the disease in

infants, when the percussion sound has been undistinguishable from that of health. As the disease progresses, however, especially in patients more advanced in life, there may be a variable amount of dulness at the apices, as well as in other parts of the lungs; the dulness appearing rather in irregular patches, than occupying any particular or large space.

The respiratory murmurs seldom afford any evidence of the real nature of the disease; they are generally feeble, harsh, or bronchial, but for the most part masked by accompanying râles.

The rhonchi first noticed are those indicative of bronchitis only, such as the sibilant, sonorous, and subcrepitant, the three often existing simultaneously, but the latter being the most frequent, and by far the most abundant. The fine crepitation of pneumonia is of uncommon occurrence. Sooner or later, however, the *humid crackling rhonchus* is pretty sure to manifest itself, associated with, and almost obscured by, other of the moist sounds. Very often this proves the sole guide to the true nature of the case; in three instances which, some time back, came under my notice, nothing had previously

indicated the formidable character of the disease.

The physical signs of acute phthisis seldom exhibit large vomicæ. The tubercular deposit usually being more diffused throughout the lung than in the chronic form of consumption, the pulmonary tissue is everywhere broken down by rapid softening, rather than by the more localised and chronic process in which cavities are ordinarily formed. I have seen but few cases of really very acute phthisis in which cavities could be distinctly diagnosed. The disease, indeed, is generally fatal long before large vomicæ can have time for their development.

Tubercular Laryngitis. This variety of the disease requires but little to be said about it, since it differs in nothing from ordinary phthisis, except in the addition of certain symptoms referrible to the larynx and trachea. It has, consequently, the same association and sequence of pulmonary signs, as we have been discussing throughout; although it often happens, that many of them, and especially those relating to the respiration, are masked or rendered valueless, either by the greater loudness of the morbid

sounds arising in the trachea or larynx extending themselves some distance below the clavicle to the exclusion of every other,—or else by the small amount of air which finds a passage through the larynx, causing the lungs, which might otherwise perhaps be tolerably expansible, to present but a feeble and deficient respiratory murmur. Hence it is, that in many of these cases, we are chiefly dependent upon percussion and inspection, in order to arrive at the physical condition of the chest, the state of vocal resonance likewise seldom affording much aid, owing to the modified or lost voice of the patient.

The respiratory sound in the healthy larynx and trachea differs from that of the lungs, in being loud, shrill, and blowing, and having the two murmurs of equal length, but divided from each other. *Morbid* tracheal respiration consists principally of the addition of harshness and loudness to these qualities, and the occasional association of rhonchi either of the sonorous and sibilant character peculiar to the larger bronchial tubes, or of the gurgling nature of those generated in cavities. Any further distinction

of such sounds I believe to be altogether valueless; because, whenever the larynx or trachea becomes the seat of tubercular disease, the general symptoms are sufficiently evident; and I doubt the possibility of any physical signs informing us of the actual pathological condition of the laryngeal mucous surface,—for example, whether, and if so, to what degree, it is either thickened, softened, or ulcerated.

In laryngeal phthisis, therefore, we find the respiration over the trachea unusually loud, shrill, and harsh, and accompanied or not with sibilant, sonorous, or gurgling râles, according to the presence or otherwise of secretion, and the consistence of such secretion.

The physical examination of the larynx is of comparatively little importance to that of the lungs. It is useful, however, to have a general acquaintance with the phenomena it presents, in order that sounds originating in the upper part of the air passages, may neither be falsely ascribed to the lungs, nor mislead us, by masking the proper characters of the pulmonary respiration.

CHAPTER X.

Physical signs indicative of arrest or improvement of the pulmonary disease in the several stages of phthisis.

The first stage. We have already seen that one of the earliest and most common deviations from healthy breathing consists in simple weakness, associated, perhaps, with more or less harshness, of the respiratory murmur. It follows, therefore, that a return to this condition from any more advanced changes in the breath sounds, is at once an indication of improvement. If, for example, the respiration after having been bronchial, or jerking, or extremely harsh, should become merely feeble, the change may be hailed with satisfaction. If, in addition to this, the general symptoms should be equally encouraging, it would seem to matter little should such weakness of respiration continue, or even become a permanent condition, since a lung

once tubercular will probably never quite regain its former amount of healthy function, although it may have ceased to be the seat of active disease. I have seen, as already remarked, many cases in which a mere comparative weakness, combined, it may be, with some harshness of breathing, constituted the sole evidence of former mischief. The jerking respiration also may remain for a long period without indicating an advance in the disease; it is, however, unusual for this variety of morbid breathing to become permanent; either it passes into the bronchial variety, indicating an advance of the mischief, or it gradually changes into the weak type, which equally points to improvement. Similar remarks are applicable to prolonged expiration.

At a more advanced period of the first stage, after secretion sounds have been developed, improvement or arrest of disease is far more easy to determine,—a simple diminution of rhonchus, and still more, the loss of it, being a most encouraging circumstance:—just as increasing secondary bronchial inflammation, denoted by subcrepitant rhonchus, points to advancing dis-

ease, so of course does the loss of such rhonchus indicate improvement.

In considering the evidence of decrease or arrest of the local disease in its first stage, we have, in fact, to invert the order of description already given in the earlier chapters. With the exception, however, of the improved respiratory murmurs, and the diminution or absence of secretion sounds, other morbid conditions may possibly remain unchanged, although, perhaps, the pulmonary mischief may be arrested. The dulness may possibly still continue, owing either to thickening and adhesion of the pleura—which is generally a permanent condition, or else to quiescent tubercle, or secondary pneumonic condensation—which may be equally permanent. For like reasons, the same may be said of morbid alterations in the form and movement of the chest-walls, and of vocal and tussive resonance. The nearer the approach to healthy condition in these respects, of course the better; but it should be borne in mind that their continued deviation from the healthy standard is no proof that the patient is not progressing satisfactorily, or that his disease is not arrested.

Loss, or decrease of the secretion sounds, with improvement in the respiratory murmurs, become therefore, at this period of the disease, the only essential evidence of our patient's amendment. Other changes towards the physical signs of health may corroborate such amendment, but the patient may still be progressing favourably, or even recovering, in spite of their deficiency.

The second stage. The only signs peculiar to this stage consisting of *humid crackling* and the *large subcrepitant* rhonchus, we have only to consider how these become modified as the patient improves.

When the disease has reached its second stage it is very seldom indeed that it stops there. I have seen but very few cases of unequivocal softening of the tubercular deposit, without a subsequent more or less marked cavity in the pulmonary substance. In cases even which ultimately do well, the second stage nevertheless passes on to the third, the expulsion of softened tubercle appearing to be the natural method of its removal. I have seen, for instance, numberless cases in which, whilst the general health was

rapidly improving, the tubercular deposit notwithstanding continued to soften, the two appearing to go on almost *pari passu*, showing that the elimination of the tubercle by softening is one of nature's methods of throwing off the local disease. That such a happy combination forms rather the exception than the rule, is easily explained by the circumstance that, in too many instances, the softening of tubercle is attended with increased constitutional disease, under which, whilst the old tubercle softens, fresh tubercle is deposited.

In the second stage, therefore, although we should gladly observe the loss of every trace either of the *humid crackling* or the *large subcrepitant* rhonchus, we need not consider their continuance and their gradual passage into râles characteristic of the third stage, *necessarily* indicative of harm. Their importancė, in fact, is to be weighed by concomitant circumstances. If the general health, and the absence of fresh tubercular deposit point to improvement, we may fairly expect that although *pathologically* the patient may be arriving at the third stage,

he may nevertheless *practically* continue to do well.

The third stage. So numerous are the physical signs accompanying the last stage of phthisis, that, for the convenience of description, I shall consider them in their relation to improvement or arrest of the disease under five divisions :—viz., the *form and movement of the chest;* the *percussion sound;* the *respiration;* the *rhonchi;* and *vocal resonance.*

Form and movement of the chest. It generally happens that at this period of phthisis, the lung is so permanently indurated, contracted, or bound down with old and oftentimes thick pleural adhesions, that, however great the improvement, neither the form nor the movement of the patient's chest is materially altered, the flattening of the walls and the limited parietal motion over the affected part still remaining. Sometimes the flattening and diminished movement actually increase as the patient improves, appearing in fact to measure such improvement, by indicating the increasing contraction of the pulmonary cavity. I have seen, for example, many cases of arrested phthisis in which the

contraction of the diseased lung was so considerable as to have produced a lateral curvature of the spine towards the diseased side. Occasionally, however, just the opposite is the case, the chest-walls regaining somewhat their original state. These differences depend, of course, upon whether the particular conditions of the lung to which I have just alluded are persistent or otherwise; but being liable to occur equally in advancing* as in improving disease, it is obvious that, as signs of improvement or arrest, the form and movement of the chest are valueless except in their connexion with other symptoms.

Percussion sounds. Similar observations apply to the percussion sound as to the form and movement of the chest-walls. If the lung be firmly bound down by old adhesions, or remain indurated and contracted, the *dull, wooden, amphoric* or even *cracked-pot* sound may continue, in spite of improvement, or the disease becoming arrested. In many instances, indeed, the *dulness,* or the *wooden character* actually increases as the symptoms undergo improvement,

* See page 69.

owing to the further contraction of the pulmonary cavity, and additional flattening of the chest. In some few cases, however, the opposite obtains:—as the patient improves, the more recent adhesions give way, much of the secondary induration is removed, and the lung regaining some of its respiratory power, the percussion sound makes some return to the healthy type. The sound on percussion, therefore, will never, by itself, be a criterion of treatment, since, with the improvement of the case, it may either remain uninfluenced, or undergo the very opposite changes.

Respiration. Far less equivocal is the evidence afforded by the respiratory murmurs. In proportion to the improvement, the *cavernous* breathing usually changes in character, and diminishes in extent;—it becomes less metallic and blowing, and gradually passes into the harsh type. Of this I have seen several instances, nothing but simple harsh breathing ultimately remaining where cavernous respiration had previously existed. The special condition of the lung, however, sometimes comes in to qualify such a result. If the pleural adhesions be of

sufficient extent and age to interfere with the contraction of the cavity, the breathing may still be cavernous, notwithstanding the patient's amendment. I have seen, for instance, several cases in which all active symptoms had subsided, and the patients might fairly be said to enjoy an arrest of their disease both local and general, in which, nevertheless, *dry* cavernous breathing still remained.

Rhonchi. The best proof of arrested or improved phthisis at this stage, is afforded by the secretion sounds. Whether these had previously been general throughout the lung, or more localised to the seat of the tubercular disease, the diminution of such sounds is a reliable index of the improvement. To the cavernous râles this observation is especially applicable, the improvement in a vomica being in direct proportion to the loss of its secretion. *Dryness of a cavity indeed is certain testimony to its satisfactory progress.*

I have already stated (p. 80) that a peculiar plaintive creaking sound of a dry quality, and resembling, in some measure, the sibilant rhonchus, is occasionally heard in vomicæ. This is

always an evidence of improvement, and may be due to a contracting cavity altering the calibre of some of the bronchial tubes; or it may have a pleuritic origin, and be, in fact, a modified friction murmur. I confess that I have often found myself hesitating between these two theories. It matters little, however, what may be the true explanation of the phenomenon. It is sufficient for every useful purpose, to know that the sound may be always welcomed as proof of the patient's well-doing. I have invariably found it associated with a reduced pulse, and other symptoms pointing to satisfactory progress.

Vocal resonance. For reasons already explained, this affords but little aid to the prognosis of vomicæ. The cavity may remain open, or nearly so, although the patient may be visibly gaining ground, and all the symptoms perhaps in abeyance,—when, of course, pectoriloquy, if previously existing, may still remain; or the vomica may be contracting,—in which case the vocal resonance may be more bronchophonic than pectoriloquous. As the pulmonary condensation diminishes, the vocal resonance may

become still further modified; but as I have already explained, the physical signs depending upon vocal conduction are liable to much uncertainty, and, in their relation to improved or arrested local mischief, there seems to be no exception to this conclusion. Weighed with other signs, those of vocal resonance may sometimes prove auxiliaries, but, by themselves, they are not trustworthy.

Although *pneumothorax* cannot, of course, be properly included amongst the signs of improved or arrested phthisis, it may perhaps not be out of place to refer to some of the observations already made in connexion with this complication. For reasons already explained, and therefore unnecessary to repeat,* numerous cases occur in which pneumothorax, far from having any immediate ill effect, really affords temporary relief, and prolongs life. I have lately been seeing a former hospital inpatient of mine, who, whilst under treatment more than a year previously, was seized with

* See page 92; where are given the several conditions modifying the character of the seizure, and thus affecting the prognosis.

severe pneumothorax. After recovering from the immediate shock, he gradually improved in health, and became so far restored as to undertake light out-door employment, being in a much better condition than before the seizure. In another case under my care, a gentleman in the third stage of phthisis lived for two years after a severe attack of pneumothorax, during which time he improved in health and was sufficiently well to enjoy moderate horse-exercise, dying ultimately of empyema. Cases similar to this have been recorded by other writers,* and they may be usefully remembered in forming a prognosis after the occurrence of pneumothorax.

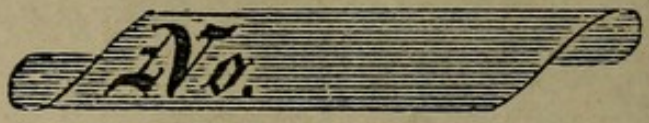
I have thus examined, somewhat briefly perhaps, but, I trust, not on that account incompletely, the physical signs of improved or arrested phthisis. It would be easy, indeed, to write a volume upon this subject alone, adorned with cases to illustrate it both practically and theoretically; but I do not see to what useful purpose it could be applied. Phthisis ever

* Dr. Pollock: *British Medical Journal*, May 2, 1863.

varies in its aspect;—there is, indeed, nothing certain about it except its uncertainty, scarcely two cases ever being met with strictly alike. It is only general principles, therefore, and not minute and multiplied rules, which can possibly avail either in the diagnosis or prognosis of such a disease.

THE END.

T. RICHARDS, PRINTER, 37, GREAT QUEEN STREET.



Worcester District Medical Society.

REGULATIONS OF THE LIBRARY.

1st. Members of the Society may, on personal or written application to the Librarian, or to any person duly authorized by him, draw from the Library three volumes, but no more at any one time.

2nd. Any Member may retain any book four months, or from one stated meeting to the next, after the expiration of which time, if he neglect to return it, he shall pay a fine of ten cents per week on each volume so retained, and be deprived of further use of the Library until he shall have complied with this by-law; and if any member shall injure or lose a book in his possession he shall pay such sum as the Librarian shall estimate the damage to be, or he shall replace it by a new copy of the same.

3rd. PERIODICALS NOT BOUND shall be subject to the following rules:—Each number of a semi monthly or monthly may be retained ten days, and of a quarterly fifteen days; and the fine for longer detention shall be the same as for detention of books.

4th. Works of reference and valuable books with plates may be withheld from circulation at the discretion of the Library Committee.