

chronic. They are carried, as it were, past the period when "acute galloping consumption" is probable. The temperature and its course, and the pulse, are important guides. Ordinary cases have intervals of comparative health; but the duration is very variable, and the end is often sudden. Syncope frequently terminates a case. Œdema of the ankles, in advancing disease, may be due to cardiac debility or to Bright's disease. It is an unfavourable symptom. Waxy disease, ulcers, or simple catarrh of the bowels, producing frequent attacks of diarrhoea, may terminate a case by exhaustion.

The rupture of a cavity into the pleura gives rise to pneumothorax, and if old adhesions have formed there, the air may make its way into the subcutaneous tissues—*subcutaneous emphysema*—if both layers are ulcerated through. Pulmonary embolism, resulting from thrombosis of the femoral veins, is a common accident. The tubercular disease may ultimately affect the meninges, peritoneum, kidney, or spinal cord. *Fistula in ano* is very commonly associated with phthisis.

The Treatment of Phthisis.—The prophylactic treatment is highly important; and as the tuberculous sputum is believed to be the chief source of the disease, it should be disinfected (5 per cent. carbolic acid) and destroyed in every case. Rooms which have been occupied by tubercular patients should be thoroughly cleaned and disinfected. All children inheriting the tubercular *diathesis* should be carefully trained physically. They should have plenty of fresh air and light, and good nourishing diet, with plenty of fat (boiled milk, cream, butter, fat bacon, &c.), and they should be warmly clothed. Gymnastic exercises in moderation, singing, early hours, the avoidance of damp atmospheres and cold winds are all highly important. Any tendency to catarrh must be promptly treated; tonsillar affections, and caseous glands, should have early surgical attention; while measles and whooping-cough must have careful management, especially during the later stages, and during convalescence. Children suffer much, in these times, from over-pressure of the brain in schools, and especially is this the case with strumous and delicate children, who are often naturally bright, intelligent, and eager to learn. These should never be allowed to become fatigued with their lessons. Growing youths of the delicate type are often threatened with phthisis. The same general and hygienic considerations apply with even greater force to them. Tonics should be prescribed (as R 21, 22, 23 or 2), and cod-liver oil should be taken whenever they show signs of failure of appetite, lassitude, or of anæmic debility. The cod-liver oil emulsions—especially those combined with maltine—are highly useful. Colds should never be neglected. As a preventive, cold bathing in the morning is to be recommended, but carried out through the winter only when the patient is sufficiently robust. Sub-acute or chronic catarrhal pneumonia is most frequently the beginning of phthisis—a cold "settling down upon the chest," as the patients so frequently express it. The treatment of this stage should be active. Up to

this time, if the patient have received any treatment at all, it will have been for bronchial catarrh; and it may be necessary to continue the expectorant mixtures, &c., if the cough and expectoration be troublesome. As a rule, however, the sooner they are regarded as threatened with phthisis the better. The chest should be painted with iodine, or a fly-blister may be used over the affected part—generally the apex of the lung. Turpentine, eucalyptol, and copaiba in capsules, are useful in sub-acute catarrhal pneumonia. Guaiacol is much used in the various forms of phthisis. A mixture of carbonate and iodide of ammonia—five grains of each thrice daily—is highly recommended by Bartholow. R 24 is useful for the cough, and is at the same time a stomachic sedative and tonic. Cod-liver oil and iron should be prescribed. Niemeyer's pill is useful in the tubercular forms, and for the pyrexia of all forms (R 25). When the acute symptoms disappear the patient should be sent to the seaside, or to some dry and healthy place inland. The open-air treatment has proved highly beneficial. A long sea voyage to the Cape of Good Hope, or to Australia or New Zealand, is to be recommended (see Dr. Wilson's little book, *The Ocean as a Health Resort*, and Otter's *Winters Abroad*). No patient should be sent abroad who has marked fever, or who is subject to repeated attacks of alarming hæmoptysis. Davos, in Switzerland, is highly extolled as a winter residence for consumptive patients.

During the course of phthisis various important symptoms call for special treatment. Hæmoptysis is treated with absolute rest, cold food, ice, &c. A mustard plaster over the consolidation is often useful; but, oftener, ice (in an ice bag) is more efficacious. A mixture of sulphuric acid and sol. of morphia (R 26) should be prescribed. Sixty grain doses of sulphate of magnesia, every four hours, is recommended, to reduce the blood pressure, in hæmoptysis (*Kidd*). Mixtures containing opium, digitalis, and ergot are sometimes ordered. In severe cases ergotine may be used hypodermically. No stimulants should be given while there is hæmoptysis. The patient should not be allowed to rise for a fortnight or longer. For the severe sweating, a pill containing three grains of the oxide of zinc is recommended. Sponging the limbs and body with vinegar and water is useful. In severe cases atropia may be injected (R 27). Strychnine is recommended by Lauder Brunton (ten minims of the liquor). The cough is best treated with codeia—a grain for a dose every four or six hours, in the form of a pill. Begbie's mixture is much used (R 24) for cough; and sometimes an occasional dose of an ordinary expectorant mixture (as R 19) gives relief, by clearing the bronchial tubes. Chlorodyne—ten minims, in water—may be allowed for severe cough; but when too often given it tends to dry up the secretions. It should not be allowed when the kidneys are much affected. Gargles of bromide of potassium, or sprays, often relieve the cough. Fever is best treated by large doses of quinine (ten to twenty grains); or by antipyrin (fifteen grains every four hours). Other antipyretics may be tried. Niemeyer's pill is indicated in chronic pyrexia. Diarrhoea is sometimes very intractable,

and it often resists all treatment. Mixtures containing astringents—as bismuth, opium, kino, catechu, and chalk—are often prescribed. A powder containing twenty grains of bismuth and two grains of Dover's powder is useful—every four hours. Copper, in pill (℞ 28), is often prescribed. Simple laudanum (fifteen minims), or solution of morphia (twenty minims), or one-third grain of morphia as a suppository, may all be used, if not contra-indicated by the state of the kidneys, and when simpler drugs, as bismuth and chalk, fail. The treatment of the laryngeal symptoms has been given with the laryngeal diseases. The use of Koch's original tuberculine has proved to be dangerous; but a modified form has been prepared which only produces slight constitutional disturbance, and is apparently beneficial. The treatment of the various complications of phthisis are discussed under their respective headings—as pleurisy, emphysema, pneumothorax, &c.

Cancer of the Lung.—Cancer rarely occurs before the age of forty. It is common in the lung as a secondary disease to cancer of the breast. It is usually the soft variety; and it may be diffused throughout the lung or form a distinct mass. The appearance of the diseased part is like hardened brain tissue, and it is yellow-white, homogeneous, and rather firm—hence the name *encephaloid*.

The symptoms consist of the development of the cancerous cachexia, associated with progressive emaciation. Should the cancer form a tumour, there will be the usual signs of consolidation of the lung—dulness over the part, bronchial breathing and increased vocal resonance. The breath-sound may be cavernous if the mass surround a bronchus. There is more or less dyspnoea and pain, while the pressure symptoms vary, and, like aneurism, they depend upon the seat of the disease. There is no fever. *Cough* is always present, and it is hard and dry. Sometimes it is due to deposits within the lung tissue, and often it results from pressure upon the bronchi or nerves by a solid mass. Sometimes there is expectoration of rusty-coloured gelatinous matter. Enlarged and indurated glands may be found in the axilla or neck.

The disease is always fatal, and the treatment can only be palliative.

Hydatids of the Lungs. Echinococci.—The cyst contains the embryo—the scolex with its four suckers and row of hooklets. Echinococci migrate from the intestines to the lungs. They affect usually the lower lobe. They set up, when large enough, severe paroxysmal pain in the side and back. Dyspnoea is almost always present, and at times it amounts to a feeling of suffocation. The cough is dry; but if adhesions have formed and the cyst rupture into a bronchus, there is expectoration of a large quantity of serous liquid and masses of hydatid *débris*. This may be fetid, and it may only occur at long intervals.

Inspection may reveal a great enlargement of the affected side. There is dulness on percussion over the tumour, and increased resist-

ance on palpation. The heart and liver may be displaced. Vocal fremitus is diminished, and the vesicular murmur is absent or replaced by bronchial breathing. The signs of a cavity may be made out if the cyst should have ruptured.

Recovery may take place if the cyst rupture and get free exit, as the cavity then contracts and cicatrises; but death may follow from exhaustion, secondary inflammation, tuberculosis, hæmorrhage, gangrene, or other intercurrent disease.

Puncture and free evacuation of the sac is the treatment. Often it is only after using the aspirator that the disease can be diagnosed—especially from pleuritic effusion. A microscopic examination, discovering the hooklets, at once clears up the matter.

Pleurisy.—In *acute* pleurisy there is first congestion of the subserous connective tissue, followed by dryness of the pleural membrane, and slight effusion of fibrinous lymph. This gives a dull lustre to the pleura. The effusion of lymph begins at the base, and rises in curved lines. It may be higher posteriorly, but this depends upon whether the patient took to his bed early or not. When the lymph is scraped off, the pleura appears unaltered, but microscopically the epithelium is seen to be in a state of cloudy swelling, and desquamating. The cells may undergo fatty degeneration, and complete absorption may take place; or small adhesions may result, the disease terminating without effusion in quantity, and is then known as *dry* pleurisy. Pleurisy *with effusion* is the inflammation of the pleura associated with the out-pouring of serous fluid, so as more or less to fill the cavity. The fluid is straw-coloured, sometimes tinged with blood (hæmorrhagic form); and it may be purulent from the first, or may soon become so (empyema). The hæmorrhagic form is usually tubercular in its origin.

The lung at first floats, but ultimately it becomes flattened against the spine, about its roots. The sound lung is often congested and œdematous. If the right pleural cavity be affected, the effusion pushes the heart to the left, and the diaphragm and liver down; if the left side, then the heart is pushed to the right, and the spleen dulness may be made out to be lower than normally. The intercostal space bulge, and the thorax has a globular appearance on the affected side. The effusion may become emulsionised and absorbed; but more usually the disease becomes chronic, and absorption takes place only in part, while adhesions form and enclose the fluid. These chronic encapsulated effusions may remain in this condition for years, with occasional exacerbations. The adhesions may ultimately produce depression of the ribs and distortion of the spine. The purulent form (empyema) may ulcerate through the pleura and thoracic wall (fistula), or it may burrow into other regions and light up fatal inflammation. It sometimes makes its way into a bronchus and is expectorated, with relief of the symptoms. In very favourable cases, the chronic form may end in organisation, and a permanent fibrous union of a much thickened pleural membrane terminates the disease by complete obliteration of the sac.

The chief cause of primary pleurisy is exposure to cold, especially when the body is perspiring. The depressed condition of the particular tissues renders them liable to invasion by certain microbes, chiefly the tubercle bacillus, streptococcus and pneumococcus. The tubercle bacilli are, however, seldom found in the pleural effusion, and this cause of pleurisy is held proved by the very frequent association of tuberculous disease, and by the subjects of pleurisy being so often of the tubercular diathesis. Pyrogenic streptococcus is the microbe found in pleural empyema of adults, while the pneumococcus is that which is commonest in childhood, and is often primary. The specific causation of other forms of pleurisy is unknown. Secondary pleurisy is far more common, and it often occurs along with bronchitis, pneumonia, catarrhal pneumonia, pericarditis, embolic pneumonia, or pyæmia, &c. Caries of the ribs, cysts of the liver, &c., may light up a pleurisy. It is also very frequently associated with Bright's disease, gout, rheumatism, diabetes, cancer, and with eruptive fevers.

The symptoms may begin with a feeling of chilliness followed by fever, with sharp lancinating pain in the side; but sometimes there is only sudden sharp pain without warming or fever. The pain is generally at the side and base of the thorax. *Friction*—from a slight rub to coarse creaking—is heard over the seat of the pain, but in the very early stage it may be absent at the first examination. If the friction-sound be coarse its vibration may be felt (*Friction fremitus*). Dyspnoea is present, and the breathing may be characteristic. The respiration is shallow and rapid, owing to deep inspiration causing sharp pain. In drawing a long breath there is a sudden "check" in the breathing, accompanied often by a jerking in of the thorax. The attack may terminate by resolution or by the formation of adhesions; but often it becomes a case of pleurisy with effusion. This form, however, does not *always* begin with pain in the side. There are often feverish attacks and irregular chills without any local signs or symptoms. The fever continues with evening exacerbations—the temperature ranging from 101° to 104° Fahr. Should there be severe rigors, the effusion is probably purulent, or the disease may be tubercular in its origin. The pain is felt below, and to the outside of the mammary region, sometimes at the back, and it is occasionally referred to a point much lower, as the lumbar or iliac regions. (In "diaphragmatic pleurisy" the pain is often referred to the pit of the stomach, and the other symptoms are often obscure.) The pain is much increased by coughing, but it is generally absent after the effusion has taken place. The cough is *suppressed*, and there is little expectoration unless bronchitis be also present. The cause of the dyspnoea is three-fold, viz.—the shallowness of the respiration hindering the proper aëration of the blood; fever increasing the necessity for oxygen; and the effusion interfering mechanically with the lung.

The *decubitus* in cases of pleuritic effusion is suggestive. The patient lies on the affected side to allow more freedom to the sound lung. According to Traube, the patient in the early stage of pleurisy

lies on the sound side, as the blood gravitates from the diseased side and relieves the nerves from pressure; but just as often the patient prefers to lie "on his pain," which helps to check the full expansion of the chest. The expression of the face is anxious and weary, pale or cyanosed. The digestion is impaired; and the urine is scanty and loaded with urates.

The physical signs of pleuritic effusion are very definite. *Inspection* reveals non-expansion of the affected side, and if the effusion be great in quantity, there is bulging of the thorax and intercostal spaces. *Palpation* not only confirms what is seen, but may also yield a sense of increased resistance or fluctuation. The vocal fremitus is also diminished or absent—a very important sign in the differential diagnosis. The *percussion* is dull, and when there is great effusion it is absolutely flat and toneless. In the early stages, when the effusion is limited, the percussion-tone is tympanitic and high pitched (see *Percussion*), particularly in the infraclavicular region of the affected side. Sometimes the "cracked-pot" note can be elicited in cases of pleuritic effusion. The various displacements of the heart, liver, spleen, &c., can also be made out by careful percussion. On *auscultation* the vesicular breath-sound is absent, or replaced by bronchial or tubular breathing, and if the lung be completely collapsed there is absolute silence over the effusion. The vocal resonance is also diminished, and it is often ægophonic, or has a peculiar whiffing character. In the latter case when the patient is asked to say *one, one, one*, it sounds like *one-f, one-f, one-f*. Bronchophony is present when the effusion is moderate in quantity, and it is often heard at the root of the lung even when there is a large effusion.

When absorption takes place the physical signs return in reversed order, and, if complete, friction is heard again, as in the early *dry* stage. Fine crepitations and râles are also heard when the lung begins to expand.

The *course* of a pleuritic effusion is slow. Beginning in one or other of the methods described, there are three or four days of gradually increasing fever, and then *continued* fever for about ten days. When effusion takes place rapidly the temperature falls. Absorption may be rapid at first; but slow absorption is the rule. The urine increases in quantity, and sometimes it contains albumen. The effusion may take months to completely absorb, but during this time additional attacks of inflammation often serve to again increase it, and the case becomes very chronic. Rigors indicate that the fluid has become purulent, and an empyema is then established. Edema of the sound lung is highly dangerous in cases of pleuritic effusion. The chronic forms, by leading to purulent infiltration or tuberculosis, cause chronic ill health, symptoms of general septic infection, and death by gradual exhaustion. The inflammation may extend to the pericardium. Pneumonia may co-exist with the pleurisy—*pleuro-pneumonia*. Pneumothorax is a common association.

The Treatment of Pleurisy.—When the attack manifests itself by severe stabbing pain in the side, a fly-blister is the best treat-

ment; and twenty grains of quinine should be at once administered. Leeching, or cupping, is sometimes good practice. A hypodermic injection of half a grain of morphia should be given before applying the blister. Smaller doses of quinine should be given thereafter, and a mixture of iodide of potassium (R 29) prescribed. A sharp saline purge is useful. A few drops of chlorodyne should be allowed for the cough. If the pleurisy be still *dry*, but affecting several points over the chest, the strong liniment of iodine or turpentine stupes, should be used externally. Diuretics, as acetate of potash, nitrate of potash, and digitalis, are sometimes ordered; and pilocarpine is sometimes given to produce diaphoresis—one-eighth of a grain hypodermically. In the more chronic forms of dry pleurisy, mercurial ointments may be rubbed into the chest with benefit. The diet should be light; and *dry food* suggests the possibility of limiting the effusion.

The *medical* treatment, when there is pleurisy with effusion, is the same; but the question of *paracentesis thoracis* remains to be considered. It is chiefly with regard to the time most suitable for tapping, that there is a difference of opinion. An effusion should not be tapped too early, as complete absorption may take place without interference. If the fluid be purulent, it should at once be removed, as absorption cannot take place. After a reasonable time (say a fortnight) without any signs of absorption, and if the fluid be considerable in quantity, *paracentesis thoracis* should be performed, before there is any chance of the lung being bound down by adhesions. It should also be performed—at any period during the course of the effusion, early or late—when there is embarrassment of the heart and dyspnoea, and also when one side of the chest is full, even without urgent symptoms, as the patient is in danger of his life from sudden syncope. The needle is usually inserted just below the inferior angle of the scapula, care being taken to keep close to the upper border of a rib, to avoid wounding the intercostal artery immediately above. A preliminary exploration with a hypodermic needle may be made. The fluid should be drawn off slowly, but no attempt need be made to withdraw the whole of it as absorption frequently takes place after the removal of a small quantity. The operation may be repeated again and again, if necessary. When the fluid is purulent, attempts may be made to remove it by frequent tapplings; but generally, opening between the ribs, washing out with antiseptic lotions, and the establishing of free drainage, is the best treatment. Draining away, by means of a long elastic tube to a jar of antiseptic fluid placed under the bed, is sometimes very successful in chronic empyemata occurring in children. The negative pressure expands the lung. In many cases of empyema, further surgical treatment becomes ultimately necessary.

If paroxysmal cough be excited during the operation of tapping, a hypodermic injection of morphia will relieve it. The subsequent treatment of the case is *as before*—frequent paintings of iodine, or friction with mercurial ointments. The syrup of iodide of iron (R 30) and cod-liver oil should be ordered. Inhalations of com-

pressed air may be tried. Residence for a time in a dry mountainous district may complete the cure.

Hydrothorax. Pneumothorax. Hydro-pneumothorax. Pyo-pneumothorax.—*Hydrothorax* is produced by the effusion of serum into the pleural cavities, and it arises from purely mechanical causes. It is usually bilateral, and is due to obstruction or interference with the circulatory apparatus—*e.g.*, emphysema, cirrhosis, tumours pressing upon the large veins; and especially is hydrothorax liable to occur in the course of *cardiac* and *renal disease*. It may arise also as part of a general dropsy, whatever be the cause.

When the effusion is rapid, sudden dyspnoea is the most striking symptom, and if large in quantity death may be sudden. The physical signs are the same as in pleurisy with effusion; but being usually bilateral, there is no displacement of the organs.

Pneumothorax arises when air or gas accumulates within the thoracic cavities. *Hydro-pneumothorax* is the accumulation of serum and gas; and in *pyo-pneumothorax* pus and gas are present. The air may enter through the wall of the thorax after an injury; but most frequently pneumothorax results from rupture of the lung, a common event in phthisis after the formation of cavities. An empyema—or an abscess of the liver, kidney, or of a bronchial gland—burrowing into a bronchus, may produce a pyo-pneumothorax. The amount of gas retained within the thoracic cavity depends upon the compressibility of the lung. If there be much consolidation, or if old adhesions be present, the amount of gas may be small. As the lung collapses—in cases of rupture of the lung—the orifice through which the air has entered is closed, and a valvular arrangement is established. If the inlet be easy and the exit difficult, there is a “packing” of air within the cavity, and this gives rise to characteristic physical signs. The pleura may become inflamed and a purulent exudation is then poured out, the contained air or gas acting as an irritant to the pleural membranes.

Pneumothorax often develops insidiously when associated with phthisis, but sometimes it occurs suddenly, and there is then severe pain, great dyspnoea, and symptoms of collapse. The skin is covered with cold sweat, the pulse and respirations are rapid, and cyanosis ushers in a fatal termination. Death may occur more slowly by venous stasis and general œdema. *Palpation* reveals increased tension and diminished resistance where there is gas. The *vocal fremitus* is diminished or absent, only in those cases in which there is more or less complete collapse of the lung. When old adhesions and consolidation are present the vocal fremitus may be as strong as before. When fluid is present along with gas, *succussion* is a characteristic sign, and it is best heard by shaking the patient suddenly, while the examiner's ear is applied to the chest. The percussion-tone over gas is tympanitic and resonant. The liver dullness may be extinguished in extreme cases of pneumothorax of the right side. When fluid is present—*hydro-pneumothorax*—there

is dulness, and signs similar to pleurisy with effusion, over the lower part of the thorax. In pneumothorax, percussion with two coins, while using the stethoscope, produces a well-marked *metallic echo*. *Auscultation* reveals *amphoric* breathing; while the heart-sounds, râles and cough, all have a metallic quality. The *vocal resonance* is increased and echoes through the cavity. The dropping of fluids produces *metallic tinkling*.

The prognosis (in all) is generally unfavourable; but in phthisis, pneumothorax, by giving *rest* to the lung, may improve matters for a time. In other cases, death generally results from secondary pleurisy within a few weeks.

Hydrothorax, pneumothorax, and hydro-pneumothorax may require to be relieved by aspiration, if the dyspnoea be very great. Inhalations of chloroform, or a hypodermic injection of morphia, may be given. Pyo-pneumothorax is treated by a free opening and drainage, as in chronic empyemata.

Pleurodynia, or pain in the side, is frequently the result of a strain. It is sometimes rheumatic in its origin. It requires to be differentiated from acute pleurisy by careful auscultation; and likewise from intercostal neuralgia, early herpes zoster, and surgical affections of the ribs. The pain is in the muscles in true pleurodynia, and it is relieved by firm pressure.

Belladonna liniments or plaster, mustard poultices or a blister, generally relieve. A tight binder is useful, and iodide of potassium with salicylate of soda (10 grs. of each) may be given in obstinate cases, twice or thrice daily, for a few days.

The Classification and Diagnosis of the Diseases of the Pulmonary Organs.—The diseases of the bronchial tubes, lungs, and pleuræ are closely associated, and it is rather the exception than the rule to find one single and uncomplicated affection.

The continuity of the respiratory tract makes it obvious that an inflammation of any part, by simple extension, may affect the other tissues, and hence a bronchitis, pneumonia, and pleurisy, with the symptoms and physical signs of each, may all co-exist. The diagnosis may then be that of the initial, or most prominent disease, while the other pathological conditions may be viewed as secondary, if unimportant in their relation to the primary or chief disease. More frequently, however, a double diagnosis must be made and stated. Such combinations as bronchitis and catarrhal pneumonia; asthma, bronchitis and emphysema; croupous pneumonia and pleurisy; phthisis, pleurisy, and pneumothorax, hydro-pneumothorax or pyo-pneumothorax; cirrhosis of the lung and bronchiectasis; and many other, and even more complicated conditions, are very commonly met with in practice.

Without repeating the symptoms and signs of the diseases, already given systematically and in a synoptical form—a few words only need be said upon the important points of difference between those affections having some resemblance to each other in their symptoms, and which may possibly lead to errors in diagnosis.

The classification given here is purely a clinical one, and it has been framed for clinical purposes alone. An attempt has been made to preserve order in the mind, by arranging the diseases with regard to the commonest sequence of events. Sometimes it is the resemblance of the symptoms—especially in the early stages of disease—that has induced me to place them together; or a prominent symptom has served, as in the *fœtid* group, as a basis for classification. The whole arrangement has been made with a view of assisting the diagnosis, by bringing allied affections closer to each other, and thus to suggest a comparison and exclusion of different diseases.

The diseases of the pulmonary organs may be tabulated in the order in which they have been discussed throughout this work, viz. :—

- I. **Neurotic.**—Pertussis. Asthma (and hay asthma).
- II. **Acute.**—A. Acute bronchitis. Fibrinous bronchitis. Pulmonary collapse (Atelectasis). Acute catarrhal pneumonia.
B. Congestion of the lungs. Œdema of the lungs. Croupous pneumonia. Embolic pneumonia (Hæmorrhagic infarction).
- III. **Chronic.**—Chronic bronchitis. Sub-acute and chronic catarrhal pneumonia. Chronic interstitial pneumonia (Cirrhosis). Emphysema.
- IV. **Fœtid.**—Fœtid bronchitis. Bronchiectasis. Gangrene of the lung.
- V. **Phthisis** (including Miliary Tuberculosis).
- VI. **Special.**—Cancer; and Hydatids of the lung.
- VII. **Pleuritic.**—A. Pleurisy—Acute; with effusion; Empyema.
B. Hydrothorax; Pneumothorax; Hydro-pneumothorax; Pyo-pneumothorax.
C. **Pleurodynia.**

In the early stages of *whooping-cough*, a positive diagnosis may be impossible as the case may prove to be a simple catarrh, or it may be the beginning of a graver disease, as bronchitis and catarrhal pneumonia. A dry incessant cough, worse at night, is suggestive. In *asthma*, the cardiac and gastric forms require to be differentiated, and œdema glottidis, paralysis of the vocal cords, aneurisms pressing upon nerves, and stenosis of the trachea, all produce dyspnoea. In true asthma, however, the dyspnoea is *expiratory*. Cardiac dyspnoea, emphysema, and bronchitis have other physical signs; and the latter disease is invariably associated with spasmodic asthma, and may itself be the cause of the seizure. The history of the *onset* is important. Nasal polypi should be noted as a possible cause of asthma. *Hay asthma* requires to be distinguished from a *simple coryza* (*vide*).

Acute bronchitis may begin with tickling cough and coryza, and the serious symptoms may develop later. *Fibrinous bronchitis* is only diagnosed from the expectoration; but the character of the dyspnoea may be suggestive. *Collapse* of the lung superadded to bron-

chitis and pertussis is generally temporary, and increased dyspnoea, with sometimes signs of consolidation—in children especially—may be observed. *Catarrhal pneumonia* existing with bronchitis raises the temperature and increases the dyspnoea. Sometimes patches of consolidation can be made out. The râle in catarrhal pneumonia is *sub-crepitant*, and not so coarse as in simple bronchitis of the larger tubes. The capillary form of bronchitis is common in children, and produces greater dyspnoea than when the larger tubes are affected. Along with much catarrhal pneumonia the physical signs are not so localised. In the early stages of croupous pneumonia, especially if the disease begin deep in the lung, the case may resemble acute bronchitis; but the mode of onset, the sudden rigor, dull pain in the side, the fine crepitations, with subsequent development of the physical signs of consolidation, soon clear up the case, if a typical one. But it may prove to be simple acute congestion of the lung, if there have been no marked rigor, and if the physical signs of croupous pneumonia do not subsequently develop. In bronchitis the râles are *general*, and not localised. Phthisical crepitations and râles are localised—most frequently at the apex, but sometimes at the base of the lung. An intercurrent attack of bronchitis may mask a case of phthisis, but the signs of consolidation may be discovered; or after a week of treatment, the general bronchitis may clear up and leave the localised râles. There is no percussion dullness in simple bronchitis. Acute tuberculosis is sometimes very difficult to differentiate from bronchitis; and so also is diffuse cancer of the lung. In acute tuberculosis the course and severity of the fever, the sweats, the colour of the lips and nails, or the consonating character of the râle, may suggest a correct diagnosis; in cancer (diffuse) the cachexia and emaciation are important signs. Bronchitis is more frequently a secondary rather than a primary disease, and hence the exanthemata, rickets, chronic valvular disease of the heart, and especially Bright's disease, must always be kept in view.

Collapse of the lung has a definite cause, and it may be permanent after long-continued whooping-cough. In after years, signs of slight consolidation at the apex, with weak breath-sounds in that region, should not be mistaken for phthisical consolidation. There are no crepitations in such a case. A large collapse, during an acute disease, might be mistaken for pneumonia by presenting the signs of consolidation, but the history and onset will serve to distinguish them. The dyspnoea in collapse is *suddenly* increased.

A *catarrhal pneumonia* may require differentiation from a deep croupous pneumonia, from empyema, meningitis, and acute tuberculosis and phthisis. The distinguishing signs have been alluded to, under catarrhal pneumonia, phthisis, &c.

There is practically no difference in the initial symptoms of *acute congestion* or *hyperæmia of the lungs*, from the first stage of croupous pneumonia. There is no marked rigor in congestion, and it is only the subsequent course that reveals the true nature of the disease—*i.e.*, in croupous pneumonia the development of the physical signs.

Œdema of the lungs is generally bilateral, and it affects both bases. The dyspnoea is increased, and the expectoration is frothy.

Croupous pneumonia may resemble a pleuritic effusion, especially if there be slight effusion of lymph associated with the pneumonia; but in croupous pneumonia the rigor, fine crepitations, rusty sputum, bronchial or tubular breathing, and subsequent course, with no displacement of the organs—serve to distinguish the two diseases. In pleuritic effusions bronchial breathing may be heard when the fluid is moderate in quantity; but later, it disappears when the effusion is greater. The two diseases—pleuro-pneumonia—may exist together. The presence or absence of vocal fremitus is important in relation to consolidation *v.* effusion. Sometimes an acute onset in croupous pneumonia, with head symptoms, suggests a meningitis. The chest should be examined. In aged persons and in drunkards there may be no cough to draw attention to the pneumonia. In the early stage, acute bronchitis and congestion of the lungs have to be remembered in relation to the diagnosis. *Embolic pneumonia* (hæmorrhagic infarction) is differentiated by the history and onset.

Chronic bronchitis requires the same differentiations to be made as in acute bronchitis. As bronchitis is frequently associated with collapsed lobules of the lung, and patches of catarrhal pneumonia—which may at any time undergo caseation—the differential diagnosis of these conditions from phthisis is a very frequent necessity in practice. It is only the very early cases of phthisis which present any difficulty, when dullness upon percussion, and the other physical signs of consolidation, are doubtful. In these cases only the discovery of lung fibres in the sputum, or the presence of the bacilli, can put the matter beyond doubt. The detection of a finer râle at the apex is suggestive, but it only means that there is a small patch of catarrhal pneumonia in that region (which may or may not become caseous), or that the finer bronchial tubes are affected. Very frequently indeed, in cases of chronic bronchitis, auscultation reveals these sub-crepitant râles, not only at the apex, but at the base, and in small areas over the back. Often, too, there is a little friction rub indicating that there is a small patch of pleurisy as well. In such cases the diagnosis is chronic bronchitis, with either patches of catarrhal pneumonia or catarrh of the small tubes, with pleurisy. When pleurisy is made out it is difficult to believe that the lobules have escaped entirely. Without the pleurisy the sub-crepitant râle may mean either capillary bronchitis or catarrhal pneumonia. *Chronic pneumonia* with bronchitis is understood to be chronic interstitial pneumonia or cirrhosis of the lung, when signs of the development of fibrous tissue are present. It may also be taken to mean secondary catarrhal pneumonia, especially when small pleurisies are present, and before the symptoms of actual caseation develop, when it becomes a phthisis—*basal* or *apical*. It is often difficult to diagnose saccular dilatations of the bronchi from phthisical cavities. Fibres of lung-tissue found in the sputum decide the matter; and the history of the course of the two diseases may be entirely different.

Chronic interstitial pneumonia is known by the slowness of its development, the history of antecedent chronic bronchitis, or long exposure to irritating dusts, or alcoholism; later, by the signs of phthisis with the displacements due to contraction. In the early stages it can only be surmised, and not until the consolidation diminishes the sonority of the percussion-tones, can it be positively diagnosed. Dilatations of the bronchi are commonly present with cirrhosis.

Emphysema is distinguished from asthma by the spasmodic character of the dyspnoea in the latter disease, while there are no alterations in the shape of the chest. Bronchitis is very often present with emphysema. The physical signs of emphysema are usually clear enough to distinguish it from all other diseases. Pneumothorax may resemble it in having a resonant note on percussion, but it is unilateral, while emphysema is bilateral, and the other physical signs are very different. Cardiac dyspnoea will have the physical signs of valvular disease. There is a cycle of diseases very commonly met with in practice, viz. :—bronchitis, asthma, emphysema, cardiac dilatation, Bright's disease, and dropsy—which requires careful examination, and inquiry into the mode of origin and history, before making a diagnosis. It may be difficult to decide what is the initial disease, in a chronic case presenting itself to the physician for the first time.

The members of the fœtid group can hardly be mistaken for other diseases, except phthisis, in which sometimes the expectoration is also fœtid. The *manner* of expectorating in bronchiectasis, with the changeable character of the physical signs, distinguishes that disease from the others of the group. In gangrene of the lungs the severity of the symptoms, associated with the strong odour, will usually make the diagnosis easy. Phthisis may resemble it, but the symptoms are never so severe, and the odour in gangrene is horribly intense. Simple fœtid bronchitis has the expectoration separating into three layers. The symptoms are not so urgent as in gangrene of the lung, and there are no signs of pulmonary disease.

Phthisis sometimes resembles typhoid or intermittent fever when the physical signs are obscure. The course and subsequent developments clear up the case, and there is a better appetite and less thirst in phthisis than in fevers. Incipient phthisis may be mistaken for atonic dyspepsia—the latter condition being common in early phthisis. In the physical examination of such cases the natural differences found on comparison of the two sides of the chest—especially the right and left infra-clavicular regions—should be carefully noted. When both lungs are affected with phthisis, the physical signs are sometimes not so clear, owing to the normal standard of comparison being absent. The dulness upon percussion may then not be so obvious, and the diagnosis must rest upon the presence of other physical signs, and the symptoms—the presence of the tubercle bacilli in the sputum being convincing, when reasons for suspecting

phthisis are also present. The differential diagnosis of phthisis has been alluded to in the paragraphs immediately preceding (*Bronchitis, &c.*) The differences between caseous and tubercular phthisis may be tabulated thus, viz. :—

Caseous.

Acquired by the strumous, . . .
Begins as bronchitis and catarrhal pneumonia, . . .
Occurs in youth or middle age, . . .
Hæmoptysis not so common, . . .
More frequently unilateral, . . .
Physical signs marked, . . .
Larynx not affected, . . .
Progress slow, . . .

Tubercular.

Hereditary (?).
Begins insidiously, but sometimes as acute miliary tuberculosis.
Occurs any age.
Very common.
Bilateral.
Sometimes not.
Laryngeal phthisis often.
Often rapid.

It is convenient to tabulate here also the most important causes of Hæmoptysis, viz. :—

1. Inflammations and ulcerations of the nasal, laryngeal, tracheal, or bronchial mucous membranes.
2. Cardiac disease, with congestion or hæmorrhagic infarctions of the lungs.
3. Phthisis.
4. Cancer of the lung, or of adjacent structures, ulcerating into the bronchial tube.
5. Gangrene of the lung.
6. Rupture of the lung by violence.
7. Aneurisms (rupture of).
8. Certain blood diseases, as scorbutus, purpura, leucocythæmia, &c.
9. Degenerative changes within the pulmonary blood-vessels themselves.

The blood may come from the mouth in cases of caries of the teeth, or in ulcerations of the gums in strumous children. Blood from the stomach (*hæmatemesis*) is black, acid, and contains food and no air; while from the respiratory passages it is red, alkaline, and frothy. It is *coughed* up when from the lungs, and there is no nausea. It is sometimes impossible to say whence the blood comes, and it is only the subsequent developments that reveal the cause. In practice phthisis is by far the commonest cause, and next to it, cardiac disease.

Pleurisy with effusion requires to be distinguished from consolidation of the lung (see *the differential diagnosis of croupous pneumonia*), and from tumour, abscess, or cyst. Abscess of the liver, hydatid cysts, and enlargements of the kidney, differ in their history; and a sub-phrenic abscess is sometimes very difficult to differentiate from an empyema. Tumours cause irregular bulging of the thorax, and the vocal fremitus is increased; while in pleuritic effusion it is absent. The effused lymph in pleurisy takes a definite course,

rising in circles from the base of the thorax. The "diaphragmatic effusions" may give rise to pain in the pit of the stomach, and in the absence of all other symptoms, may very readily escape diagnosis. The temperature should be noted, and a careful physical examination made of the heart and lungs. The progress should be watched. Aspiration may be necessary before a positive diagnosis of pleuritic effusion can be made. Repeated rigors in a case of pleurisy indicate the formation of pus (empyema). If sudden pallor and syncope should occur, with first a fall of the temperature, followed soon by a rise, during the course of pleurisy—hæmorrhage has probably occurred. The disease then is probably tubercular in its origin. *Hydatid cysts* may give rise to signs like pleuritic effusion. There is no fever, and they develop slowly. Aspiration may remove all doubts. A *sub-phrenic abscess* is more frequently on the right side. There "may be a marked inspiratory descent of the lung above, and, in a right-sided case, of the liver below." When opened *inspiration* increases the outflow of pus—the converse occurs with fluid in the pleura (*Dickinson*). The pus is fetid; and there may be a history which suggests a perforation of some part of the alimentary canal—the most frequent cause of sub-phrenic abscess.

Pneumothorax may be mistaken for very large vomicæ; but the latter are almost invariably at the apex. Cavities form slowly, the chest-wall is retracted, and the vocal fremitus is marked. The opposite conditions are present in pneumothorax. If fluid be present in the chest (hydro-pneumothorax), succussion is often heard; and this is rare in vomicæ, however large.

CHAPTER V.

THE URINE.

Contents.—General remarks—Quantity, specific gravity, colour and transparency, odour and re-action—**Albuminuria**—**Peptonuria**—**Urea**, and its estimation—**Sugar**, and its estimation—Tests for bile, blood, pus, urobilin, indican, and acetone—Tests for chlorides, phosphates, and uric acid—**Examination of deposits**—*Naked-eye appearances*: mucus, pus, uric and oxalic acids, urates, oxalate of lime, triple phosphates, amorphous phosphates—Urinary concretions—*Microscopic examination of deposits*—*Inorganic deposits*: uric acid crystals, urates, oxalate of lime, triple phosphates, neutral phosphates of lime, cystin, leucin, and tyrosin—*Organic deposits*: tube casts, blood corpuscles, pus, epithelium, spermatozoa—Micro-organisms, and parasites. (See Appendix.)

As so large a number of diseases during some part of their course are associated with renal changes, and as so many apparently primary affections are really secondary to kidney disease—the examination of the urine should be more or less a matter of routine. Even when negative results are obtained, as is the case in a large proportion of the cases, the information gained is often of importance in relation

to the *prognosis* as well as the diagnosis. No case can, therefore, be said to be complete without an investigation of the urinary secretion. In Bright's disease, it is, of course, of special importance; and as the symptoms in all forms may begin very insidiously, it is often only by the examination of the urine that the disease is detected in the early stages. For these reasons, therefore, it will be well for the junior practitioner to continue to a great extent the routine practice of the hospital, until experience teach him how far such an examination may be unnecessary.

When the urine is to be examined the patient should be directed to empty the bladder at a certain time, and the quantity should be collected and measured for the next twenty-four hours. He should also be directed to micturate before going to stool; and in some cases of incontinence it may be necessary to use a catheter frequently. The whole of the urine need not be kept, but a small quantity, at each micturition, may be placed aside in a cylindrical glass. By this means a fair average sample is obtained—the urine varying in acidity and specific gravity in relation to the food and liquids taken during the day. A preliminary inquiry as to the act of micturition may elicit the fact that there is *pain or increased frequency*. Sugar in the urine, or great acidity, may give rise to the former—and an increased volume (as in diabetes mellitus and insipidus, and in chronic Bright's disease) to the latter symptom. There are many *surgical* affections in which micturition is painful and frequent. (See Caird and Cathcart's *Surgical Handbook*.)

The examination of the urine should first include the consideration of the *quantity, specific gravity, the colour and transparency, the odour and re-action*.

1. **The Quantity.**—In adults the normal amount of urine passed within the twenty-four hours should average about fifty ounces. Ten or fifteen ounces, *less or more*, may be allowed for the variations, which depend chiefly upon the character of the diet, the quantity of fluid imbibed, and the occasional withdrawal of the fluid through other channels.

The urine is *diminished* in heart disease; in acute Bright's disease, and in the latest stages of the chronic forms; in renal colic; in diarrhœic affections, and after effusions and hæmorrhages; in irritating nervous reflexes and shock; in severe anæmic conditions; in fevers; and from mechanical and surgical causes. Complete suppression may also result from the action of drugs (cantharides, turpentine, &c.). The urine is *increased* in diabetes mellitus and insipidus; in the chronic forms of Bright's disease, and in cystic disease of the kidneys; and by diuretics.

2. **The Specific Gravity.**—This varies in health and it should always be considered with the quantity of urine passed. Normally, the larger the quantity of fluid, the lower is the specific gravity. Taking fifty ounces as the average quantity passed in the twenty-four hours, the specific gravity should be about 1,020. It is estimated by the *urinometer*—care being taken that it do not touch the sides