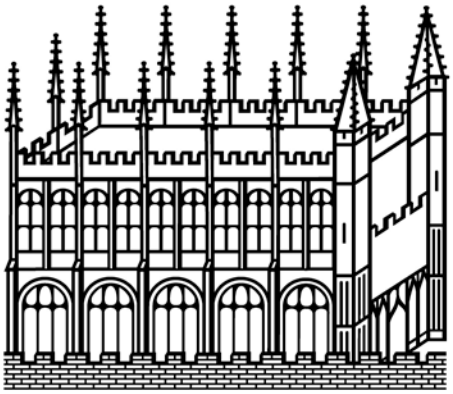

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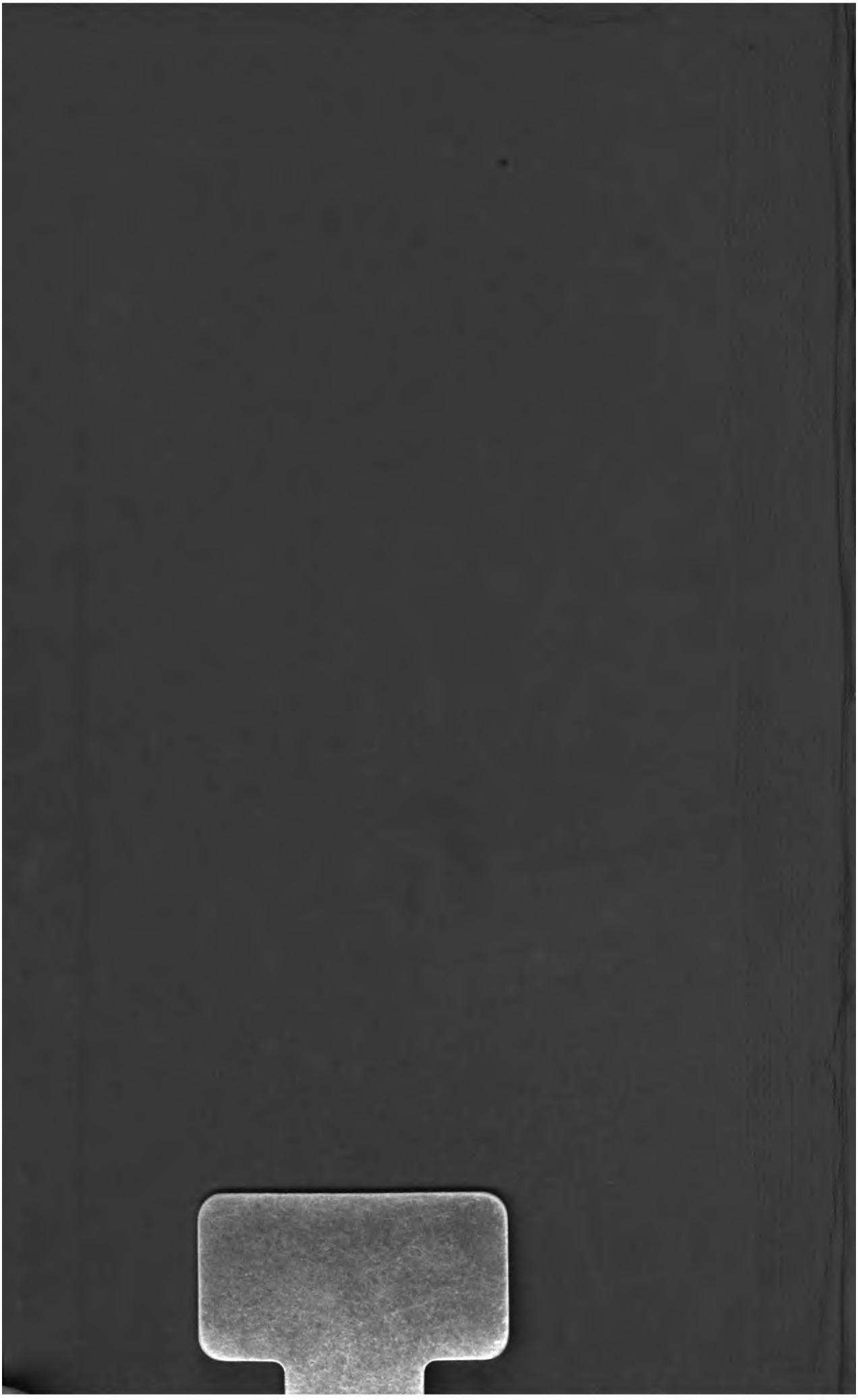

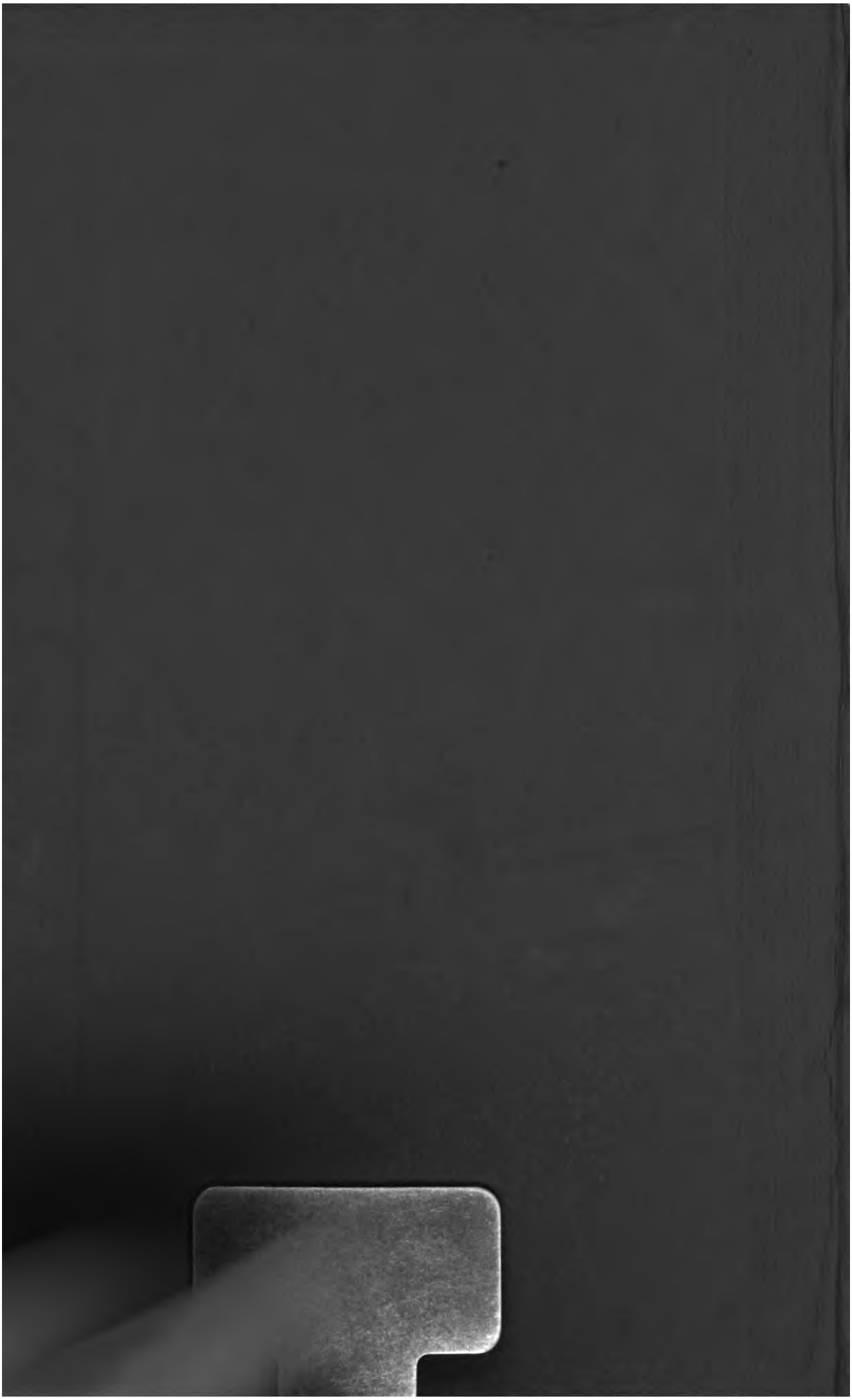

BRONCHITIS.

LONDON
PRINTED BY SPOTTISWOODE AND CO.
NEW-STREET SQUARE

THE FORMS, COMPLICATIONS, CAUSES, AND TREATMENT OF BRONCHITIS.

BY

JAMES COPLAND, M.D., F.R.S., F.R.C.P.

ETC.

NEW EDITION.

LONDON:
LONGMANS, GREEN, AND CO.
1866.

157. o. 64.

BODLEIANA
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PREFACE.

THE several forms of inflammation of the bronchial mucous membrane—of the mucous surface of the bronchial ramifications—are amongst the most frequent, and often the most dangerous diseases, to which the inhabitants of the British Isles are liable. The great mortality by bronchitis, in different epochs of life, especially in early and advanced ages, is shown by the tables which have been compiled from the returns made to the Registrar-general. The results will indicate the importance which should be attached to the primary or idiopathic states of this disease, which are those chiefly returned, and also to those associations of it with other maladies that often render them more or less dangerous, or conduce to, even when not the actual cause of, a fatal issue. There are few diseases, so extensive, so serious, and in very young and very aged persons, so fatal, that have received so little attention from medical writers, as bron-

chitis has received; and there are still fewer, with the exception of fevers and phthisis, which present greater modifications, especially in connection with the states of vital force, and with endemic and epidemic prevalence, than are presented by this. Bronchitis was treated by me at considerable length in the first part of my "*Dictionary of Practical Medicine*," published in 1832. Since that time my observation of its forms, complications, and treatment, has been uninterrupted owing to its frequency in all ages, and in all classes of the community. The amount of its frequency may be inferred from the number of deaths by it, which is about half as great as that by phthisis, and seeing that it is a much more curable disease than phthisis, its much greater prevalence must be manifest. During 1859 and 1860 bronchitis was more prevalent than I ever knew it to be and much more fatal.

Old Burlington Street:
March 1866.

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ON

BRONCHITIS.

CHAPTER I.

DESCRIPTION OF THE FORMS AND GRADES OF BRONCHITIS.

BRONCHITIS may be generally *characterised* or defined as follows:—*Cough, with or without rigors, often preceded by coryza, and followed by expectoration of a transparent, pale, glairy, and watery fluid; more or less febrile commotion, dyspnœa, and slight soreness, heat, or tightness of the chest, which are diminished as the expectoration becomes more abundant and opaque.*

1. This important disease,* until Dr. BADHAM directed particular attention to it, was, according

* SYNONYMES.—*Bronchitis,* Badham, Hastings. *Erysipelas Pulmonis,* Lommius. *Catarrhus pituitosus, Angina bronchialis,* Stoll. *Catarrhus suffocativus,* Auct. Var. *Bronchitis Catarrhosa,* Hildenbrand. *Peripneumonia Bronchitis,* J. Frank. *Bronchite,* Fr. *Die Entzundung der Luftröhrenäste, Bronchialentzundung,* Ger.—*Inflammation of the Bronchi.—Bronchitis, acute, sub-acute, and chronic; Acute, sub-acute, and chronic inflammation of the bronchi; Inflammation of the mucous surface or membrane of the bronchial or respiratory canals.*

to the particular form it assumed, confounded with common catarrh, with pneumonia, under the appellation of peripneumonia notha, and with other diseases of the lungs and air-passages, more especially tubercular consumption, dyspnœa, &c. Dr. YOUNG seems to have viewed it as a modification or extension of inflammation of the trachea, or even as synonymous with that disease, probably from their occasional complication, or succession to each other. J. P. FRANK appears to have been among the first who directed attention to the frequency and importance of inflammation of the bronchial surface. 'Cum vero,' he observes, 'profundius per tracheam penetrat, ac in bronchia descendit inflammatio; tunc in primo casu tracheitidis speciem, in altero peripneumoniæ imaginem refert, in qua ultima vix non constantem internorum bronchiorum phlogosin in centenis cadaveribus deteximus.' (*Interp. Clin.* p. 110.) 'Rectam habebis febrium catarrhalium saltem fortiorem ideam, si eas pro inflammatione bronchiorum, sive pro bronchitide consideres.' (*De Cur. Hom. Morb.* p. i. t. i. c. vi.). BROUSSAIS also noticed the frequency and importance of inflammation of the mucous surface of the bronchi (*Hist. des Phlegemas. Chron.* t. i. p. 75. Paris, 1800). But it is chiefly to the writings of BADHAM, BROUSSAIS, HASTINGS, LAENNEC, VILLERMÉ, ALCOCK, ANDRAL, and CHOMEL, that we are indebted for our knowledge of it as a specific disease.

2. Bronchitis commences variously, and assumes different forms and states, according to the intensity of the exciting causes, the severity of the attack, and the constitution of the patient. I shall consider it chiefly with reference to its activity and duration, to the states of vital energy and the age of the patient, to its forms and complications, and to its results. Its general prevalence, severity, and not infrequent fatality, require for it a more particular notice than it has received, even recently, from several systematic writers. This will appear somewhat singular, when I state that I know of no disease that is more frequent, or productive of a greater number of deaths, in children than it, in its different states and complications. BRONCHITIS assumes different grades of severity, and a modified type, according to the habit of body and vital energy of the patient, and the extent to which the inflammatory action advances along the bronchial tubes. It presents itself in practice, as a *primary disease*, in three forms : — 1st, Common catarrhal bronchitis, in which only the mucous membrane of the large bronchi and trachea are affected by the specific and often infectious inflammatory irritation constituting *catarrh:* 2nd, Sthenic or true bronchitis, in which the inflammatory action is more acutely marked, is of a more phlogistic description, probably from its further extension along the bronchi, and from both the mucous and the submucous tissue of the tubes being affected ; and, 3rd,

Asthenic bronchitis, where, owing to weak vital energy, the inflammatory irritation assumes a lower and more asthenic grade, and extends still more generally, or affects especially the minute bronchi, interrupting their functions, and preventing those changes from taking place in the blood which are requisite to the support of the nervous and vital manifestations.

3. i. CATARRHAL OR MILD BRONCHITIS.– This form of the disease has generally been termed *Catarrhal Bronchitis* (*B. Catarrhalis*); *Mild Bronchitis* (*B. Mitis*); *Pulmonary Catarrh, Bronchial Catarrh, Catarrhal Fever; Bronchitis serosa*, &c.—This is the most common form of the disease, and generally commences with coryza, or with slight hoarseness or sore throat, and other symptoms of catarrh extending down the larynx along the trachea to the large bronchi; the affection of the former parts generally subsiding as the latter become diseased. But it sometimes appears without any signs of irritation, either of the Schneiderian membrane, or of the tonsils or fauces, evidently originating in the trachea or large bronchi themselves, particularly in delicate persons, or in those disposed to coughs, pulmonary disease, and habitual expectoration.

4. A sense of roughness, with frequent attempts to clear the throat, is generally the first *symptom* of the disease. This is accompanied with, or followed by, titillation of the larynx, exciting a dry hard cough; hoarseness of voice, with a sense of

tightness across the chest, and sometimes slight pain or soreness upon coughing or breathing deeply. Accompanying these local symptoms, more or less constitutional disturbance is generally present. The patient complains of lassitude, pain in the limbs and back, slight shiverings or cold chills, quickness of pulse, and increased warmth, with dryness of the skin. The cough, which was at first dry, is now accompanied with a slight expectoration of a somewhat saline, glairy, and thin fluid; and as it rises towards the glottis, increases the cough, and renders the fits more frequent, probably owing to its irritating quality; in this resembling the secretion in coryza with which it so often originates. In the slighter forms of the disease, the expectoration becomes in two, three, or four days thicker, more abundant and tenacious, less irritating and somewhat more opaque; and with this change the constriction, pain, and soreness are diminished, or very much relieved; the pulse also is less frequent; the skin cooler and more moist; the urine less scanty, paler, and deposits a sediment; and the cough less frequent, although often in longer paroxsyms. As the amendment advances, the sputum decreases in quantity, but is more opaque, tenacious, and deeper coloured, being frequently greenish-white. This amelioration is most remarkable at first in the morning, and, as convalescence proceeds, continues throughout the day. At last but little expectoration takes place, and is observed, as well

as the cough, only morning and evening. In slighter cases, the chilliness continues throughout, or alternates with some increase of heat and perspiration; the pulse is scarcely affected unless towards evening; the expectoration is neither abundant nor very viscid; the fits of cough not severe, and chiefly in the night and morning. Such are the usual symptoms and course of catarrhal bronchitis, constituting what is usually named a cold upon the chest. But it sometimes assumes other characters; and then pulmonary catarrh is no more applicable to it than to inflammation of the substance of the lungs, in which, also, it occasionally terminates.

5. This form of bronchitis appears to consist of catarrhal irritation extending to, or originating in, the mucous membrane of the trachea and large bronchi, to which it is chiefly limited, without materially affecting the sub-mucous tissue. It seems not to be actual inflammation, or, if inflammatory action be present, it is of a peculiar or specific kind, probably owing to its being seated in, or rather limited to, the mucous membrane; in which light it is viewed by HILDENBRAND, who very justly considers catarrhal irritation to be distinct from true inflammation. This variety may assume an epidemic form, when its symptoms become somewhat modified; and repeated or prolonged attacks of it often favour the development of tubercles in the lungs, or even originate them in scrofulous and delicate subjects. It may

also pass more or less rapidly into either true acute bronchitis, or into the chronic form of the disease, owing to the extension of inflammatory action more generally through the bronchi, and to their sub-mucous cellular tissue.

6. ii. STHENIC ACUTE BRONCHITIS.—This form of inflammation of the mucous surface of the bronchi has, from its phlogistic or acute and active character, been called *acute bronchitis*, or *sthenic acute bronchitis*, or *sthenic bronchitis*,—*B. acutus*,—*B. acutus verus*,—*B. acutus sthenicus*. It is the *acute mucous catarrh* of LAENNEC.—This more decidedly inflammatory form of the disease is sometimes preceded by coryza of sore throat; and as these begin to yield, the morbid action extends along the mucous membrane to the trachea and bronchi. But it frequently also commences in this last situation, particularly in those who are liable to pulmonary disease, and to chronic coughs, and assumes a severe form. After these preliminary signs, sometimes hoarseness, or loss of voice, and always a dry hard cough, with a sense of soreness, rawness, dryness, and heat, are complained of under the sternum, preceded by marked chills or complete rigors. The chills at first alternate with increased heat and dryness of the skin; and are soon followed by quickened and somewhat laborious respiration; dyspnœa or oppression of the chest; sometimes a dull pain on coughing; quick, full, and often strong pulse; sickness or loss of

appetite; pain in the forehead, back, and limbs; loss of animal strength, with an inability to leave the couch or bed; foul loaded tongue; constipated bowels, and scanty high-coloured urine. As the disease advances, the frequency of pulse, the cough, expectoration, and general febrile symptoms, increase, as well as the tightness and soreness of chest; the latter sensation often amounting to an obtuse pain extending between the shoulders, to the back, and to the attachments of the diaphragm to the false ribs, sometimes with pale anxious countenance, and great oppression and anxiety. As expectoration comes on and increases, the sense of heat below the sternum diminishes. The cough is generally excited by a full inspiration; and from being short and dry, or attended by but little expectoration, becomes longer, more severe, and convulsive, accompanied with a more copious expectoration; and subsequently, in some cases, terminates in scanty vomiting, which promotes the discharge of a watery or serous and frothy mucus, sometimes in considerable quantity, which had accumulated in the bronchi and trachea. The febrile and other symptoms are aggravated towards night, which is generally sleepless and disturbed, the position of the body being on the back; but the posture is often changed. In some cases, particularly those which are not remarkably severe, each exacerbation of the fever is attended by chills; and throughout the disease, the sensibility of the surface to cold is very great. In the more

phlogistic cases, especially in plethoric subjects, the dyspnœa and oppression are very urgent, the face is flushed, and sometimes slightly tumid, and the eyes injected. At a still more advanced period, the tongue is often red at its sides and point, and deeply loaded in the middle and base, the breathing becomes rattling or wheezing, owing to the air struggling through the mucous accumulation in the bronchi, and the exertions to expectorate greater. In extreme cases of this description, collapse, with diminished expectoration, purple lips, orthopnœa, quick depressed pulse, cold perspirations and extremities, with threatening suffocation, occur as early as the sixth or eighth day.

7. The chief characteristic of this true form of bronchitis is the state of the *sputum*, which ought always to be carefully examined. When the disease attacks a person who never expectorates whilst in health, the cough remains dry for a considerable time; and those who expectorate habitually, cease to do so when the inflammatory attack is very acute. If the disease be slight, the sputum is often increased from the commencement, and its quality changed. As long as the cough continues dry, the disease may be said to be in its first stage. In the course of a period which varies with the constitution of the patient and the treatment employed, each fit of coughing is followed by the excretion of a clear, transparent, serous or watery mucosity, which is at first slightly saline, but afterwards becomes tasteless. It is without

odour. As the disease advances, it is a glairy mucus, resembling white of egg. When it is poured into one vessel from another, it flows with extreme viscidity. The more it can be drawn out into a fine thread, and the greater its tenacity, the more marked is the irritation of the surface secreting it; the greater also being the oppression, heat, and anxiety in the chest, the violence of the cough, and the general febrile symptoms. In these very acute cases, it adheres closely to the sides of the vessel containing it by long striæ. When the fits of coughing are severe, there is a froth or sort of lather on its surface; and in some cases it is streaked with a little red blood, which, however, is not combined with the mucus as in pneumonia. Early in the disease, whilst the expectoration is fluid, transparent, or watery, it often contains small whitish flocculi, proceeding from the mucous cryptæ of the pharynx and fauces.

8. In proportion as the inflammation advances to *resolution*, the sputum loses its transparency, and is mixed with opaque, yellowish, whiteish, or greenish matter, which increases until it forms nearly the whole of the expectorated mass, and is attended by a marked diminution of the symptoms: its quantity also is lessened. The inspection of the sputa thus not only serves to indicate the nature of the disease, but also its various stages. In cases of a relapse or aggravation of the inflammatory action, the sputum again becomes transparent, frothy, more abundant, and viscid; and the

other symptoms increase. In several instances the disease will continue to fluctuate for several days, exhibiting symptoms of slight amelioration, soon followed by slight relapse or exacerbations, often occurring on alternate days, or at the tertian period, and assuming from this circumstance a remittent character, until either a more decided improvement takes place, or a more marked aggravation, terminating in some one of the ways hereafter to be detailed (§ 12 *et seq.*).

9. In the two forms of the disease now described, the minute bronchi so far escape, during the favourable course of the disease, as that no material interruption to the functions of the lungs in respect of the changes effected on the blood during respiration, takes place in them; the air still passing through them and reaching the air-cells: but, in certain of their very severe forms and complications, and of their unfavourable terminations, and in the variety next to be noticed, obstruction to the free circulation of air, and to the changes produced on the blood in the lungs, occurs to a greater or less extent.

10. iii. ASTHENIC ACUTE BRONCHITIS. — This variety has most commonly been described by former writers as *Bronchitis Asthenicus*,—*Asthenic Bronchitis*,—*Peripneumonia Notha**,—

* '*Peripneumonia notha* fortior nobis bronchiorum catarrhus est, quo in pituitosis, obesis, senibus, cachecticis, laxisque hominibus frigida et humida sub tempestate, ab accedente membranæ mucosæ hos canales investientis irritatione, copiosior, tenaxque

Acute Suffocative Catarrh,—Acute Sthenic Bronchitis, which latter name I gave it in my first treatise on Bronchitis. This variety of the disease generally occurs in very young, or in aged persons, in those of a phlegmatic or cachectic habit, and of lax fibres and exhausted powers of constitution, or who have been liable to chronic coughs, and to copious expectoration of a thin watery phlegm. Severe paroxysms of cough, with wheezing and oppressed breathing; foul loaded tongue; scanty urine; complete loss of appetite; very quick, small, or irregular pulse; little or no increase of heat, excepting at night; cold extremities; vertigo; pain in the head; exacerbating fits of dyspnœa, with a scanty expectoration at the commencement, gradually becoming abundant and frothy; are its chief symptoms in persons advanced in life. It is much less acute or phlogistic in its character than the preceding variety; and its duration is longer. In the more severe cases, the countenance is pallid and anxious; the oppression of the præcordia extremely great; and a full breath taken to relieve it brings on a severe fit of coughing, which sometimes terminates in vomiting, and relieves for a time the symptoms by favouring the excretion of the accumulated mucosities. The tongue is often dry and brownish-red at its point and edges, and sometimes covered at its base with a dark coating; the breathing is much more difficult; the lips and

pituita celeriori passu secreta bronchiorum fines opplendo, suffocationem sat cito minatur.' (J. P. Frank.)

nails assume a blue livid appearance; the face becomes lurid or dusky; the patient cannot lie down in bed, or, if he does, starts up, after falling asleep, with a sense of suffocation; and the symptoms indicate either collapse, and obstruction of the air passages, or effusion of fluid in the thoracic cavities, or even both: stupor, or sopor; weak, wiry, and very frequent pulse; marked diminution of the sputa, cold extremities, orthopnœa, clammy sweats about the face and neck, suppressed urine, &c., ushering in a fatal termination.

11. This is, upon the whole, the most common form of bronchitis which is met with in *children*, particularly in the metropolis, and among the children of the poor, ill-fed and ill-clothed, and those living in cellars, ground-floors, and badly ventilated lanes and apartments, and is often remarkably prevalent during the winter and spring. In this class of patients its approach is often insidious; and it usually commences with coryza, but not infrequently also with chills, febrile symptoms towards evening, wheezing, quick breathing, and cough. There is at first little or no dyspnœa; but the tongue is loaded, the pulse accelerated and full, the face pallid or tumid, and the child has lost its animation. As the disease advances, the breathing becomes more quick and laborious; and fits of dyspnœa come on, generally followed by severe attacks of cough, which often terminate in vomiting; on which occasion only the bronchial

secretion is presented for examination, and is found to consist at first of a viscid, watery mucus, and afterwards of a yellowish-white, or a tenacious matter. These exacerbations are followed by remissions, during which the child dozes, and appears relieved, and the pulse becomes less frequent. Thus the disease may continue, with alternate remissions and exacerbations, for many days, until either a permanent diminution of the symptoms takes place, or an increased frequency of pulse, stupor, lividity of the lips and nails of the fingers, convulsions, &c., supervene, and indicate impending suffocation, with congestion or watery effusion on the brain.

12. iv. CONSEQUENCES AND TERMINATIONS OF ACUTE BRONCHITIS.—*A. Duration.*—The *sthenic* variety of the disease usually runs its course in about seven or nine days; but it may terminate either way as early as the fifth; or it may be prolonged to the 21st, or even the 28th day. Its duration will, however, chiefly depend upon the treatment employed, the complication it may present, the severity of the symptoms, and on the age and constitution of the patient. The *asthenic* form of bronchitis generally runs its course in a slower manner; it seldom terminates in either way in less than fourteen days, and generally continues for several weeks.

13. *B.* In *favourable* cases, the asthenic form of the disease begins to decline from the fifth to the ninth day. The change is first evinced by the

state of the sputum, as above described (§ 8); by an amelioration of the cough, dyspnœa, and febrile symptoms; in rare instances, by copious epistaxis; by a more general and copious perspiration than that which frequently terminated the febrile exacerbations; by a more copious discharge of a paler urine, depositing a sediment; and by a diminution of the dyspnœa, of the frequency and severity of the cough, and of the quantity of the expectoration, which becomes pearly, opaque, thick, yellowish, or greenish yellow; at last febrile symptoms occur only towards evening, and the disease disappears as in the catarrhal variety.

14. *C.* This favourable change is not, however, always observed, particularly when the attack is very severe, when treatment has either not been soon employed, or has not been sufficient to remove the disease, or when the secretion into the bronchi has been very profuse, and expectorated with much difficulty. In such cases, it either lapses into the chronic state about to be described; or, owing to the extension of the inflammation to the capillary or minute bronchi and to the air-cells and substance of the lungs, gives origin to pneumonitis, and even to pneumonitis combined with pleuritis, which is thus superadded to the original disease; or, from the great extent of surface affected, the consequent irritative fever, and interruption to the pulmonary functions, and the profuse viscid fluid filling up the bronchi, collapse of the powers of life supervenes, and the

patient dies, either with cerebral affection, or with the usual symptoms of asphyxy, consequent upon diminished discharge of the morbid secretion, and its accumulation in the air-tubes.

15. *a.* When the disease thus terminates in *pneumonia*, the sputum becomes more rounded, thick, tenacious, and streaked with blood, which is more or less intimately mixed with it; and sometimes of a dark colour, giving it a rusty appearance; and the cough is more tight, hard, and deep. The oppression also increases; the cheeks are flushed with circumscribed red; the pain of the chest is more severe, or is now complained of for the first time; the skin is partially covered with moisture, sometimes very abundant in parts; the chest, which was hitherto sonorous throughout, is dull, in some part or other, upon percussion; and the auscultatory signs of severe and dangerous pneumonia appear, on which delirium and other unfavourable symptoms often supervene, and terminate, with coma, the life of the patient.

16. *b. Collapse* of a greater or less portion of the lungs may occur, especially in children and aged persons. Bronchitis, either in the sthenic or asthenic form, may also terminate in chronic pleuritis, and in effusion of serum into the pleural cavity, and in some instances also into the pericardium, particularly in persons advanced in life, and in those who have experienced difficulty in the circulation through the cavities of the heart. In some instances of this description,

the expectoration, and many of the other symptoms, are suddenly or quickly diminished; but the dyspnœa continues, and signs of effusion become more apparent as those of bronchitis disappear. In these, the consecutive effusion occurs in the form of a translation or metastasis of the morbid action from the mucous to the serous surface. In other cases, symptoms of pneumonitis, or pleuritis, intervene between the change in the bronchite symptoms, and the occurrence of effusion, with pain, more or less severe, loss of resonance in some part of the chest, and other auscultatory signs, indicating the extension of the inflammatory action first to the small bronchi, and thence to the substance of the lungs and the pleura. Sir C. HASTINGS has detailed some cases of this termination in his work, and I have treated several instances at the Children's Infirmary; but it is chiefly the aged who are liable to this unfavourable occurrence.

In other unfavourable cases, the disease becomes, in the course of a few days, characterised by failure of the energies of life; oppression and uneasiness increase; the cough is more frequent, laborious, and convulsive; the sputum is either more abundant, frothy, tenacious, and glairy, or gelatinous, and excreted with great difficulty, or much diminished in quantity from want of power to excrete it; the pulse is more rapid, small, weak, and irregular, or intermittent; the pain of the head more distressing; the countenance is pale, and the

face and neck covered with a clammy sweat; the respiration very frequent and wheezing, sometimes with an audible rattle; and, at last, delirium, lividity, at first of the lips, afterwards of the countenance, great prostration of strength, and coma, supervene, and the patient sinks with all the signs of imperfectly changed blood. In some cases, cerebral symptoms come on much earlier, with either violent or low muttering delirium, which soon terminates in most profound coma. In a few cases, this early accession of delirium, or of violent headache, with other symptoms of consecutive inflammatory action, ending in serous effusion on the brain, altogether removes the original bronchial inflammation, or in others moderates it greatly and masks it. I have observed this in *children*, and once or twice in robust adult persons; but in both classes of subjects it is a dangerous occurrence. More commonly, however, the cerebral symptoms continue increasing, with those referrible to the bronchi, till life is extinguished.

17. In other cases of very acute bronchitis, with very high fever and severe local symptoms, particularly with quick, laborious, short respiration, dyspnœa, anxiety, great sense of heat under the sternum, and bloated countenance, collapse takes place rapidly, particularly if an appropriate treatment have not been early employed; and either delirium, coma, and other cerebral symptoms, or those more directly depending on the circulation

of venous blood, appear, and the patient is speedily cut off. In weak and nervous patients, and during unfavourable states of the air, the inflammatory action sometimes seems to invade nearly all the respiratory mucous canals, and is soon productive of a copious mucous secretion, which, either from its difficult excretion, or rapid secretion, either causes collapse of the lungs, or speedily suffocates the patient.

18. In *children*, and more rarely in adults, cases occur, in which the inflammatory action extends to the capillary bronchi and substance of the lungs, or causes obstruction or plugging of some considerable bronchial ramification, and consecutively a collapse of the portion of the lung supplied by that branch. In other cases, the inflammatory action commences in the pharnyx, larnyx, and trachea, and advances to the bronchi, or attacks those parts simultaneously. It more rarely extends upwards from the former to the *trachea* and *larnyx*, occasioning all the symptoms of laryngitis in addition to those of bronchitis, and terminating fatally with convulsions and the signs of congestion in the head. In many of the unfavourable cases of bronchitis in children, the extent of the disease, and the copious secretion, occasion suffocation more or less rapidly, with somnolency, bloated or livid countenance, convulsions, coma, and, at last, complete asphyxy: and, on dissection, congestion of blood, with watery effusion, is found within the cranium; the bronchi

are filled with a muco-purulent matter, and the vessels of the lungs are loaded with blood. (See in the sequel, '*Of Bronchitis in Children.*')

19. v. Complications of Acute Bronchitis.—The most common complications in which bronchitis presents itself in practice, are, 1st, With catarrhal sore throat, coryza, &c., of which it is generally consecutive, and with catarrhal inflammation of the pharynx and œsophagus. 2nd, With tubercular consumption. 3rd, With asthma and emphysema of the lungs. 4th, With inflammation of the trachea, or larynx, or both, of which it is most frequently consecutive; but also sometimes antecedent, as I have occasionally observed in children. Indeed, we have seldom croup in London uncomplicated with bronchitis in some one of its forms or states. 5th, With measles, diphtheria, scarlatina, small-pox, on which it very frequently supervenes, particularly on measles, sometimes very early in the disease, and before the eruption breaks out; but oftener in consequence of its premature disappearance or retrocession. 6th, Very commonly with hooping cough, especially during certain seasons and epidemics. 7th, With inflammation of the substance of the lungs, constituting broncho-pneumonia. 8th, With influenza, upon which it very often supervenes and assumes an asthenic and complicated form. 9th, Not infrequently with continued fevers, particularly in its asthenic form. 10th, Often with disorder, or even sub-acute inflammation, of the digestive

mucous surface, and diarrhœa, in children, when it also assumes this form; the stools being offensive, and the tongue red at its point, &c.* 11th, With disease of the liver, and accumulations of bile in the gall-bladder, chiefly in adults; the tongue then being very deeply loaded with a yellowish brown crust, or fur; and the stools dark-coloured, and most offensive. 12th, In some cases with erysipelas, particularly its epidemic and infectious form. 13th, With pleuritis, either consecutively of the bronchitis, or simultaneous with it. 14th, With dropsical effusion into the pleura or pericardium, especially in aged persons: and 15th, With inflammatory irritation in the substance of the brain, or in its membranes, with disposition to effusion,—a complication most commonly met with in children. In many of these complications bronchitis may be either primary, coetaneous, or consecutive.

20. All these diseases are greatly aggravated, and their danger increased, from being associated with bronchitis; and they frequently terminate fatally by one or other of the unfavourable states which the bronchial affection assumes. Bronchitis thus complicated also presents, in consequence, either a more acute character, or the

* During some seasons I have occasionally admitted in one day, at the Infirmary for Children, several cases, in which it was difficult to determine whether the digestive or the respiratory mucous surface was most affected. This complication is not infrequent during convalescence from the exanthemata, particularly measles and scarlet fever.

asthenic form; and being attended by a more marked disposition to invade the smaller or capillary bronchi and air-cells, or by a more profuse secretion of mucus, and a rapid depression of the vital force, the unfavourable terminations described above quickly supervene. In several of these complications, particularly with pertussis, measles, scarlatina, influenza, continued fever, diseases of the lungs or pleura, cerebral affections, &c., the bronchitis generally assumes an asthenic form, and often escapes detection, until it becomes one of the most important, or the most dangerous, or an actually fatal lesion.

The importance of being acquainted with the most common and the most serious of the complications I have enumerated requires a more particular notice of them. Certain of these complications are noticed as fully as my limits admit, or as the subject requires, inasmuch as the mere mention and recollection of them will suggest a due attention to them on the part of the physician, and at the same time the indications and remedial means which the existing associations of disease appear to render necessary, having a due regard to the states of vital force.

21. *A. The complications of tubercular phthisis*, and of *laryngotracheal phthisis* with *bronchitis*, have been noticed under their respective heads in my '*Dictionary of Practical Medicine*'; but it is chiefly with the chronic form of bronchitis that these maladies are associated, the acute state

being much less frequently observed, and then mainly during an early period of the complication. When we consider the intimate anatomical and physiological relations of the bronchi with the air cells and substance of the lungs on the one side, and with the trachea, larynx, and pharynx on the other, the surprise should not be that these complications, or rather extensions of morbid action, so frequently exist; but that they should be so often, or even at any time absent. The extensions and limitations of disease in the course of mucous surfaces, and the extension of it to or from other structures, are chiefly under the control of the vital force which also influences, through the secreting and depurating organs, the states of the circulating fluids; and when the vital force is unimpaired and the circulating fluids uncontaminated, inflammatory and other diseases are limited, and their extension is resisted. When this vital resistance is weak and insufficient, these diseases are extended, and hence complications more readily occur.

22. *B. The occurrence of bronchitis with measles* either before, during, or subsequently to, the eruption is often observed, and is one of the most serious complications which can appear in the course of measles, more especially when this eruptive fever is epidemic. The severity and danger of this association are the greater, inasmuch as the inflammation of the bronchi, which is most frequently of an asthenic character, is much

disposed to extend to the capillary ramifications and thence to the lungs, and thus develop asthenic broncho-pneumonia. Moreover, this complication may not only appear in the course of, but also during, convalescence from measles.

The more inflammatory and sthenic form of measles is so very frequently complicated with *bronchitis* or *broncho-pneumonia*, or is so liable to be followed by those diseases, or even by pneumonia or pleurisy, during convalescence, that strict attention should be paid to these occurrences. When extensive or severe bronchitis appears in the course of the more sthenically inflammatory forms of measles, the patient is often suddenly seized with great difficulty of breathing; the face is pale, if it precede the eruption, but generally somewhat livid, or even of a deep crimson, if it occur during the eruption. Sometimes the eruption either appears only partially, or recedes prematurely; the lips are also livid; the chest and diaphragm, as evinced by the motions of the abdomen, labour much during respiration, and a sonorous, sibilous, and, lastly, a mucous rhonchus is heard on auscultation. The countenance becomes anxious; the expectoration is more or less abundant, and attended by severe paroxysms of cough; the pulse is quick, small, [or oppressed; and the skin is warm or cool in parts only. This state is not merely a severe form of bronchitis, but an association of it with congestion of the lungs, to which a similar state of the brain is

sometimes superadded. The pulmonary affection in this severe form may soon terminate the life of the patient, chiefly in consequence of the effusion which takes place in the air-passages, together with the loaded state of the vessels of the encephalon.

In the less severe forms of the complication of bronchitis with measles, or when the bronchitis is not conjoined with congestion of the lungs, the symptoms are much less marked and severe; there is less urgent oppression in the chest, and the lividity of the countenance is generally absent. But these less severe states of bronchitis not infrequently superinduce inflammation of the capillary bronchi, extending to the substance of parts of the lungs or of a whole lobe. In this case the sputum becomes more rounded, and sometimes streaked with blood; respiration is puerile in the vicinity of the affected part, in which the respiratory murmur is either feebly heard, or is attended by crepitation, or the sound is no longer detected in it, whilst the chest is dull, in this situation, on percussion. At the same time the respiratory motions are quick, laboured, unequal, and imperfect.

23. When thus complicated with *measles* or other *exanthematous diseases,* the eruption, if it still continue on the surface, often assumes, as the powers of life sink, a dark or purplish hue; or a slight dirty blueness of the skin, particularly of the face and hands, is generally observed, indicating the impeded functions of respiration, and the consequent changes in the blood. The fre-

quency and importance of the *complication* of bronchitis with *measles*, or with other eruptive or continued fevers, especially before the eruption, during its progress, and after its decline; and the occurrence of bronchitis both during and after convalescence from these maladies, especially measles, and other epidemic diseases, are deserving the careful attention of the physician.

24. *C. Bronchitis is frequently associated with hooping-cough* during some epidemics, and especially in spring and winter, and particularly in this climate in the months of February, March, and April, and during the prevalence of easterly or north-easterly winds, and when pertussis follows soon after measles.

1. Bronchitis may precede hooping-cough; 2. It may be coeval with it; 3. It may supervene in the course of the disease. The last is most common. Whenever bronchitis appears, there are always decidedly febrile symptoms during the intervals between the paroxysms of cough. The breathing is also much accelerated, and when examined by auscultation is accompanied by the mucous rattle, and occasional temporary suspension of the respiratory sound in parts of the lungs, owing to the accumulation of the mucous secretion for a while in one or more of the bronchial tubes conveying air to those parts of the organ. The expectoration also, from being clear, whitish, and ropy, becomes more opaque, less fluid, gelatinous, and less abundant. The paroxysms of

cough are much more frequent, and often accompanied with a feeling of oppression in the chest, and are less constantly followed, or even not at all, by rejection of the contents of the stomach. The chest sounds well upon percussion, and the patient lies on the side most affected, or in slighter cases on either side. When the bronchi of both lungs are generally affected, he is unable to lie on either side, or is incapable of lying down at all.

25. This complication often terminates fatally, either from obstruction of the air-tubes by the accumulation of tenacious mucus, and collapse of portions of the lungs, owing to occlusion of these tubes, together with spasm about the larynx, occasioned by the nervous character of the disease, and the irritation of the glutinous secretion, the patient dying asphyxied; or from congestion of the vessels of the head, owing to the paroxysms of cough, the obstruction produced by the mucus in the air-passages, and the difficult circulation through the lungs; or from the inflammatory action having extended either to the trachea and larynx on the one hand, or on the other to the minute bronchi and substance of the lungs, terminating in condensation, &c., of the structure of the organ, &c. In some cases, owing to the treatment employed and constitution of the patient, the acute form of the bronchial affection gradually subsides until it arrives at a milder state; when, owing to the incapability of the vessels to assume the healthy state, a chronic form of disease

continues long afterwards, which may be removed, in some cases, by judicious management; but which terminates in ulceration of the mucous membrane, or gives rise to tubercles, to chronic pneumonia or pleuritis, or other lesions in the thoracic cavity. This complication is frequent from six or seven months upwards, and especially during the second, third, and fourth years of age.

26. *D. Bronchitis was one of the most frequent and severe complications of influenza*, observed in the two great epidemics of this latter disease in 1833 and 1837. But it was very different from the sthenic acute bronchitis usually observed as a primary malady, or as occurring in previously healthy persons. It was attended, in many cases, with more marked vital depression, with a more copious expectoration of a greyish, viscid, ropy, and less frothy mucus, which often quickly passed into a thin, muco-puriform matter, than in idiopathic bronchitis. In most of the cases both lungs were more or less affected, and the disease rapidly extended, especially when injudiciously treated, to the capillary ramifications of the bronchi, until, in the dangerous or fatal cases, the air-cells themselves became implicated.

At the commencement of the bronchitic complication the cough was hard, dry, and severe; but expectoration soon became abundant, the wheezing from the accumulation of the morbid secretion in the bronchi being often remarkably loud, the cough and the quantity of the sputa

were generally increased at night, the former being frequently so severe, and the attendant dyspnœa so urgent, as to prevent the patient from lying down in bed. When both lungs were gravely affected, the patient was obliged to sit, or be shored up by pillows. In some cases the sputa were remarkably abundant, consisting of a very fluid muco-puriform matter, almost from the commencement.

In most of the bronchial complications, the *dyspnœa* was considerable, and especially when expectoration was difficult and the sputa copious: still it was often great when the discharge from the respiratory passages was neither abundant nor difficult. The rapid extension of the asthenic form of bronchitis throughout both lungs was most remarkable in the delicate, in the aged, the cachectic, and in those subject to asthmatic or bronchial disorder. In some instances, it quickly superinduced a nervous or asthenic form of pneumonia or pleuro-pneumonia, with which it further became associated; and occasionally it seemed to have given rise to more or less emphysema of the lungs. The mucous or crepito-mucous ronchus was generally heard in most of these cases. The pulse was commonly upwards of 100, and often above 110 or even 120, and often irregular or intermitting. The severer states of this complication often terminated fatally, owing to the quantity of the morbid secretion filling the smaller bronchial ramifications, infiltrating the air-cells,

or even the areola of the connecting cellular tissue, and thus occasioning asphyxia.

27. *E. The complications of bronchitis with pneumonitis* are more common than the pure or unassociated form of either of these, and are met with in both the sthenic and asthenic types of these diseases; the latter types, however, more generally presenting the complicated state. This association, consisting of *broncho-pneumonia*, or *broncho-pneumonitis*, is more common than generally supposed; for the asthenic form of pneumonia can hardly exist without the capillary bronchi being implicated, and the inflammation, which is primarily seated chiefly in the larger bronchi, in sthenic bronchitis readily extends to the capillary ramifications, in delicate, scrofulous, or cachectic constitutions, more especially when exposed to depressing influences, and when bronchitis appears in the course of exanthematous or continued fevers, and during the epidemic or endemic prevalence of diseases of the respiratory passages. When bronchitis is complicated with pneumonia it is sometimes of importance to mark the procession of the morbid phenomena, in order to ascertain the primary affection. In the great majority of instances, the bronchi are primarily affected, the morbid action extending thence to the parenchyma of the lungs, owing either to the nature of the causes, to the constitution and existing state of the patient, or to the treatment adopted at the commencement. I have observed,

in numerous cases, particularly among the children of the poor, living in low, damp, and close situations and rooms, sleeping in overcrowded apartments, and insufficiently or unwholesomely fed and clothed, that the disease has commenced in the bronchi, extended to the air-cells and substance of the lungs, and thence to the pleura, with great rapidity. In this complication the quantity of mucus in the bronchi may mask the crepitation of pneumonia. Still, crepitation will generally be heard in the inferior and posterior regions of the chest, whilst the mucous rhonchi will be evident in the more superior parts. The rusty or tinged appearance of the sputa, as the disease proceeds, the dulness on percussion, the increased dyspnœa, the greater severity and more paroxysmal character of the cough, will also mark this association.

28. Broncho-pneumonia very frequently supervenes in the course of *Influenza* (§ 26). It was common and fatal in the influenza of 1837, particularly when it implicated, as it very often did, both lungs. In this epidemic the pulmonary affection generally assumed the asthenic form, the pulse being weak, quick, and small, the cough being severe, puriform expectoration abundant, and dyspnœa distressing; and in proportion to the vital depression the most energetic means were required to rouse the vital resistance to the extension and fatal tendency of the disease. Broncho-pneumonitis is also frequent in the

course of *hooping-cough* (§ 24), and in the more unfavourable forms of *croup*; but, in these, it assumes a more sthenic character than in influenza. It also occurs in the course of *cardiac disease*, particularly when the valves are affected, and in connection with *hæmoptysis*; but, in these circumstances, it presents much of the congestive form.

The bronchitis which so very generally complicates *measles* (§§ 22, 23) passes very frequently into broncho-pneumonia, although the pneumonia may be the chief affection. In all cases of this association, the pulmonary disease partakes of the constitutional malady, being sthenic, asthenic, or malignant, as this latter may be. When the local disease is severe, it is readily recognised, as it is commonly attended by an imperfect evolution of the eruption, or it follows immediately upon either the premature or the regular disappearance of it; the fever or constitutional disturbance being unabated or increased.

The *peripneumonia notha* of the older writers was generally a broncho-pneumonia occurring in aged, cachectic, or debilitated persons, in whom the disease assumed, from these circumstances, more or less of an asthenic form, and extended to both lungs; but the same term was often also applied to other states of bronchitis, and even to asthenic pneumonia, with extension of disease to the pulmonary pleura.

29. *The asthenic form of acute bronchitis, or*

acute capillary bronchitis, the acute suffocative catarrh, although often occurring primarily in very young, delicate, cachectic, and ill-fed *children*, especially in low, crowded, and unhealthy localities, is quite as frequently seen as *complication* of eruptive and continued fevers, of hooping-cough, of influenza, etc., or as supervening upon these either during their decline, or during convalescence from them. When thus complicated, asthenic acute capillary bronchitis may assume the states described above (§§ 27, 28); but it may be more or less varied as respects its symptoms and the rapidity and character of its terminations, with the circumstances in which it appears, or with the nature of the disease with which it is associated, or upon which it supervenes. It generally, especially when thus complicated, terminates fatally, owing to both lungs being affected, and to the extension of the mischief not merely to the capillary bronchi, but also to the air-cells and substance of the lungs, which often becomes collapsed or carnified. In these cases, the pulse is rapid, small, weak, etc., the face and fingers become livid and cold, and somnolence, coma, and asphyxia supervene.

The remarks now offered respecting the most frequent complications of bronchitis, and the mere enumeration of others of more rare occurrence, will be sufficient to direct attention to the practical importance of the subject. The association of bronchitis not only with the exanthematous

fevers, but also with continued fevers at certain seasons, and in some epidemics, will also frequently engage professional attention.

30. vi. SUB-ACUTE BRONCHITIS. — It is often difficult to determine the grade of severity which may exist in an attack of bronchitis, or whether it present an asthenic or sthenic character on its first appearance. Very early in the disease an acute attack may rapidly assume a mild or sub-acute form, or the sthenic character may soon pass into the asthenic, owing either to its causes, the diathesis of the patient, or the influences and treatment to which he has been subjected. In most of the cases of sub-acute bronchitis which I have observed, especially in the *children* of the poor, and in those which were brought before me in the patients at the Infirmary for Children, the complaint presented a sub-acute form from the commencement, and often could not be distinguished from a common catarrh. After a period of varying duration, the cough becomes more and more severe, and is sometimes followed by retching or vomiting; the complaint being frequently then mistaken for hooping-cough. Respiration is frequent, wheezing, or irregular; fever supervenes, with flushed face, accelerated pulse, and heat of skin. As the mucous secretion increases, the cough becomes more paroxysmal and looser, and the respiration, which was at first tight or oppressed, more wheezing and laboured. When

the paroxysm of cough terminates in vomiting, mucus, in varying quantity, is thrown off, and much relief is experienced for a time, until it again collects. If the cough be not followed by vomiting, and if the child be not old enough to expectorate freely, the mucus is swallowed. In most cases the tongue is moist, and the respiration, cough, and fever are, for several or even for many days, without much alteration; the symptoms, especially the fever, being aggravated towards evening or night; and, when sleep is procured, perspiration takes place: upon awakening, the respiration is much oppressed until the cough dislodges the accumulated mucus. Auscultation detects only the mucous or sibilous respiration, with large or moist crepitation in the lower and the posterior regions of the chest.

31. As the disease continues or becomes aggravated, particularly in children, and as the vital force becomes exhausted, the capillary bronchi are liable to obstruction from the tenacity and quantity of the mucus secreted, and from the vitality of the ciliæ of the mucous surface being insufficient for the conveyance of the secretion along the smaller to the larger bronchi, some of which may also be obstructed, and the portion of lung which they supply may thus either collapse or be carnified by the accumulation in the capillary bronchi, and by the accompanying vascular congestion. When these changes occur, dulness on percussion, and absence or weakness of the

respiratory murmur, are more or less manifest. In some cases of sub-acute bronchitis the symptoms are merely of a milder character than in the sthenic and asthenic forms above described (§§ 6—11), and the duration of the disease is not so protracted, although, when the case is neglected, it may be even more prolonged than the acute.

32. Other cases of sub-acute bronchitis are characterised by the symptoms of the sthenic form of the disease (§§ 6—9) in a milder and more chronic form. The cough continues longer dry, and the expectoration scanty, or thick, viscid, gelatinous, or albuminous, or almost membraniform, with tightness, oppression, or uneasiness in the chest, and difficult breathing. In some cases of this form of the disease, a plastic albuminous exudation forms on the surface of the lower part of the trachea and of the large bronchi of only one lung, and is moulded in a tubular form, and in the shape of the air-tubes, and is expectorated either in fragments, or in large tubular branches and ramifications. Cases of this description are described by the older writers under the appellation of bronchial polypi, and figures are given of them by TULPIUS and others. I have met with several cases where this bronchial exudation was expectorated in fragments, some of which presented a branched and tubular form. It was observed in uncomplicated cases of sub-acute and chronic bronchitis; or in states of the disease that

appeared intermediate between these conventional forms. The cases which I had an opportunity of observing recovered.

The diseases above mentioned as being frequently complicated with acute bronchitis, often are attended by a milder form of the bronchitic affection, which generally assumes a *sub-acute*, or even a *chronic character*. This is especially observed in the course of tubercular consumption, of asthma, of hooping-cough, of chronic pleurisy, in all of which the *bronchial complication* is even much more frequently chronic than acute. (*See Chapter II.*)

CHAPTER II.

DESCRIPTION OF CHRONIC BRONCHITIS.

In few diseases may the terms acute, sub-acute, and chronic, be more truly viewed as conventional than in Bronchitis, the one form often passing insensibly into the others—the acute lapsing into the sub-acute and chronic, more or less rapidly or even slowly; and, in other cases, although much less frequently, the sub-acute or chronic, owing to exposures or other causes, assuming an acute or active form. In most cases, however, of chronic bronchitis, the duration of the disease is such as fully justifies the term, and in some its most protracted acceptation.

33. *A. Chronic bronchitis* often follows severe attacks of catarrh; and is also frequently consecutive of acute bronchitis; but it sometimes occurs primarily in the chronic state, particularly in aged persons. It differs in nothing from the acute or sub-acute forms, excepting in as far as the symptoms are altogether milder, and their continuance longer; there being no distinct line of demarcation between its grades of activity and chronicity. The chief means by which we are enabled to infer that the disease has assumed a chronic form, when it is consequent on the acute, is the continuance

of the sputum for several days, in undiminished quantity, and the persistence of the opaque, whitish yellow, or yellowish green appearance, which it assumes upon passing from the transparent, fluid, and viscid condition characterising the acute form.

34. Chronic bronchitis assumes various grades of severity, and presents different phenomena, according to the changes which have taken place in the bronchi. In its *slighter states*, and primary form, as it is often met with in persons advanced in life; and as it prevails during winter and spring, or variable seasons, it consists chiefly of a frequent and almost habitual cough, with scarcely any pain in the chest, continuing for weeks, or even months, or recurring every autumn, winter, and spring; being most severe in the mornings, and much easier through the day, with slight dyspnœa on exertion, and copious viscid mucous expectoration; but without any marked febrile symptoms, excepting slight acceleration of pulse. Its *severer forms* are met with in young or middle-aged persons, after catarrh or acute bronchitis; and are attended with fits of coughing, and copious expectoration; with oppression at the chest and præcordia; with febrile symptoms, particularly towards night; with copious perspirations in the morning, which often seem to increase the cough instead of relieving it; with loss of strength, emaciation, and slight disorder of the digestive organs. The cough is increased

after getting into bed, and very early in the morning. The breathing is quick and laborious, particularly on any exertion; and the patient complains of slight tightness of the chest. The pulse generally ranges from 90 to 120; being the former whilst quiet in bed, and the latter towards evening.

35. Attention to the *expectoration* is very important, in order to enable us to judge both of the accession of this state of the disease, or of its aggravation or change into the acute form, which is not infrequent, and of the concurrent or consecutive alterations which often take place. The sputum occasionally continues long in the state now described. It is generally then inodorous, and without taste. But it oftener becomes greenish or yellowish white, or muco-purulent; is mixed with a colourless watery phlegm, and is more or less abundant. In cases of a worse character, particularly when hectic symptoms are present, it assumes a more purulent appearance; is sometimes streaked with blood, or mixed with dark specks of blood, or consists chiefly of pus. These changes, however, seldom occur without much antecedent fever, and attendant emaciation, night sweats, occasional diarrhœa, and the symptoms of confirmed hectic. In rarer cases, the sputum becomes remarkably fœtid; but this change cannot be imputed to any particular lesion of the bronchi or lungs, excepting sometimes to considerable dilatation of the former. The whole of the symptoms

in this class of cases so very nearly resemble tubercular consumption as to be distinguished from it with much difficulty, and only by attending to the appearances of the sputum, and by examining the chest with the stethoscope.

36. The *sputum* generally partially swims on the surface of water. When it is thin, transparent, viscid, and frothy, it usually altogether swims; but when it is thick, in tenacious, opaque lumps, or in fragments resembling portions of albuminous exudation, it generally sinks. In all these states it cannot be diffused in the water. When it consists of yellowish white, or greenish yellow matter, it partly sinks, and by agitation is broken into ragged portions, and is partially diffused; and the more it approaches a purulent state, the more completely and readily is it diffused, imparting to the water, by agitation, a yellowish white appearance.

37. *B.* Chronic bronchitis is sometimes *consecutive* of the eruptive diseases; but these diseases have generally altogether or very nearly subsided before the bronchial affection supervened. It occurs primarily from the irritation of minute particles of mineral or vegetable substances floating in the air, as is shown in the sequel. It is sometimes also *complicated* with other chronic diseases of the lungs and pleura, more especially with *tubercles*, with *asthma*, with *hooping-cough*, with organic diseases of the heart, with congestion of the lungs, with chronic inflammation, or other disorders of

the mucous surface of the digestive tube; particularly of the œsophagus, stomach, and large bowels. In all these consecutive and complicated states, it presents no certain or unvarying forms; its chief character, its duration, progress, and termination, being modified by its severity, by the constitutional powers of the patient, by his diathesis, by the nature of the complication, and by the quantity of expectoration. In some protracted cases, the secretion from the bronchial surface is so profuse as to be the chief cause of the exhaustion and death of the patient.

CHAPTER III.

THE DIAGNOSIS AND PROGNOSIS OF BRONCHITIS.

i. Of the Diagnosis of Bronchitis.

The characters of the cough, and of the sputa, the physical signs, and the constitutional symptoms, are our chief guides in the diagnosis of bronchitis. The history I have given of the disease will be generally sufficient to enable even the inexperienced to recognise it; but it will often be necessary to arrive at more precise information as to the extent of lesion, and its existence either in a simple or in a complicated form.

38. *A. Of acute Bronchitis.—a. By auscultation.*—In the first stage of the disease, the inflammation causes tumefaction of the mucous bronchial surface, and consequent diminution of the calibre of the tubes. This state occasions a modification of the respiratory sound in them; and hence, either with the unaided ear, or with the stethoscope, we hear at first the '*dry bronchial rhonchus;*' consisting chiefly of a sibilous or whistling sound; occasionally with a deeper tone, resembling the note of a violoncello, or the cooing of a pigeon, particularly when the large bronchi

are affected. These sounds, denominated the *sibilous* and the *sonorous rhonchi*, are present chiefly in the early stage, and before expectoration takes place; and prove the accuracy of the rational inference of Dr. BADHAM, that the difficult breathing of this period is owing to the state of the mucous membrane; and, I would add, of its submucous cellular tissue also. To these sounds is added the *mucous rhonchus*; and in proportion as the bronchial secretion, to which it is owing, augments, this sound becomes predominant. When the inflammation is seated in the large tubes, the bubbles of mucous rhonchus are large and uneven; and the respiration may be still heard over the chest. But when the mucous rhonchus is fine, and is heard constantly, it may be inferred that the small bronchi are invaded. When this is the case in a severe degree, there is also slightly diminished resonance of the chiefly affected part upon percussion. As the disease proceeds, and the secretion passes into an opaque and thickened state, the mucous rhonchus becomes interrupted, sometimes with obstruction of the respiratory sound in a portion of the lungs, and passes into a sibilant or clicking sound. These changes arise from the entire or partial obstruction of one or more tubes by the thickened mucus, and are generally of temporary continuance; occurring now in one part of the chest, and disappearing; and now in another. This state of the bronchi fully explains the dyspnœa of this stage.

39. *b. Rational Diagnosis.—α.* The *cough* in *bronchitis* is loose, diffused, and deep; in paroxysms, and attended with fever, often with wheezing. In *pertussis*, it is in severe paroxysm, unattended by fever or wheezing; is accompanied with a distinct whoop; and terminates in vomiting. In *croup* it is sonorous, clanging, and harsh. In *laryngitis*, it is suffocating, shrill, or grunting; and, on inspiration, attended with a drawing down of the pomum Adami to the sternum, and retraction of the epigastrium and hypochondria. In *pneumonia*, it is deep in the chest; frequent and short, often hard; and gives a metallic sort of noise. And, in *pleuritis*, it is short, dry, hard; sometimes slight, but always suppressed and painful. —*β.* The *expectoration* in *bronchitis* is abundant after the second or third day, or even from the first; in *pertussis*, it only follows the vomiting: in *pneumonia*, it is more rounded, distinct, thickened, purulent, rusty, and intimately streaked with blood: in *pleuritis*, *croup*, and *laryngitis*, it is scanty, thin, frothy in the latter; sometimes with shreds or pieces of lymph, and entirely different in appearance from that of bronchitis.—*γ. Pain* in *bronchitis* is scarcely complained of; and consists merely of a sense of soreness, heat, and tightness in the chest, particularly beneath the sternum, and is not increased on full inspiration: in *pneumonia*, it is more marked, especially in certain parts of the chest, generally nearer the lateral regions, and is increased on inspiration or pro-

longed expiration: in *pleuritis*, it is very acute, and a full inspiration is impossible: in *croup* and *laryngitis* the pain is increased upon pressing the trachea and larynx.—δ. The *countenance* in *bronchitis* is more frequently pallid or bloated: in *pneumonia*, it is generally flushed; and dyspnœa is greater in the former than in the latter. The breathing is *wheezing* and *hurried* in acute bronchitis; in pneumonia it is less so, and generally without the bronchial wheeze. The *pulse*, in the former, is frequent, full, free, developed, and soft; in the latter full, hard, bounding, or vibrating, and sometimes oppressed and undeveloped. The general febrile symptoms are more continued in pneumonia than in bronchitis; morning remissions, with free perspiration, being more frequent in the latter than in the former. The *physical signs* in pneumonia, pleuritis, &c., are the surest means of their diagnosis.

40. *C.* Some cases of *asthenic bronchitis* may be mistaken for *humoral asthma;* and occasionally no very distinct line of demarcation can be drawn, both affections either insensibly passing into each other, or being complicated with one another. But, generally, the slow accession of the former, the more continued and less urgent dyspnœa and tightness of the chest, and the presence of febrile symptoms, particularly great quickness of pulse, will distinguish it from humoral asthma; which is commonly characterised by the sudden accession of the paroxysms, their severity

during the night, and the attendant orthopnœa, the more or less complete and prolonged intermissions, and especially by the absence of fever, and by the much more marked integrity of the vital and animal powers than in asthenic bronchitis. In this latter disease, the patient is incapable of leaving his bed or his apartment; in asthma he may attend to his avocations; or may, at least, change his room in the intervals between the fits. The diagnosis between the *sthenic* bronchitis and asthma is attended with no difficulty.

41. *B. Diagnosis of Chronic Bronchitis.—a. By auscultation.*—The physical signs of this form of bronchitis are not materially different from the acute. The respiration is extremely varied; being sometimes louder, at other times more obscure than natural, and generally accompanied with the *mucous rhonchus;* which, however, is not heard over the chest, but now chiefly in one part and then in another, and seldom during the whole of the respiratory act. The occasional occurrence of the *sibilous* and *sonorous* rhonchi indicates that the tubes are sometimes partially obstructed; but this is much less frequent than at the commencement of acute bronchitis; and it rarely happens that the respiration is entirely interrupted in a part of the lung. Very often, also, when the dyspnœa is considerable, or even urgent, the air is heard to enter the lungs as well as usual, the respiratory sound being either distinct or puerile. The resonance of the chest on percussion is

scarcely diminished. When the bronchitis is very chronic, the tubes sometimes become *dilated*, from being weakened by the inflammation, and strained by the paroxysms of coughing. When this state of the bronchi exists, the sputum is often fœtid, and several of the auscultatory signs of tuberculous excavations of the substance of the lungs are present. If the dilatations be large and rounded, it may furnish *pectoriloquy* and the *cavernous rhonchus*; but if, as is more generally the case, it extend to several tubes, or if they be dilated along a considerable portion of their axis, a loud *bronchophony* is only heard. If this dilatation be extensive, bronchophony, bronchial respiration, sometimes with a '*veiled blowing*,' and even slight pectoriloquy, will be heard in corresponding parts of the thorax. On *percussion*, the sound is often somewhat less than natural, owing to the compression of the surrounding pulmonary tissue; and owing, also, to this cause, the dyspnœa is often great. Dilated bronchi remain long stationary; tuberculous excavations generally increase rapidly. The former are most frequently situated in the scapular, mammary, and lateral regions; the latter in the subclavian and sub-acromian regions of the chest.

42. *b. Rational diagnosis.*—It is chiefly with tubercles in the lungs that chronic bronchitis is liable to be confounded; and indeed, without the aid of auscultation, the diagnosis between them is very difficult. When they both co-exist, and es-

pecially when the latter is attended with dilatation, we have seen that even auscultation does not easily enable us to ascertain the exact state of disease: however, by a careful comparison of the physical and rational symptoms of both, we may generally form a tolerably correct opinion. Early in chronic bronchitis, the absence of pain during inspiration, the capability of resting on either side, the pallidity of the lips and countenance, the appearance of the sputum (§§ 34, 35), and the wheezing noise on respiration, may readily distinguish it from tubercular phthisis. As the disease advances, the symptoms more nearly resemble tubercular consumption; but the pallor of countenance and absence of pain generally continue; or, if the latter be present, it is diffused over the chest, and the patient can draw a larger volume of air into the chest, and retain it longer, than in phthisis. The dyspnœa is less on exertion, consists more of a stuffing sensation, and is more relieved by expectoration; the sputum generally consists of a more considerable portion of mucus, and is more regularly abundant; and the perspirations are much more partial, the emaciation less, and the paroxysms of hectic much less regular, than in tubercular disease. The cough is very different. In chronic bronchitis, it is generally deep and sonorous, and in paroxysms; in phthisis it is short and tickling. When we find copious purulent expectoration, but without broken-down portions of softened tubercles or of the pulmonary tissue;

night sweats; hectic fever; with full deep cough, and absence of the physical signs of phthisis;—if, after repeated examinations, there can be detected neither a constant absence of the respiratory murmur, nor gurgling cavernous rhonchus, nor pectoriloquy, nor marked defect of resonance on percussion,—we may safely conclude the disease to be chronic bronchitis. When this disease depends upon the inhalation of irritating substances, especially the mineral, vegetable, and animal molecules, and more particularly those to which sculptors and several classes of labourers are exposed, the cough and copious muco-purulent expectoration often continue for months, or even years, without much suffering, with pale countenance, slight lividity of the lips, etc. In these cases there can be no difficulty in the diagnosis. (See the Causes and Prevention of Bronchitis at §§ 80 *et seq.*; the remarks on 'Arts and Employments' in the *Dictionary of Practical Medicine*, vol. i. p. 122.)

43. It may be remarked in general, as regards the *physical diagnosis* of uncomplicated bronchitis, that *percussion* affords only a negative sign, at least no direct sign, further than that it may be attended by more or less dulness, according to the amount of accumulation of mucus in the bronchi of the lower parts of the lung, to the existence of occlusion by mucus of the smaller branches, and to collapse, or carnification, or infiltration of a portion of lung. Bronchitis of the

larger bronchi, unless thus accompanied, is not attended by dulness on percussion; if such dulness be present, it is caused by the changes now stated, or by some other lesion of the parenchyma of the lung, or by disease of the pleura and its consequences. Bronchitis may even exist with much effusion of muco-puriform matter in the larger bronchi, and yet no dulness on percussion be perceived. A distinct vibration is often felt on application of the hand over the parietes of the chest consonant with the motions of respiration.

The modifications of the respiratory murmur heard on auscultation in bronchitis, are owing to either of the following mechanical causes:—1st. To turgescence or congestion of the mucous membrane;—2nd. To the resistance of mucous or muco-purulent secretions; and 3rd. To the existence of spasm, which, however, can hardly be inferred unless when bronchitis is complicated with asthma. Generally, the more intense the mucous, sonorous, or sibilous *râles*, or combinations of them, during respiration, the more severe the bronchitic attack may be considered; but when the minute or capillary bronchi are affected, the sounds during respiration are not measures of the intensity of the disease, and they become louder only upon the decline of the disease. During the period of secretion from the inflamed surface of the bronchi, the mucous *râle* may occur with large and distinct bubbles, or pass into an almost crepitating character, the sounds on percussion being clear.

When a considerable branch or branches of the bronchi become obstructed so as to prevent the entrance of the air, it may be inferred that the obstruction is owing to one or more of the following changes:—1st. To vascular congestion of the mucous surface or surrounding tissue;—2nd. To greater consistency or tenacity of the morbid secretion;—3rd. To deficient vital influence or force of the mucous ciliæ of the bronchi which promote the course of the mucous secretion from the smaller to the larger bronchi. When the obstruction arises from one or more of these changes, diminution or absence of the respiratory murmur may be temporary or permanent, according to the duration and association of these changes. But although the respiratory murmur may be altogether absent, clearness on percussion may continue for a time. If, however, the obstruction be permanent, more or less dulness will supervene, owing to the collapse or other changes of that portion of the lung which is supplied by the obstructed bronchus or bronchi. If, in a case of bronchitis, dyspnœa suddenly occurs with diminution of the respiratory murmur in some portion of lung, this portion at first preserving its sound on percussion, although probably losing its sound on percussion subsequently, especially if the obstruction continue, we may infer that obstruction of a bronchial tube or tubes has been caused as above explained, and especially by the morbid secretion therein accumulated.

ii. Prognosis of Bronchitis.

44. *A. Prognosis of Acute.*—When the disease is slight, or limited to a few bronchi only, it generally terminates favourably. The change is indicated by a more perfect apyrexia in the mornings, less severe and less frequent cough, easier expectoration, and a thicker and more opaque sputum; which, however, generally assumes a more fluid and glairy appearance for a few evenings during the febrile exacerbation. A *relapse* of the disease is indicated by increase of the fever and cough, and a more transparent fluid and glairy expectoration. When the inflammation is very severe and general, as indicated by high fever, dyspnœa, etc., the prognosis should be unfavourable, or given with caution. If symptoms of collapse have appeared, and the mucous rhonchus be heard universally, and with little or no respiratory murmur upon auscultation; if the pulse become very frequent, small or weak, irregular or intermittent; and if the countenance be at the same time pallid and anxious, slightly livid, or the nails of the fingers, and lips, tending to purple; the danger from asphyxia is extreme. When the disease occurs in the course of continued or exanthematous fevers, in some epidemic states of hooping-cough, and in the other severe forms of complication (§ 19 *et seq.*); and when the signs indicating the unfavourable *terminations* already enumerated

appear, the danger is also great, although it may not be extreme. The supervention of pneumonia or pleuritis, or of tracheitis or laryngitis; a sudden diminution of the expectoration; the occurrence of cerebral symptoms, of orthopnœa, or even continued dyspnœa, with expansion of the nostrils; a dark red colour of the tongue; are all unfavourable circumstances, and indicate imminent danger. On the other hand, when spontaneous evacuations occur, with a favourable change in the cough and expectoration, particularly on one of the critical days, although the attack has been extremely severe, a favourable result may be looked for, more particularly if the disease proceeded from cold, and was uncomplicated.

45. The *asthenic* form of the disease is very dangerous when occurring at the extremes of age; but less so when it is unattended by marked depression of the powers of life, and by signs of the circulation of venous blood,—circumstances which, in connection with the frequency, weakness, and irregularity of the pulse, the quantity and appearance of the sputa, and with the difficulty of expectoration, constitute the danger.

46. *B. In the sub-acute and chronic.*—If it have arisen from catarrhal affection, and be unattended by much emaciation or hectic, this form of the disease will generally terminate favourably, although the expectoration present a puriform appearance. The more purulent, however, this

excretion, and the more marked the symptoms of hectic, the greater the danger. But when the sputum seems to consist chiefly of mucus, although the quantity expectorated be great, a favourable issue may take place: and this will be more frequently the case when the chronic bronchitis has been consecutive of the acute. When there are constant dyspnœa, very frequent pulse, profuse sweats, and copious purulent expectoration, with emaciation, hectic fever, colliquative diarrhœa, associated symptoms of disease of the liver, or of the mucous surface of the bowels, with a smooth, glossy, or chopped, a dark red or raw appearance of the tongue, a most unfavourable prognosis should be given; and if to these succeed aphthous eruptions about the mouth and tongue or fauces, little hope of recovery can be entertained. The causes and complications of the disease should also materially influence our prognosis. When it has arisen from mechanical irritation of the bronchi, patients often recover from a very unfavourable state, when the irritating cause has altogether been removed. The occurrence of bronchitis in the scrofulous diathesis, and its association with tubercles in the lungs, are dangerous circumstances. This *complication* is to be ascertained chiefly by means of the physical signs. If these indicate the existence of tubercles, or do not establish with certainty their absence, a very cautious opinion should be given. The mucous rhonchus, and dulness on per-

cussion, with the rational symptoms of tubercles, are indications of a very dangerous malady. The rapid development of symptoms of the acute, in the course of chronic bronchitis, must be viewed as an unfavourable circumstance. The extremes of age also increase the risk in this as well as in the acute state of the disease.

CHAPTER IV.

CAUSES OF, AND APPEARANCES AFTER DEATH BY, BRONCHITIS.

i. Causes of Bronchitis.

47. *A.* The *predisposing causes* are—whatever lowers the energies of the frame, more particularly too warm or crowded apartments; sleeping with too many clothes; late rising, late hours, and too great sexual indulgence; very early, and far advanced age; the lymphatic and sanguineous temperaments; relaxed habits of body; febrile and exanthematous diseases, the suppression of accustomed eruptions and discharges, and previous disease, or convalescence from exanthematous epidemic, and endemic maladies.

48. *B.* The *exciting causes* are, exposure to a cold and moist atmosphere, or to currents of air, particularly when perspiring; rapid vicissitudes of weather and season; wearing damp clothes or shoes, or sleeping in damp beds or linen; continued exposure to dry cold; quick refrigeration of the body after being overheated and fatigued, or upon coming from crowded apartments and assemblies; wearing too low or very thin dress, with exposure of the neck and chest; rapid atmospherical changes, par-

ticularly during autumn, winter, and spring, and especially from cold to heat; epidemic constitutions of the atmosphere; easterly and north-east winds; exposure to the night air after rain; the inhalation of irritating gases, vapours, or mineral or vegetable particles; sudden passage from the cold air into overheated apartments; catarrhal infection; miasmal exhalations in cold and moist states of the air; the imperfect irruption or retrocession of the exanthematous diseases, and the translation or metastasis of gout, rheumatism, erysipelas, etc.

Many of the causes just enumerated would, in the tubercular diathesis, occasion tubercular consumption; whilst several of the causes which concur in the development of phthisis are productive, in sounder constitutions, and according to the ages of the patients, of some form of bronchitis, or of broncho-pneumonia, or of pleurisy, or of complications of either, most probably of capillary bronchitis and broncho-pneumonia in children; and of asthenic or chronic bronchitis, asthenic pneumonia, or pleurisy, and their various complications in persons more or less advanced in age.

49. *C.* Several diseases both *predispose* to and *directly develop* bronchitis, in one or other of its forms; but in these cases, as I have shown above, bronchitis is chiefly a complication of the original complaint, of which, however, it may become the most important and predominant part; or it may be sequela of these diseases, which had predisposed the constitution to the operation of the direct or

exciting causes, especially those enumerated above. Hooping-coughs, influenza, exanthematous and continued fevers, asthma, emphysema of the lungs, diseases of the heart, etc., are not only complicated with, but also frequently followed by, bronchitis. Tubercular consumption can hardly be said to exist unassociated with partial or more extended bronchitis, and the same remark applies to most cases of chronic laryngitis or laryngo-tracheal phthisis, and not infrequently to acute laryngitis.

Of all the causes which most unequivocally and directly occasion bronchitis — more particularly chronic bronchitis—there are none more manifest in their operation than the inhalation of the molecules or particles of mineral, vegetable, and animal substances by persons engaged in avocations in which, or by which, these particles are diffused in the air. Persons thus occupied are the more liable to become the subjects not only of bronchitis, but also of tubercular consumption, and of laryngeal and tracheal disease, as already noticed, if they do not adopt those precautions which will be noticed hereafter. Those persons who follow avocations by which any of these molecular particles are diffused in the air they breathe, and who neither wear the upper and lower beards, nor resort to other precautionary measures, seldom reach advanced age, and often not even middle age, owing to one or other, or even to all these diseases of the respiratory organs.

50. The prevalence of bronchitis in both *sexes*

TABLE I.—*Deaths of* MALES *in* ENGLAND *by* BRONCHITIS *at different Periods of Life in the Years* 1855, 1856, *and* 1857.

Years	Deaths of Males in England by all causes	Deaths by Bronchitis	Under 5 years	5 to 10	10 to 15	15 to 25	25 to 35	35 to 45	45 to 55	55 to 65	65 to 75	75 to 85	85 to 95	95, &c.
1855	216,587	13,783	4,435	167	58	182	350	663	1,189	2,052	2,618	1,752	308	9
1856	198,875	11,043	4,114	135	54	141	246	480	971	1,485	1,940	1,251	223	3
1857	212,356	12,798	475	180	51	152	283	607	1,054	1,752	2,221	1,464	271	7

TABLE II.—*Deaths of* FEMALES *in* ENGLAND *from* BRONCHITIS *at different Periods of Life in the Years* 1855, 1856, *and* 1857.

Years	Deaths of Females in England by all causes	Deaths by Bronchitis	Under 5 years	5 to 10	10 to 15	15 to 25	25 to 35	35 to 45	45 to 55	55 to 65	65 to 75	75 to 85	85 to 95	95, &c.
1855	209,116	13,399	3,695	177	57	181	370	594	1,055	2,021	2,769	2,065	397	18
1856	191,631	10,485	3,471	179	46	151	293	465	819	1,480	1,891	1,397	281	12
1857	207,439	12,790	4,130	193	55	161	316	521	939	1,815	2,573	1,723	349	15

and in *different epochs of life*, will appear from the subjoined tables. *The deaths in England from bronchitis, from phthisis, and from all causes*, according to the Registrar General's Report, have been nearly equal in both *sexes*; and that the deaths from bronchitis have been, on an average, nearly half the number of deaths from phthisis. Now as bronchitis is a very much less fatal disease than phthisis, it follows that the former is remarkably prevalent. During the years 1859 and 1860, it was more prevalent than I have recollected it to have been in any year during a tolerably long practice; and I believe that deaths from bronchitis were not much, if at all, fewer than those from phthisis. The tables furnished in the Registrar General's Reports show the rates of mortality from bronchitis, in both sexes and in all epochs of life, for England and for London, during the years stated in them. They moreover show the greater mortality from bronchitis in children under five years of age, and especially in aged persons from fifty-five to seventy-five or eighty. When the numbers living at these ages are considered, the mortality from this disease in aged persons will appear the greater.

ii. Appearances observed in Fatal Cases of Bronchitis.

These appearances may be divided into, 1st. Those which constitute bronchitis at early periods or stages of this disease; and 2nd. Those which

are observed after death by this malady, and which may be viewed as the more common, or the contingent results of the severity or continuance of the disease, especially in its last stage.

51. *A.* The Anatomical Characters of Bronchitis.—(*a.*) When the body of a patient is opened, that has sunk under any disease whilst affected at the same time with a *mild and recent bronchitis*, some redness is found, generally in a circumscribed portion of the mucous membrane, and usually towards the end of the trachea, and in the first divisions of the bronchi. If the inflammation have been more *intense*, the redness extends to a greater number of these tubes, and exists moreover in the smaller ramifications. It sometimes happens that this redness is exactly limited to the bronchi of one lobe only; and it is the bronchi of the superior lobe which seems to be more particularly disposed to inflammation. The red colour of the bronchi presents itself occasionally under the form of a fine injection, which seems to exist both in the submucous cellular tissue, and in the mucous membrane itself, and is usually attended by slight tumefaction. Sometimes the vessels cannot be distinguished, but only a number of small, crowded, red points, which are agglomerated the one around the other. Finally, a uniform red colour is occasionally observed. In some cases the redness diminishes progressively from the large bronchi to the small ones; in others, an opposite disposition is remarked. Occasionally the redness only exists

in intervals, in the form of bands or of isolated spots, forming, as it were, as many circumscribed phlegmasia, between which the mucous coat is white and healthy.

52. (*b.*) When the inflammation is *chronic*, the mucous membrane generally loses its lively redness; it presents a livid, violet-coloured, or brownish tint. Finally, and what is very remarkable, in individuals offering all the symptoms of inveterate chronic bronchitis, with puriform expectoration, the mucous membrane of the lungs has been found scarcely rose-coloured, and even perfectly pale through its whole extent. BAYLE and ANDRAL have particularly noticed this fact. I would not wish to conclude that there is not, and least of all, that there has not been, inflammation in these cases; but I think a very copious secretion will often take place from mucous surfaces, and assume even a purulent appearance during its retention in the bronchi, from lost tone of the extreme capillary vessels, with, perhaps, an increased flux or determination of the circulating fluid in order to supply the discharge, all vascularity disappearing with the cessation of circulation.

B. THE CHANGES OBSERVED AFTER DEATH BY SIMPLE AND COMPLICATED BRONCHITIS.—Whilst in many of the bronchial ramifications the slighter alterations now stated are only observed, others of a more severe or disorganising nature are seen in other parts or branches.

53. *a. Inflammatory injection*, or active con-

gestion of the bronchial surface is generally *partial*, or affects one part of the air-passages more than another. It is also of a livelier colour, and is usually attended with some of the changes hereafter to be noticed. Partial or inflammatory redness of the mucous membrane is very much more common than general congestion. It may be limited to the trachea and larynx, whilst the bronchi are pale; and in this case it may be confined to one side of the tube. M. Andral has seen it cease abruptly at the median line, particularly when one lung was affected; and then the inflamed side of the trachea has corresponded with the diseased lung. The redness may also be confined to the large bronchi, the mucous surface of the passages above and below its seat being pale; or it may be limited to the smaller bronchi, where it often occasions great dyspnœa and fever, with little or no cough. The bronchi of the upper lobes are most frequently congested and inflamed. Congestion and inflammatory injection of the bronchial mucous membrane, although very often connected with diseases of the substance of the lungs, are not necessarily dependent on any of them; for this membrane may be pale from the glottis downwards in cases of acute, and still more in chronic, pneumonia. The same obtains in respect of tubercles, previously to their softening. In many cases, however, where tubercles exist in the lungs, the surfaces of the smaller bronchi are more or less inflamed or congested; and when the

tubercles have advanced to softening, the bronchi nearest them are almost always red. Where tubercular excavations exist, the redness is still more marked and extensive, sometimes proceeding along the trachea to the larynx: bronchitis thus supervening on tubercular phthisis. In these and various other diseases, the inflammatory state of the mucous surface commences in the smaller ramifications, and spreads upwards to the glottis. But in other maladies, which first affect the Schneiderian membrane, throat, fauces, pharynx, &c., the injection of the bronchial surface is chiefly an extension of these; inflammatory action more frequently originating in some one of these situations, and extending itself more or less rapidly, according to the state of the patient, along the surface of the larynx, trachea, and large bronchi successively, until it at last reaches the minute bronchi, or even the air-cells and structure of the lungs. This is the usual direction in which inflammation of the mucous membrane of the air-passages commences and extends itself; but most frequently without reaching the smaller bronchial ramifications, and pulmonary parenchyma.

54. *b. Thickening of the mucous membrane of the air-passages* is a very common lesion, arising, 1st, from its congested or injected state; and, 2nd, from its increased nutrition or hypertrophy.—(*a.*) The former is most frequently observed in the larynx and small bronchi: it is sometimes found in children about the margin of the glottis, giving

rise to a form of croup.—(*b.*) True thickening, or hypertrophy of this membrane, occurs in various situations, occasioning very different phenomena accordingly, particularly in those who had been affected with chronic coughs. This form of thickening may extend throughout the larynx, or may be limited to the epiglottis, to the entrance of the glottis, to the chordæ vocales, or to the ventricles. In the trachea it may occasion no marked symptom; but in the bronchi, particularly the smaller, it gives rise to sensible alterations of the sound of the pulmonary expansion. It may, when extensive, very materially impede the changes produced by respiration on the blood. Hypertrophy of this membrane may also be confined to a circumscribed point, forming thus a tumour rising above the surrounding surface. This form of thickening may assume a nearly cauliflower appearance, from its exuberance. These excrescences have been found in the larynx by MM. ANDRAL and FERRUS.

55. *c.* The *mucous follicles* may be enlarged independently of the membrane in which they are seated. When this is the case, a number of round granular bodies, of either a white, red, or dark-brown colour, are found on the internal surface of the membrane, surrounded by two coloured circles—one round the centre, the other round the base. M. ANDRAL thinks that they have often been mistaken for tubercles, and for the variolous eruption.

56. *d. Other alterations of structure in the*

respiratory mucous membrane.—(*a.*) *Atrophy* is sometimes observed in this membrane, and chiefly in asthenic and chronic cases. In many of these the ciliæ can hardly be detected by the microscope. —(*b.*) *Softening* is much more frequent; and is most common in the larynx, especially in the situation of the chordæ vocales and ventricles, where it is sometimes very remarkable, and has been the only change of these parts observed in persons who had either lost their voice or been hoarse long before death, especially in chronic bronchitis and laryngeal phthisis.—(*c.*) *Ulceration* is not infrequently found in this membrane. Ulcers may be seated in any part of the air-passages, but are more common in the *larynx* than in the trachea or bronchi. They rarely, however, occur in the larynx, trachea or bronchi without tubercular ulceration existing also in the substance of the lungs. They occasion various modifications of the voice, according to the parts of the larynx in which they are situated; being found in every point of its internal surface. Ulcers, when seated in the *trachea*, are chiefly found in its posterior or membranous part. In some cases they are confined to one side of the trachea, which invariably corresponds to the diseased lung; or, if both lungs be diseased, to that which is most affected. Ulcers are not so frequent in the *bronchi* as in the larynx, but more so than in the trachea.

57. Ulcers in the internal surface of the air-passages sometimes extend no deeper than the

cellular tissue connecting the mucous membrane to the subjacent parts. In this case the connecting tissue is much thickened at the bottom of the ulcer. But they sometimes proceed deeper, destroying successively the different tissues, until the parietes of the tube are at last perforated, and a fistulous opening is formed between it and a neighbouring organ or part, as the œsophagus, aorta, parenchyma of the lungs, large blood-vessels, the pleural cavity, &c., or even the external surface; forming, in this last case, a direct communication between its interior and the external air. When a fistulous opening extends into an excavation in the parenchyma of the lungs, it is difficult to determine whether it produced, or was itself occasioned by, the excavation. When it is connected with a cavity arising from the liquefaction of tubercular masses, there can seldom be much difficulty in determining the precedency; but every cavity found in the lungs has not this origin. There can be no doubt that ulcers perforating a bronchial tube may excite inflammation of the substance of the lungs, and occasion either small abscesses, or ulcerations, which enlarge into considerable excavations. But, in the majority of cases, excavations communicating with the bronchi arise from the softening of tubercles; the bronchi being perforated from without inwards, instead of from within outwards, as in the case of ulceration commencing in their mucous surface. The bronchi or trachea may be also perforated from without

inwards, by aneurisms, &c., of the aorta, and not infrequently by ulceration commencing in the œsophagus and extending through the membranous part of the trachea; instances of which have occurred in my practice. Suppurated bronchial glands may also perforate the bronchi which they surround, and pour their contents into them. A similar result may likewise occur from purulent collections, hydatid formations, &c., of adjoining parts, as of the thyroid gland; instances of which are recorded by PORTAL and ANDRAL.

58. *e. Alterations of the secretions of the air-tubes.*—Alterations may occur, 1st, in the gaseous secretion; 2nd, in the perspiratory exhalation; and, 3rd, in the mucous secretion.—(*a.*) Changes of the *gaseous exhalations* are but little understood, and are more matters of inference than of demonstration. There can be no doubt, however, that not only in various diseases, but also in certain states of the system and of the atmosphere, a very material alteration occurs in the proportions of the different gases naturally exhaled by the mucous surface of the lungs. That the successive changes in the system, certain conditions of temperature and of the air, different states of vital force, and the constitutional differences in the various races of our species, modify very materially the quantity of carbonic acid gas and of azote exhaled from the lungs, may be considered amongst the surest established facts in physiology.

59. (*b.*) The *perspiratory exhalations* evidently

undergo changes in disease; but their nature and extent are but little known. The vapour exhaled from the respiratory mucous surface very probably may, when excessive, be condensed into a liquid state, and increase the watery fluid sometimes discharged from the lungs. M. ALIBERT states that he has seen, in certain diseases of the skin in which the cutaneous transpiration is suppressed, the pulmonary vapour issuing like steam from the chest, and descending again like an abundant dew. M. ANDRAL adduces, in his *Clinique Médicale*, the case of a person who suddenly discharged, whilst suffering from hydrothorax, an enormous quantity of a serous fluid from the bronchi, at the same time that the fluid which had been infused in the chest was absorbed.

60. (*c.*) Alterations *of the mucous secretion* of the bronchi have been successfully studied by modern pathologists. This secretion is modified both in its quantity and quality. It is often very greatly increased in acute and chronic affections, particularly those immediately affecting the respiratory passages. The quantity of the mucous secretion may be so excessive as to nearly fill up the bronchi, trachea, and larynx, and to suffocate the patient. This sometimes occurs in adults; but still more frequently in children, forming in one of its states a species of croup intermediate between true croup and bronchitis; and, in another state, that described as *asthenic bronchitis*. M. BLAUD considers the former, or that seated chiefly

in the large bronchi, in which the secretion is consistent and glairy, a 'form of croup,' and calls it '*croup myxagène.*' This excessive secretion of mucus is sometimes unattended by any alteration of the air-passages. The mucous secretion may become so viscid as to adhere to the sides of the bronchi; where it may accumulate so as to occasion a fatal dyspnœa, by preventing the passage of the air, and causing a collapse of a portion or portions of the lungs. In other cases the mucus is transformed into a puriform fluid; sometimes without any trace of ulceration, or even of redness, in any of the bronchi; the alteration of the secretion being independent of any perceptible change of structure. More commonly, however, patches, streaks, or points of inflammatory injection of the mucous membrane accompany this state of secretion.

61. (*d*) *Membraniform exudations*, or false membranes, form more frequently upon the internal surface of the air-passages than in any other mucous canal. Some pathologists have supposed them to be consequent on the most intense states of inflammatory action in mucous membranes; but this is evidently not the case: they are rather a result of a state of the system, probably connected with excess of the albuminous constituent in the blood, together with a disposition in the inflamed vessels to secrete it. These membranes are generally unorganised, and vary in thickness and consistence in different parts as

well as in different cases. According to SCHWILGUE, they consist of albumen, with a small portion of carbonate of soda and sulphate of lime. M. BRETONNEAU has detected fibrine in them. They may exist in patches, or in continuous layers, or in perfect tubes; and extend from the larynx, where they usually commence, to the minute divisions of the bronchi. They rarely originate in this latter situation, and advance upwards; but they often commence in the pharynx, fauces, &c., and extend through the glottis, and down the trachea and bronchi. They are most frequently met with in children from two years of age to puberty; and are not confined to, although most frequent in, acute diseases. In some cases they assume, in children, a chronic character, but only when confined to the trachea; whilst a chronic state is most common in adults, when they are usually formed in the bronchi. When, however, they occur in the larynx, the tumefaction of the subjacent membrane, the spasms of the muscles, and their own thickness, often give rise to an acute or fatal disease. The most rapid and extensive instance of these exudations that I have observed occurred in a case of diphtheria in an adult lady. The membrane thus formed extended from the pharynx, larynx, trachea, and larger ramifications of the bronchi in both lungs, and was thrown up entire during the life of the patient. When seated in many of the small bronchi, they may occasion asphyxia by interrupting the changes

produced by the air on the blood. It is probable that *fibrinous* or *polypous* concretions may sometimes form in the bronchi, from the coagulation of a portion of blood exhaled from its mucous surface. LAENNEC has described (*Rev. Méd.* 1824, t. i. p. 384) a case which appears to be of this description. Such formations differ from the albuminous exudations, in their containing much fibrine, and being of a darker colour than the latter.

62. (*e.*) *Earthy or calcareous concretions* occasionally are found in the air-passages, and are sometimes coughed up. They consist chiefly of phosphate of lime; and are formed in the far advanced stage of tubercular development, or are rather the remains of tubercles, in the substance of the lungs, and escape into the bronchi.

63. (*f.*) *Hæmorrhage from the respiratory surfaces* is amongst the most frequent changes to which it is subject. In the greatest number of cases of *hæmoptysis*, the blood is exuded without any ulceration or breach of surface: a slight redness of the mucous membrane being the only change that can be detected. When the hæmorrhage occurs in the smaller bronchi, the blood sometimes accumulates and coagulates in them; imparting a blackish or brownish-black appearance to the lobules, and constituting the *pulmonary apoplexy* of LAENNEC. The occurrence of hæmorrhage into the parenchyma of the lungs is, however, more strictly deserving of this appellation.

The extravasation and coagulation of blood in the small bronchi, giving to portions of the lung a blackish and indurated appearance, are most commonly, but not always, found in persons who have expectorated blood, or died from an attack of hæmoptysis; and are most frequent in those cases which supervene in the progress of diseases of the heart. M. ANDRAL considers, however, that the hæmoptysis is not from those sources which have been called apoplectic; but from a larger extent of mucous surface, and from larger tubes.

64. *C. The fibrous and cartilaginous tissues* of the air-passages experience various changes.— *a.* The *fibrous* structure of the bronchi is sometimes found either softened or hypertrophied. In this case the voice is remarkably altered. When the fibrous tissue is hypertrophied, increase of thickness is the chief appearance. — The *fibro-muscular* structure, as it exists in the trachea, &c., may be either atrophied or hypertrophied; it may also be softened and destroyed partially or in points by ulceration.

65. *b. The cartilaginous structures of the air-passages* are most frequently diseased in the larynx. The *rings of the trachea* are sometimes ossified, but seldom or never otherwise altered. The cartilages of the bronchi are often hypertrophied, becoming more apparent, and forming more complete rings than natural. They are also sometimes ossified. MM. REYNAUD and ANDRAL found the ultimate ramifications of the bronchi

changed into osseous spicula, with minute canals (the cavities of the bronchi) running through them, in very old subjects. M. ANDRAL states that the bronchial cartilages may become so brittle from disease, as to break into fragments, project into the canal of the bronchi, or become altogether detached, and be ultimately expectorated.

66. *c.* The *cellular tissue* connecting the above structures is often the seat of disease. In cases of bronchitis complicated with laryngo-tracheal disease, the larynx is always inflamed or congested, and, as a consequence of chronic inflammatory action, it sometimes becomes indurated and thickened; diminishing remarkably the calibre of the glottis, impeding the action of the muscles, and affecting the form and movements of the epiglottis. This tissue, in the situation of the larynx and epiglottis, is occasionally infiltrated with *serum*, which, when considerable, constitutes the *œdema of the glottis*, first accurately described by BAYLE. The infiltration may distend the folds of mucous membrane surrounding the rima of the glottis, so as to obstruct more or less the passage through it. This change is generally consecutive of inflammation of the mucous membrane of the larynx, or of chronic affections of this organ. In some cases it is very chronic; in others very acute, quickly producing asphyxia. *Purulent matter* is sometimes found in the cellular tissue of the air-vessels, either in the state of small abscesses, or infiltrating it to a greater or less extent; and

either in the ventricles of the larynx, or in any other situation in the course of the air-passages. *Tubercular matter* has also been found in various parts of this tissue, but chiefly in the follicles of the mucous surface of the larynx.

67. *D.* The changes already described very often cause marked alteration in the air-tubes, either diminishing or increasing their calibre.—*a. Diminution of their canals* are occasioned,—(*a.*) by the formation of false membranes, chiefly in the larynx and trachea of children, and in the bronchi of adu ts;—(*b.*) by thickening of the mucous membrane; occurring principally in the glottis and bronchi;—(*c.*) by infiltrations of fluids into the sub-mucous cellular tissue, chiefly in the larynx and vicinity;—(*d.*) by various substances formed in some part of these tubes, such as hydatids, coagula of blood, concrete mucus, &c.;—(*e.*) by compression by some tumour situated externally to some portion of them, as by the thyroid gland, an aneurismal tumour, or enlarged bronchial glands.—(*f.*) Lastly, there is every reason to conclude that diminution or constriction of some part of these passages very often arises, although seldom in so permanent a manner as to be observed after death, from spastic contraction of the fibres or muscles belonging to them.

68. *b. Dilatation of the bronchi* is most frequently observed in the smaller ramifications; and may be so great as to be mistaken for tuberculous excavations.—(*a.*) In some cases, the bronchi may

be uniformly dilated throughout one or more of their ramifications, some of those which could not naturally receive a fine probe, having attained the size of a goose-quill; and, in some instances, even admitting the finger. These dilated branches are sometimes visible on the surface of the lung, where they terminate abruptly. They occasionally also terminate, particularly near the top of the lung, in an indurated black portion of its substance, or in a cartilaginous mass, or in a calcareous concretion, either exterior or interior to the dilated bronchi. This saccular expansion of the terminal branches of the bronchi forms a peculiar subdivision. We often meet with them, distended in the form of thin membranous vesicles, filled with air, either singly, or in groups, and generally at the apex of the superior lobes of the lungs, or in the vicinity of cicatrices, the remnants of former tubercular cavities. Dilatation of the bronchi affects especially the smaller tubes, as those of the third or fourth order, and is rarely met with in those of the larger trunks.—(*b.*) In other cases, the dilatation is limited to a particular point of the tube, and has the appearance of an excavated cavity in the substance of the lung, for which it may be mistaken, especially when it is met with in the upper lobe. The size of cavities arising from this species of dilatation varies from that of a hemp-seed to that of an egg. Several of these may co-exist. When they are placed near each other, they form, by their com-

munication, a complicated sinus filled with puriform mucus, and closely resemble some kinds of tuberculous excavations.—(*c.*) Occasionally they present a third form, consisting of a succession of dilatations, between each of which the bronchus recovers its natural diameter, the walls of the dilated portion being generally thin and transparent. One lung may contain a number of these dilatations.—(*d.*) The *parietes* of the dilated bronchi are, in some cases, hypertrophied, or more fully developed than in the natural state; in other cases they are reduced to a delicate membrane, presenting neither fibrous nor cartilaginous tissue. The dilated portions generally contain much mucus, or a puriform mucus.

69. These changes of the bronchi are seldom found, unless in persons who had suffered attacks of chronic bronchitis, or of asthma, or emphysema, with which they may be associated. They are most common in persons of middle or advanced age. But they are also sometimes met with in children who had died of whooping-cough, particularly in its more chronic states, and when complicated with bronchitis. I have occasionally found them in this class of subjects; but only consequent upon this disease. Dilatations of the bronchi, unless when very considerable, seldom occasion any change of the parenchyma of the lungs, beyond compressing and condensing it: they are frequently associated with either grey or dark induration of the adjoining pulmonary sub-

stance, and various other changes in the substance of the lungs. Their formation has been much discussed by Dr. CORRIGAN and by ROKITANSKI, but, as will appear in the sequel, with no practical results.

CHAPTER V.

OF THE PREVENTION OF BRONCHITIS.

70. The causes, nature, and circumstances attending the occurrence of this disease, almost preclude the consideration of, or render it difficult to remark upon, the *prevention* of it with advantage to those who may be predisposed to it, or who may be liable to a return of it, after one or more attacks of it. A knowledge of its causes, and the avoidance of them, more especially when suffering from the diseases with which I have stated bronchitis to be frequently complicated, or during convalescence from them, constitutes the chief means of prevention. To those causes I must refer the reader (§ 47 *et seq.*). But there are certain of those which require a more particular notice, as respects the causation not only of bronchitis but also of pulmonary and laryngo-tracheal consumptions. The habits, or rather the fashions, among males, of wearing either neckcloths or beards, or neither, cannot fail of influencing the prevalence of this disease. The exposure of the throat and neck, on all occasions, may probably render the respiratory surfaces less susceptible of the influences produced by alterations of tempe-

rature and weather; but the amount of benefit from this custom, if any, can be hardly or only vaguely estimated. The habit of wearing thick or warm neckcloths, a directly opposite mode, is not always sufficient to protect from these maladies, especially on accidental exposures, night or day. Wearing the beard, the natural protection of the throat, has undoubtedly no small influence in preventing throat, laryngeal, and bronchial affections; whilst keeping the beard closely shaved has some influence in favouring the occurrence of these affections. The diseases of the respiratory organs, so frequently caused by various *arts and employments*, especially those about to be noticed, should induce persons thus occupied to preserve the beard on the upper lip, or the *moustache*, in order to intercept during respiration the mineral, vegetable, or animal molecules diffused in the air surrounding them.

71. I have already mentioned certain trades (§ 49) the workmen in which are liable to pulmonary consumption. Most of those are also productive of bronchitis, seldom in a simple form, but more frequently complicated with other affections of the respiratory organs. The artisans and workmen who experience these very injurious effects, more especially bronchitis, owing to the inhalation of the various mineral, vegetable, and animal molecules diffused in the air by their avocations—causes which, although very dissimilar in themselves, generally act in nearly a

similar manner—namely, by irritating the bronchial surface, and superinducing various modifications of disease, according to peculiarities of constitution, temperament, and habits of life, are chiefly dry-grinders and needle-pointers; edge-tool, gun-barrel, and other grinders; flax-dressers, and pearl and horn button-makers; iron, brass, and other metal filers; stone-cutters, millstone-makers, miners and quarriers, particularly in sandstone; wool-carders and feather-dressers, sawyers, turners, weavers, bakers, and starch-makers. All these suffer more or less, generally in the order here followed (needle-pointers and dry-grinders the most, and starch-makers the least), from chronic bronchitis, in one or other of its modifications: in some, from the spasm of the bronchi thereby occasioned, with the symptoms of asthma predominating; in others, with those of chronic inflammation extending to the lungs; in a few, with dilatation of the bronchi and pulmonary emphysema; and in many, with tubercular and cretaceous formations. The most inflammatory effects seem to result from needle-pointing, dry-grinding, and stone-cutting; whilst the more asthmatic affections proceed from the horn and pearl button-manufacturing. These workmen seldom live above forty years, and the greater number not beyond thirty or thirty-five. They often experience but little inconvenience till some time before the fatal disease takes place; but they are as often affected with bronchitis in early life,

particularly pearl and horn button-makers, the disease subsequently assuming an asthmatic character.

72. Various means have been invented in order to prevent the molecules or dust arising in these trades from accumulating and being inhaled into the lungs of the workmen; but nearly every measure hitherto advised has been neglected by them, even the natural one of wearing the *moustache*. Amongst other contrivances, the muzzle of damp crape recommended by Dr. JOHNSTONE, the sponge by Dr. GOSSE, and M. D'ARCET'S 'fourneau d'appel,' which is, however, not known in this country, may be named. The best means yet devised seems to be that invented by Mr. ABRAHAMS of Sheffield, in which magnetic attraction is employed to arrest the floating metallic particles. This, as well as the use of the 'damp bag' suspended over the stone, in grinding and pearl button-turning, are most useful inventions. In mining, quarrying, or cutting stones, dry-grinding, &c., much good would probably result from wearing the beard on the upper lip, and from having moistened or wet woollen curtains suspended over the heads of the workmen, and in such a way as to be agitated through the air of the place. The simpler the means, and the less trouble required in their use, the more likely are they to be adopted.

73. In respect of the treatment of bronchitis and other pulmonary diseases which result from

these causes, very little difference from that employed under ordinary circumstances is required. The frequent use of emetics is adopted by the workmen themselves, and there can be no doubt of their utility for bronchitis and most of the diseases of the air-passages.

CHAPTER VI.

TREATMENT OF ACUTE BRONCHITIS.

THE treatment of this disease should be based on *three great inferences*, which can be formed only by physicians possessed of powers of close and correct observation and of great practical information and acumen. These inferences are—1st. The state of vital force, or, in other words, of constitutional power manifested by the patient at the time of prescribing for him;—2nd. The existence of a primary and simple form of the disease, or of a complication of bronchitis with some malady, upon which it has supervened, or which it has superinduced;—and 3rd. The nature of the malady with which it is associated, and the order of succession of the associated diseases.

There are few maladies which require a more intimate observation of the vital force or constitutional power of the patient, than bronchitis; and in none should the prevailing epidemic constitution or character of disease generally receive greater attention. At the time when I first wrote on bronchitis (in 1831), the general vital character of diseases was about changing from a sthenic to an asthenic, or at least to a much less sthenic type. The asthenic form, or one of a less sthenic character than formerly, has up to the present

time generally prevailed, and it has become, even more than heretofore, requisite to be guided in the adoption of indications of treatment, and of curative means, by the states of the pulse, by evidences of constitutional energy or debility, by the antecedents of the patient, and by the nature and concurrence of the causes of the disease.

i. Treatment of Uncomplicated Acute Bronchitis.

The treatment of primary or simple Acute Bronchitis should be especially directed at every stage by the states of vascular action and of vital force, and by the nature and concurrence of its causes.

74. *A. The catarrhal or mild form of Bronchitis* (§§ 3—5) requires merely mild saline diaphoretics,* demulcents, and emollients. When, however, fever is considerable, or the patient complains of soreness and pain in the chest, then a mustard poultice may be applied over the sternum, or the terebinthinate embrocation.† This embrocation having been well shaken should be sprinkled on two or three folds of flannel, or on spongeo-piline, and be placed either over the

* No. 1. ℞—Liq. Ammon. Acet. (vel Citratis) ℥j.; Spirit. Ætheris Nit. ʒiij.; Vini Antimonii Potassio-Tart. ʒijss.; Mist. Amygdal. dulc. (vel Mist. Camph.) ad ℥viij. Misce. Capiat cochl. j. vel ij. larga, 3tis vel 4tis horis.

† No. 2. ℞—Linimenti Camph. Comp.; Linimente Terebinthinæ āā. ℥jss.; Olei Olivæ ʒvij.; Olei Cajuputi ʒj. M. Fiat Embrocatio.

thorax or between the shoulders; and the dose of the antimonial may be increased in the medicine just prescribed; the bowels being moderately opened by a small dose of calomel or blue pill, with antimonial powder at bed-time, and a gentle aperient draught given in the morning. If the patient be aged, or delicate, or vitally depressed, the antimonial should be omitted from, and a proportion of infusion of cinchona or of the decoction of senega added to, the mixture. Pediluvia, with salt and mustard in the water, or the warm bath, or the semicupium, for children, may be allowed at bedtime, and other means which circumstances will suggest may be adopted. Diluents, emollients, weak broths or soups, or mild farinaceous food, may be taken until the more acute symptoms are removed, and then a more restorative treatment, medicinal and dietetic, may be cautiously employed. The white kinds of fish, boiled, and subsequently, chickens, mutton, &c., may be allowed.

75. *B. Treatment of Sthenic Acute Bronchitis* (§§ 6—9).—This variety may be considered the true acute bronchitis. It often, especially in the young, plethoric, and robust, is acutely inflammatory at an early stage; and in strong persons the sthenic character may continue for a very considerable time, if the disease have been neglected or antiphlogistic remedies have not been prescribed. In the former class of patients, as well as in the latter, a small or moderate blood-letting,

by venesection or by scarification and cupping, will generally shorten the duration of the disease, especially if early employed, and render the means subsequently ordered much more effectual than they otherwise could have proved. The quantity of blood which may be taken should depend upon circumstances adverted to above, to the period of the malady, the strength of the patient, the state of the pulse, and the prevailing general type of diseases. It ought not to be so much as to produce fainting, for reaction may follow this state. A slight or more manifest impression made upon the pulse by it will generally be sufficient. Immediately afterwards the preparations of antimony or of ipecacuanha, combined according to circumstances, should be given in full or frequent doses, so as to prevent excessive local action, by determining the circulation to the surface of the body, and promoting perspiration and the excretions generally. Soon after vascular depletion, calomel with antimonial powder, or James' powder, or ipecacuanha ought to be given, and repeated at bedtime; and subsequently the mixture No. 1 already prescribed should be taken, with the preparations of antimony or of ipecacuanha in larger or more frequent doses, according to the nature of the case.

76. This treatment will generally procure an abatement of the acute symptoms, and of sthenic vascular action, when promptly, efficiently, and judiciously directed. When these ends are at-

tained, the continuance of the milder diaphoretics, especially of the solution of the acetate or citrate of ammonia, with the spirit of nitric æther, with small doses of nitre, and either of antimonial wine or ipecacuanha wine, will soon subdue the febrile action, and both cool the skin and promote perspiration. If, however, soreness, pain, or heat and tightness in the chest be felt, and the pulse and temperature of the skin continue increased, cupping over the sternum or between the shoulders, moderate in quantity, and with due reference to the vital condition of the patient and the character of the expectoration, may be repeated, and antimonials or ipecacuanha be given in larger doses; if an emetic operation result from them, the effect will be the more beneficial. Calomel and James' powder may be taken at bedtime, and an aperient draught in the morning. If these means are not manifestly beneficial, the terebinthinate embrocation or stupes should be applied over the chest or between the shoulders.

77. In all classes of subjects, *blood-letting*, more especially its repetition, must be cautiously regulated, if adopted at all, by the presence of pain or soreness in the chest, by the state of the pulse, the heat of skin, the character and quantity of the expectoration, &c. At the time when I first wrote upon bronchitis, general and local blood-letting was often required early in acute bronchitis; but now, and for many years past, it has been very generally anathematised, and, although the as-

asthenic diathesis and character of diseases have so long prevailed, yet I believe that this treatment has been sometimes neglected where a cautious recourse to it was required, owing to the generally prevailing opinion against it—an opinion entertained by many quite incapable of forming a correct judgment as to the circumstances either requiring it, or contra-indicating it; and as to the manner in which the adoption or the neglect of it may influence the course and termination of the disease. When the measures mentioned above have subdued the severity of the symptoms, expectoration will be rendered more easy, or be promoted by combining small doses of camphor, or of ammonia, or of the decoction of senega, with the medicines prescribed above, the antimonial being either relinquished or given in much smaller doses.

78. If the cough be severe, and the expectoration difficult or laboured, an ipecacuanha or antimonial emetic should be given. But if the vital powers be much lowered by the continuance of the disease, or by previous treatment, the emetic should consist of the sulphate of zinc, conjoined with ipecacuanha and camphor; and the decoction of senega may afterwards be given in the form subjoined, the intervals between the doses varying with the state of the symptoms.* In some cases

* No. 3. ℞—Liquoris Ammoniæ Citratis ℥j.; Tinct. Camph. Comp. ℥ss.; Ammon. Carbon. ℈j.; Decocti Senegæ ℥v.; Syrupi Tolutani ℥ij.; Aquæ Flor. Aurant. ad ℥viij. Misce. Capiat

attended by congestion of the bronchi and lungs, causing dyspnœa, and impeding the functions of respiration, a recourse to cupping either over the sternum or between the shoulders, although the disease be far advanced, if cautiously and judiciously adopted, will often be most beneficial; and if the abstraction of the blood be contra-indicated, dry cupping should not be neglected.

79. If the more acute or sthenic symptoms present in an early stage, should lapse into the asthenic with more or less rapidity,—an occurrence by no means rare, when the disease commences, as it generally does, in the larger bronchi, especially of both lungs, and extends to the smaller, and thence to the capillary bronchi,—the restorative medicines now advised, aided by the external means noticed above, or the more stimulating and tonic remedies recommended for the next or asthenic form of the malady, in doses and combinations suitable to the urgency of the case, must be allowed. These sudden changes in the character or type of the disease are generally owing to a too anti-phlogistic treatment at the commencement, or to the rapid extension of the disease to the minute bronchi, causing impeded or interrupted oxygena-

cochleare unum vel ij. ampla, secunda, tertia, vel quarta quaque horâ in aquæ hordei pauxillo. Vel:

No. 4. ℞—Tinct. Conii, Tinct. Scillæ, āā. ℥ij.; Spirit. Anisi, Spirit. Ammon. Aromat. āā. ℥iij.; Decocti Senegæ ℥iv.; Syrupi Tolutani (vel Rosæ) ℥ij.; Aquæ Pimentæ ad ℥iij. Misce. Capiat cochl. j. vel ij. larga, 3tis vel 5tis horis in aquæ hordei pauxillo.

tion of the blood. This change of type occurs chiefly in cachectic, intemperate, and exhausted subjects, and in children and in aged persons. In many of these cases more powerful stimulants given in the food, drink, and medicines prescribed, even than those already mentioned are requisite, and although often unsuccessful are not the less necessary, as being the only means which are attended by a possibility of benefit.

80. *C. Treatment of Asthenic Bronchitis.*—This form of the disease (§§ 9, 10) occurs chiefly in persons who, owing to age, to early childhood, and to the capillary state or seat of the malady, seldom require vascular depletion. If ventured upon in this form, it should be preferably practised by cupping in small quantity; or dry cupping may be substituted for it. The admissibility of depletion, or of antimonials, or the extent to which they should be carried, and the propriety of having recourse to stimulating expectorants, necessarily depend, in this form of the disease, upon the degree of morbid action and of vital power presented by individual cases, and upon the quantity of the expectoration and the difficulty to excrete it. Small or moderate local depletions are more frequently required when this state of disease occurs in children, than when it is met with in aged persons; whilst the latter are more benefited by expectorants, diaphoretics, counter-irritants, and diuretics, than the former class of subjects. In many cases of this state of the

disease, a warm stimulating emetic, consisting of sulphate of zinc, or of ipecacuanha with senega, will promote expectoration and promote the functions of the lungs; and, after its full operation, a mild aperient, or a moderate dose of a mercurial at bedtime, followed by a gentle aperient in the morning, will often be required. But in this class of cases, always numerous in the aged, and in cold and humid seasons, restorative medicines and due support by digestible and nutritious food are generally beneficial. In some cases, especially when the bronchi of both lungs are affected, and the disease extends to the minute bronchi, the risk of asphyxia from interruption to the functions of the lungs being urgent, not only should expectorants be freely prescribed, but also a powerful warm emetic, with sulphate of zinc, capsicum, camphor, &c., be given, aided by external derivatives, dry cupping, stimulating pediluvia, &c. In these cases also, the vital force should be developed by the preparations of cinchona, quinia, serpentaria, &c., or by cascarilla, ammonia, camphor, decoction of senega, &c., and by allowing a moderate quantity of wine, or even brandy, in the food or drink of the patient, especially if he have been intemperate, or is much exhausted, depressed, or old. In this state of the disease, both food and drink should be warm, and the medicines given in warm fluids, &c. If it should be preferred to order medicines similar to those just named, the subjoined pills, or the mixture, may be adopted

and varied as those previously prescribed, according to the age and circumstances of the patient and to the urgency of the symptoms.*

81. *D. The Treatment of Acute Bronchitis in Children* should be conducted according to the principles stated above. In robust and previously healthy children, vascular depletion by leeches or by cupping is required in moderate quantity, preferably by leeches in young children, and by these or by cupping in older children. During teething, bronchitis, either catarrhal or acute, frequently occurs; and then the gums require attention and should be freely lanced, especially if they be hot or swollen. A dose of grey powder (Hydrarg. cum cretâ) with magnesia and ipecacuanha, may be given at night, and castor oil or some other aperient in the morning. A diaphoretic mixture may also be directed in the course of the day, and the semicupium in the evening. In the more acute and febrile form of bronchitis in children, a cautious and moderate blood-letting, according to the age and state of the patient, followed by an ipecacuanha emetic, and subse-

* No. 5. ℞—Quiniæ Disulphatis, Camphoræ, āā. gr. xv.; Pilulæ Galbani comp., Pilulæ Scillæ comp., āā. ℈ij.; Olei Cajuputi, q. s. Misce et contunde bene. Fiant secundum artem Pilulæ xxx., quarum capiat unam vel duas 2dis, 3tis, vel 4tis horis.

No. 6. ℞—Ammoniæ Carbon. ℥ss.; Tinct. Camphoræ Comp. ℨss.; Tinct. Serpentariæ ℥ij.; Decocti vel Infusi Senegæ ℨiv. vel v.; Aquæ Carui ad ℨviij. Misce. One or two table-spoonsful to be taken every three, four or six hours in barley-water.

quently by a dose of calomel, will generally be most serviceable, especially if the terebinthinate embrocation be placed between the shoulders; the calomel and James' powder, or some other antimonial, in small quantity, to be taken at bedtime, and an aperient in the morning. Beyond two or three doses antimonials ought not to be given to children, especially young and delicate children, and to those living in large towns and much confined in-doors; nor should they be prescribed at all during weaning. Unless in the more acute cases, they should not be continued much longer than now stated, ipecacuanha, or ipecacuanha wine, being substituted. Calomel and ipecacuanha may be given at bedtime, and ipecacuanha wine instead of the antimonial wine in the medicines prescribed above (§ 74). If a strangulating or suffocative cough be complained of, and indications of the extension of the disease to the minute bronchi appear, an emetic of ipecacuanha, or of sulphate of zinc, should be exhibited, and the treatment advised above for the more asthenic forms of the disease be adopted, according to the age and circumstances of the patient. The application of blisters to the chest is sometimes of service; but they should not be applied longer than three or four hours, or longer than they occasion redness of the surface, and then a warm poultice ought to replace them. In many cases a mustard poultice, and the terebinthinate embrocation mentioned above, may be

preferred to a blister, which should be cautiously prescribed, and for a short time only, in young children and in all children of a cachectic or delicate constitution. For these especially the cod liver oil should be given on the surface of suitable restorative fluids.

ii. Treatment of the Complications of Acute Bronchitis.

82. *A.* Bronchitis is not infrequently associated, particularly at its commencement, with *sore throat* or *inflammation of the fauces and pharynx.* In these cases the disease extends from the pharynx to the larynx and trachea, and thence to the bronchi, and is commonly asthenic in character. When it supervenes in the course of *diphtheria*, or *diphtheritis*, or of *scarlet fever*, it is always connected not only with depression of the vital force, but also with contamination of the blood, these morbid conditions becoming rapidly increased by the obstruction of the respiratory passages, and by the dirty albuminous exudation often forming a false membrane over the mucous surface of the throat. The complication of *diphtheritis* with bronchitis first came before me in practice from 1822 to 1824 at the Infirmary for the diseases of children, and afterwards in 1826, in the low and ill-drained parts of Kennington and North Brixton. In all these cases the danger was extreme; the treatment adopted for them as well as for others which I have seen during the

recent epidemic prevalence of diphtheritis, consisted chiefly of preparations of cinchona with the bi-carbonate and chlorate of potash, or with camphor and ammonia; and of gargles of the muriate of ammonia, muriatic acid, tincture of krameria and decoction of cinchona; or gargles containing a strong solution of boracic acid, or biborate of soda. Terebinthinate embrocations were also applied around the neck and throat, and over the sternum.

83. The complication of *scarlet fever* or of *small-pox* with bronchitis generally requires a similar treatment to the above, and the several other means recommended for the *asthenic* or third form of bronchitis (§ 80). When, however, this disease is complicated with *scarlet fever*, the treatment will depend upon the character of the prevailing epidemic and the circumstances of the case. Early in the complication, local depletions are sometimes required; and afterwards, full doses of camphor or ammonia, or of both,—particularly if the eruption prematurely disappear, or present a dark tint, or if the anginous affection assume an ash-colour, or a dark, red, or brownish hue,—are amongst the chief remedies to be depended on. I have met with severe cases in which the bronchial disease either preceded, or followed, the efflorescence and decline of the eruption in scarlet fever; and in the course of this association, most violent cerebral symptoms have supervened; thus forming a double complication. These cases,

although extremely dangerous, are not necessarily fatal. Local depletion may be practised, chiefly by leeches applied over the sternum, behind the ears, or below the occiput, or by cupping on the nape of the neck; and calomel, revulsants, purgatives, camphor, ammonia, &c., according to the circumstances of the case, ought to be prescribed. The terebinthinate embrocations should be applied, as above recommended, and renewed according to their effects.

84. *B.* When *bronchitis* is consequent upon *laryngitis* (or *tracheitis*, or *laryngo-tracheitis*, or *croup*), either affection preceding the other (§ 49), the treatment should depend chiefly upon the states of vital force and vascular action. If these are sthenic and phlogistic, local depletions, calomel and antimony at first in full doses; purgatives, the warm bath, the semicupium or stimulating pediluvia; embrocations with turpentine applied around the neck and throat and over the sternum; and emetics, especially if paroxysms of suffocative or strangulating cough, or stridulous respiration, supervene, are the means more immediately required. Subsequently, aperients, revulsants, and diaphoretics, especially the solution of the acetate or citrate of ammonia, with the spirits of nitric æther, antimonial wine or ipecacuanha wine, anodynes, &c., should be prescribed; and these, with other suitable means, be employed appropriately to the circumstances of each case.

If this complication present an *asthenic* cha-

racter, as very frequently observed in young children and aged persons, the treatment advised above for laryngo-tracheal consumption and asthenic bronchitis, more particularly the latter, may be adopted. The decoction of senega, the preparations of cinchona or of other tonics, of camphor, ammonia, squills, ammoniacum; stimulating and warm emetics; the inhalation of watery, emollient, and anodyne vapours; or the vapour of warm water containing a small quantity of a solution of camphor in vinegar, and the terebinthinate embrocations applied in the way just now advised, are the means, in various combinations and modifications, which ought chiefly to be confided in. The more urgent symptoms, especially suffocative cough, accumulations in the bronchi, difficult expectoration, paroxysms of extreme dyspnœa, &c., require not only the means just enumerated, but also stimulants, external irritants, and more particularly emetics consisting of sulphate of zinc and ipecacuanha, with camphor, capsicum, &c.

85. *C.* The occurrence of bronchitis with *measles* (§ 22), either previous to, in the course of, or subsequent to, the eruption, or even the accession of it during convalescence, is very frequent. This association was common in the winter and spring seasons of 1829, 1830, 1831, and 1832; during which epoch, and subsequently, blood-letting was not so generally indicated, nor so well borne as in former years, the bronchial affection being more frequently of the asthenic type. In some cases,

however, small local depletions are required early in the disease, and may be carried further than in the association of bronchitis with scarlatina. I have sometimes found it necessary to deplete locally in both these states of complication, at the very time when I judged it proper to exhibit camphor or ammonia in considerable doses. But in many instances, particularly during the years above specified, patients have recovered as readily where no sanguineous depletion has been employed, as where it has. In other respects, the treatment should be much the same as already advised, according as this complication presents more or less of a sthenic or asthenic character. In both types, the external embrocations, revulsants, emetics, and aperients, with restoratives, tonics, and stimulants, in the asthenic forms mentioned above, are generally necessary.

86. *D.* Bronchitis may be contemporaneously associated with *influenza* (§ 26), and in most of the many cases of this complication which I have witnessed during thirty years, this was commonly the case, unless when patients recovering from the latter were exposed to the causes of the former. In every instance of this complication the asthenic character was more or less marked, and the treatment consisted chiefly of various combinations of the decoction of senega with diaphoretics; of sulphate of quinine with camphor, ipecacuanha and expectorants, of terebinthinate embrocations on the thorax, and of warm stimulating emetics. Re-

storatives, tonics, and stimulants, especially the ammonia-chloride, or the ammonio-citrate of iron, were early prescribed in many cases.

87. *E.* One of the most frequent complications presented to us in practice is that of bronchitis with *whooping-cough* (§ 24). In some cases this complication commences with the usual symptoms of catarrh, on which those of bronchitis supervene; the characteristic signs of whooping-cough, particularly the convulsive fits of coughing, with the inspiratory whoop, and vomitings, not appearing for some days subsequently. In other cases,—and those perhaps the most numerous,—the inflammatory affection has not appeared until after the invasion of pertussis. When thus associated, bronchitis may be either sthenic or asthenic; the one or the other being more generally prevalent in some seasons than in others. During the years mentioned above (§ 85), the asthenic state was most common; and I have seen several cases in which sanguineous depletion had been injudiciously practised, particularly as respects quantity. Cerebral symptoms are apt to occur during this complication, and also infiltration or hepatisation of a part of the substance of the lungs. These unfavourable terminations should be anticipated and prevented by small local depletions,—by leeches applied behind the ears; by the exhibition of emetics, and afterwards of camphor combined with ipecacuanha or antimonials, and narcotics, particularly conium or hyoscyamus; by diaphoretics with

diuretics; and more especially by the embrocations and revulsants already recommended.

88. *F.* The almost constant complication of *tubercular consumption* with *bronchitis* (§§ 21, 37), although the latter may be very limited in extent in some cases, or extensive in others, commonly in no way affects the treatment of either complaint, more especially the former, as long as the bronchitic affection is neither very extended nor *acute.* But when it is either the one or the other, or both, and as soon as the bronchitic symptoms and the character of the sputum are evidently *acute,* and more especially when the sputum is very abundant, then should it claim the chief attention and an appropriate treatment be prescribed, lest the tubercular disease become greatly aggravated by the continuance of it, as is usually observed. A careful examination of the seat of pain, if any, and of the extent of both the tubercular and the bronchitic disease by means of auscultation, &c., ought to be instituted, and the treatment of acute bronchitis, with strict reference to the severity and to the asthenic or sthenic character of the complaint, should be adopted. If the bronchitic affection be more or less acute or sthenic, and the tubercular disease not advanced into the third stage, and more especially if pain, or constriction in the chest be felt, a few leeches applied near the seat of uneasiness, a small blister, repeated or kept open, or the terebinthinate embrocation, diaphoretics, anodynes, revulsants and

the promotion of the secretions and excretions are the means chiefly indicated. In some cases, emetics, mild expectorants, the cod liver oil, restoratives, and even gentle tonics, are also sometimes required, either contemporaneously with, or subsequently to, the foregoing measures, especially when the sputum is very copious, the cough severe, and expectoration laboured or difficult.

89. The bronchitic affection, however, is much more frequently *chronic* in this complication, and persistent than acute, an attack of acute bronchitis being only occasional or *intercurrent.* But the chronic bronchitic complication, although limited, often very partial, or even slight, is almost constant, and the remedies most appropriate to the several stages of phthisis are generally also suited to the bronchitic affection, whilst the means indicated for the latter are beneficial in the former. In this complication, as well as in the simpler or more chronic states of phthisis, cod liver oil taken soon after a meal on suitable medicated or other fluids; the external means of cure, especially the embrocations so often advised; and the diffusion of various medicated vapours in the patient's apartment, as recommended hereafter for the treatment of chronic bronchitis, are often of great service. It should not be overlooked that chronic bronchitis may give rise to, or terminate in, phthisis; and that a judicious recourse to the means just noticed will often prevent this occurrence.

90. *G.* The remark now made as to the treat-

ment of the complication of *chronic bronchitis* with *phthisis*, almost equally applies to the association of the former with *asthma*, or with *whooping-cough*. The bronchial affection complicating these may develope or terminate in, tubercular formations; asthma and whooping-cough thus passing into phthisis. In order to prevent this termination, the embrocations, counter-irritants, revulsants, external drains, and diffusion of medicated vapours in the air surrounding the patient, are amongst the best means of preventing these affections of the respiratory passages from superinducing chronic bronchitis or from terminating in broncho-pneumonia, or tubercular consumption. There can be no doubt that the peat smoke (peat reek), which is so abundant in the huts and bothies of the peasants in the Western and Northern Isles, and highlands of Scotland, in Iceland and the Faroe Isles, is the chief cause of the remarkable infrequency of phthisis, of chronic bronchitis and asthma, in these places. The antiseptic substances contained in peats generally used for fuel, furnish elements which are either given off, or generated during combustion, and which, with the smoke, are insufficiently dissipated from the dwellings in these places, and, being respired by the inhabitants, protect them from tubercular consumption and bronchitis. A similar sanitary effect is produced by burning wood for fuel, especially if a portion of the smoke

from it escape into the dwelling and sleeping apartments. These kinds of fuel disinfect and counteract, by the terebinthinate, creasotic, and antiseptic principles evolved from the resinous and pitchy substances contained in them, the injurious emanations proceeding from the various sources of contamination, both within and without the dwellings in these places, and protect the respiratory organs from the diseases to which they are most liable.

91. *H.* When bronchitis extends to the capillary bronchi, and thence to the air-cells and substance of the lungs, thus passing into *broncho-pneumonia*, a very serious complication is produced, especially in young children, or when it occurs in the course of exanthematous or other fevers, of influenza or whooping-cough (§ 27 *et seq.*). It may even extend to the pleura, and thus further complicate the mischief. The treatment necessarily depends upon the circumstances now stated, and upon the age, strength, and habit of body of the patient. If these be impaired, local depletions, repeated dry cupping, revulsants, external and internal diaphoretics, calomel with aperients and antimonials, rubefacient embrocations, &c., are gene rally required. But if this complication present asthenic features, as most frequently observed, especially when occurring in the course of the diseases now enumerated, antimonials and other depressing medicines should give place to cam-

phor, ammonia, ipecacuanha, senega, and mild expectorants at first, to emetics, to diaphoretics, to terebinthinate embrocations often renewed, to blisters, and to other external rubefacients and revulsants, as circumstances may suggest. If the vital force be much impaired, warm expectorants, restoratives, stimulants, and tonics must be adopted with such energy as the nature of the case may demand.

92. *I.* When bronchitis occurs in the course of *continued fevers*, the same general principles of treatment are required as have been specified in respect of scarlatina and measles (§§ 19, 23). In such complications it should be recollected that they more or less impede the changes of the blood during respiration, and thereby increase the morbid condition of this fluid characterising both exanthematous and continued fevers. The propriety of having recourse even to local depletions in this complication must depend upon the form of fever, the prevailing epidemic, and the symptoms and circumstances of the case. I have seen a strong and regular-living man, with fever thus complicated, very seriously depressed by a single small depletion. Purgatives are however better borne, particularly when conjoined with camphor or ammonia, or when preceded by an emetic, and followed by saline diaphoretics and mild tonic infusions, especially the infusion of cinchona and wine. One or two full doses of

calomel with camphor, followed in a few hours by a cathartic draught, and by diaphoretics and diuretics, will be of much service in enabling the excreting organs to remove the effete elements from the blood which accumulate in it when the functions of the lungs are impeded.

93. *K.* The simultaneous occurrence of inflammatory action in both the *digestive* and respiratory mucous surfaces is not infrequent, particularly in children (§§ 19 and pp. 20, 21); and means calculated to benefit the one generally aggravate the other, or risk the accession of cerebral disease. Small local depletions, followed by the pulv. ipecacuanhæ comp., combined with small doses of calomel, or hydrarg. cum creta and camphor; the warm bath and afterwards the stimulating embrocations already specified; the application of blisters for a few hours only, and sometimes repeated; the liq. ammoniæ acet., with spirit. æther nit., camphor mixture, diuretics, &c., constitute the principal means of cure.

94. *L.* Persons with organic disease of the *heart*, especially with alterations of the valves, or with other obstructive lesions, or dilatations of the cavities, or of the auriculo-ventricular openings, are often liable to pulmonary congestion with bronchitis, but more frequently to chronic or subacute, than to acute bronchitis; and if this last, it is commonly of an asthenic form. In these cases, the more energetic means already mentioned, conjoined with

preparations of iron, the senega mixture, &c. (p. 94, No. 6), are especially indicated. In some of these which lately came under my care, the subjoined medicines* removed the bronchial affection.

* No. 7. ℞—Ferri Sulphatis ℈j.; Quinæ Disulphatis gr. xv.; Camphoræ gr. xii.; Pilulæ Galbani Comp. ℈ij.; Pilulæ Aloes cum Myrrhâ ℈j.; Extr. Hyoscyami ℈ij. (vel Extr. Conii ʒss.); Extr. Fellis Bovini ℈ij.; Olei Anisi q. s. Misce et contunde bene. Divide in Pilulas xlviij., quarum sumantur binæ bis terve in die. Vel:

No. 8. ℞—Tinct. Ferri Muriatis ʒvj.; Quinæ Disulphatis gr. xxxij.; Acidi Muriatici diluti ʒiij.; Acidi Hydrocyanici diluti ʒjss.; Syrupi Tolutani ʒvi.: Mist. Camphoræ ad ℥iv. Misce. Capiat Cochl. j. minimum ter in die in aquæ cyatho vinario.

CHAPTER VII.

TREATMENT OF CHRONIC BRONCHITIS.

i. Of Simple Chronic Bronchitis.

The *indications* of cure for chronic bronchitis are—1st, to diminish the general irritability and excitability, and quiet the circulation; 2nd, to equalise the circulation, to determine to the skin, and increase the excreting functions; and 3rd, to restore the healthy tone and functions of the bronchial surface, by means which seem to have this effect either directly or indirectly. It is obvious, however, that the accomplishment of the first and second intentions have an indirect influence in bringing about the third.

95. *a.* General *blood-letting* is inadmissible in this state of the disease; and even local bleedings should in many cases be employed with great caution. Cupping, however, to a moderate extent, or the application of leeches is frequently required; and it is evidently more advantageous to repeat the operation to a small amount, than to abstract a large quantity at once. When the disease has existed long, and is attended with a copious discharge, much general debility, and absence of pain upon full inspiration, even local depletion cannot

be ventured on. Next in importance to depletion is *counter-irritation*; and for this purpose several means are presented to us. When there is a tendency to acute action, or when the cough is at all painful, and the sputum puriform, either the tartarised antimonial ointment, or a large issue or seton in the side, is preferable; but when there is very marked relaxation of the bronchial mucous surface, blisters and rubefacients, or a succession of them, seem more appropriate. I have, however, found, in a number of cases, terebinthinate embrocations and liniments productive of much greater advantage, and more generally applicable, than either blisters or ointments. They may be employed once or twice daily. The vapour arising from them, and diffusing itself around, has also a direct and beneficial effect, by being inhaled, upon the diseased mucous membrane. I am also favourable to the use of *setons* and *issues*; and have seen several instances of marked benefit from them, particularly in the obstinate state of the disease which simulates tubercular phthisis. But it is chiefly early in the chronic disease, or when it has recently passed into this state from the acute, that issues and setons prove successful. They exhaust the energies of the system too much to be of service in the latter stages, or when the discharge from the lungs is profuse, and the vital energies much depressed. Mustard poultices, or blisters applied to the chest, and followed by warm poultices after the blisters have been applied for a few hours only;

or rubefacient plasters between the shoulders, consisting of one part of blistering plaster in seven or eight of Burgundy pitch-plaster, are generally of much service, especially after more active means and in slight cases.

96. *b. Expectorants* have been much employed in this state of disease; and though more appropriate to it than to the acute, they are often hurtful from being too exciting to the vessels of the bronchial surface. This is especially the case with squills and ammoniacum, which ought to be used with much caution, and never whilst pain or soreness is complained of in the chest, with fever, heat of skin, &c. The best expectorants are those which are also astringent, or at least not very heating: amongst these, the *sulphate* or *oxide of zinc*, with small doses of myrrh or galbanum, and extract of *conium*; or small doses of *sulphate of quinine*, or of the *sulphate of iron*, with *ipecacuanha* and opium; or the *sulphuret of potassium*, and the *balsamum sulphuris*, are the most eligible, when the state of the expectoration, of the skin, and pulse, indicates the propriety of having recourse to tonic expectorants. *Opium* has been too much reprobated in cases of this description, as well as in acute bronchitis, owing to the dogma that it suppresses expectoration. I believe, however, that, when judiciously combined, particularly with ipecacuanha, with the chloride of calcium, or either of the sulphates of potash, of alumina, or of zinc; or with the nitrate of

potash; or with camphor, according to the circumstances of the case, it is a valuable medicine; and that the diminution of the expectoration produced by it, and which has been unaccountably dreaded, is, when it occurs, a consequence of its changing the morbid state of the vessels forming the excreted matter. If it be the object—as necessarily follows from the doctrine of some writers—to preserve a copious and free expectoration in this disease, how can it ever be cured? Frequently have I seen this end pursued, as if it constituted all that was required, and squills, ammoniacum, &c., given accordingly; and the more abundant and easy the expectoration thereby produced, the more rapidly did the powers of life give way, or complete hectic, with all its attendants, manifest itself. The subjoined * have proved serviceable

* No. 9. ℞—Pulv. Ipecacuanhæ gr. j.; Camphoræ rasæ gr. ss. —j.; Extr. Conii gr. iv.—vj.; Mucil. Acaciæ q. s. M. Fiant Pil. ij. ter die capiendæ. Vel:

No. 10. ℞—Zinci Sulphatis gr. vj.; Massæ Pilul. Galbani Co. ℈j.; Extr. Conii ℥ss.; Syrupi q. s. M. Fiant Pilulæ xij., quarum capiat unam tertiis horis. Vel:

No. 11. ℞—Pulv. Ipecacuan. Comp. gr. xx.; Quinæ Sulphatis gr. vj.; Pil. Galbani Comp. ℥ss.; Extr. Lactucæ ℈j.; Syrupi Papaveris q. s. M. Fiant Pil. xviij., quarum capiat binas ter quotidiè. Vel:

No. 12. ℞—Quinæ Sulphatis gr. vj.; Ipecacuanhæ gr. iv.; Camphoræ rasæ gr. vj.; Opii Puri gr. iv.; Pulv. Rad. Glycyrrh. (vel Extr.) ℥ss.; Mucilag. Acaciæ q. s. Misce benè, et fiant Pilulæ xx., quarum capiat duas ter quaterve quotidiè. Vel:

No. 13. ℞—Balsami Sulphuris (Sulph. præcipit.: and Ol. Anisi) ℥ss.; Pulv. Ipecac. gr. iv.; Extr. Conii ℈ij.; Pulv. et Mucilag. Acaciæ q. s. M. Fiant, secundum artem, Pil. xx., quarum capiat binas quartâ quâque horâ.

when the pulse was soft, and not remarkably frequent; the skin cool and moist; the sputum very abundant, and consisting chiefly of mucus; and the weakness and emaciation considerable. Dr. ARMSTRONG strongly recommended the balsam of copaiva in chronic bronchitis; but it is seldom beneficial, and is certainly inferior to the other balsams and terebinthinates in this affection. In the more advanced stages of chronic bronchitis, particularly when colliquative sweats or diarrhœa occur, the most essential benefit has been derived from the following mixture.*

The cretaceous mixture will often be of service when used alone, or with a little of the chloride of calcium, or with the addition of mucilage, or of hyoscyamus, or conium, or extr. lactucæ, or the extr. papaveris, according to circumstances. In this state of the disease, also, I have given *sulphur* and the *anisated balsam of sulphur* with advantage in mucilaginous electuaries. Dr. L. KERCKHOFFS states that he has administered them with success, in conjunction with the powder of the white willow bark. M. BROUSSAIS relies chiefly upon *mucilages* and demulcents, combined with ipecacuanha and opium, and certainly with great justice. The extr. lactucæ, as recommended by Dr. DUNCAN, may occasionally be substituted for the opium. The decoctions of *Iceland moss*,

* No. 14. ℞—Mist. Cretæ ℥vjss.; Vini Ipecac. ℥jss.; Tinct. Opii ℥ss. (vel Tinct. Camphoræ Comp. ℥vj.); Syrupi Tolutani ℥iij. M. Capiat Cochlearia duo larga ter quaterve in die.

and the infusions of *conium* or *marrubium*, of the *uva ursi*, or of the *melissa*, with mucilages, anodynes, and ipecacuanha, are also very serviceable.

97. *c.* When the disease is attended with dyspnœa, and profuse or difficult expectoration, *emetics* are of great, although often of temporary advantage only, particularly in aged persons. Ipecacuanha, or sulphate of zinc, with the addition of diffusive stimulants, is the most appropriate in the majority of cases. After this operation the decoction of senega may be given with hydrocyanic acid (the dilute), and with mild tonics, as the infusion of orange peel, or the infusion of cinchona, or some aromatic water. If the disease assume a protracted form, with much debility and expectoration, the ammonio-citrate or the ammonio-chloride of iron, or the tincture of the latter, should be prescribed; or the sulphate of quinine in the compound infusion of roses, and compound tincture of camphor; or sulphate of iron may be taken with the compound galbanum pill and extract of henbane; or the muriated tincture of iron, with additional acid and tincture of columba, in suitable vehicles.

98. *d. Hydrocyanic acid* is often of much service in the chronic forms of bronchitis, especially in their *complications* with disorder of the digestive organs, and may be exhibited with demulcents, gentle tonics, astringents, or expectorants. When the disease is associated with derangement of the

hepatic functions, or even of the stomach and bowels, it will be necessary to give small doses of blue pill, or of the hydrarg. cum creta, with deobstruents and gentle tonics; and, on some occasions, a dose of calomel from time to time, either alone, or in suitable forms of combination, followed by a stomach purgative.

The treatment by tonics and astringents, especially the sulphates of zinc, iron, or quinine, already noticed (p. 97), are applicable, with but little variation, to the more chronic and humoral states of the disease, particularly in persons advanced in life, and in children, when it has assumed a chronic form after whooping-cough and the exanthemata. I have also occasionally seen benefit derived, in these states of chronic bronchitis, from the *chlorate of potash*, given to adults, in from two to six grains, three or four times a day. This medicine was often prescribed by myself and one of my colleagues, at the Infirmary for Children, during the years 1820—1828, and subsequently, in the more chronic forms of bronchitis, and in various disorders of debility; in which latter it was generally beneficial; but little advantage was frequently derived from it in this disease, unless in those forms of it now mentioned, where it was often of great use, particularly when the morbid action seemed connected with deficient tone of the bronchial vessels, and of the system generally.

99. *e.* In chronic bronchitis, especially when

affecting children, or when following whooping-cough or measles, the unadulterated *cod-liver oil* has proved most beneficial in my practice, when taken soon after a meal and on the surface of some fluid or fluid medicine suited to the circumstances of the case. It may be given on the surface of orange or ginger wine, more or less diluted for children, or of milk, or of the subjoined combinations,* the dose being carefully regulated according to the circumstances of the case and the age of the patient.

ii. Treatment of the Complications of Chronic Bronchitis.

100. Much of what I have advanced respecting the complications of acute bronchitis apply to the association of other maladies with sub-acute or

* No. 15. ℞—Tinct. Ferri Muriatis ʒij.; Acidi Muriatici diluti ʒss.; Acidi Hydrocyanici diluti ʒss.; Tinct. Columbæ ℥ij.; Syrupi Zingiberis ad ℥iv. Misce.

From thirty drops to one or two teaspoonfuls, according to the age of the patient, to be taken twice or thrice daily in a wine-glass of water, on the surface of which the cod-liver oil may also be taken.

No. 16. ℞—Tinct. Ferri Muriatis ℥ss.; Acidi Muriatici diluti ʒj.; Spiritus Anisi ℥ss.; Acidi Hydrocyanici diluti ʒss.; Syrupi Zingiberis ℥j.; Aquæ destillatæ ad ℥viij. Misce. Capiat Cochl. j. minimum ad Cochl. j. largum, bis terve in die, in aquæ cyatho vinario, cum Olei Morrhuæ ʒj. ad ℥ss. Vel:

No. 17. ℞—Tinct. Ferri Ammonio-Chloridi ℥j.; Aquæ Destillatæ ʒvij. Misce. Capiat Cochl. j. medium ad Cochl. j. largum, bis terve in die, ex aquæ cyatho vinario cum Olei Morrhuæ Cochleare uno medio vel magno.

chronic states of bronchitis. This remark applies more especially to what I have stated respecting the complication of phthisis with bronchitis, to which I need not further refer than that acute bronchitis occurs chiefly as an *intercurrent* affection in the course of phthisis, and requires a treatment mainly directed to its removal or relief, in order to prevent the aggravation and acceleration of the latter malady; whilst chronic bronchitis is a more or less partial or limited affection, which is generally consequent upon the tubercular disease, particularly upon its advanced and latter stages, and therefore more persistent. Hence chronic bronchitis, being most frequently consecutive of, although sometimes terminating in, or producing, tubercular formations, especially in the scrofulous diathesis and the otherwise predisposed, generally requires the remedies which I have mentioned for the treatment both of it and of chronic phthisis, according as the predominating features of each will suggest a preference to one or the other of these means or plans of cure. The best guide to the preferential adoption of these will be found in the appearances of the sputum, in the cough, the vital energy, and other signs and symptoms of particular cases.

In asthma, especially the humid or humoral form of it, in persons advanced in age, chronic bronchitis may be viewed as a predominating morbid condition, more or less closely associating the two maladies. In this complication, the

medicines already advised for chronic bronchitis are generally required, more particularly camphor, ammonia, the decoction of senega, the anisate of sulphur, the sulphate or oxide of zinc, the trisnitrate of bismuth, ipecacuanha, the sulphate of iron or of quinine, assafœtida, galbanum, myrrh, and the balsams, may be severally prescribed, or variously combined, or given with a preparation of opium, or of henbane, or stramonium, belladonna, conium, lobelia, &c. In many cases of this complication, an occasional emetic, of either sulphate of zinc or ipecacuanha, or both, will prove of service, and often render the operation of any of the medicines just mentioned or of others—whether expectorant, diaphoretic, anodyne, antispasmodic, or tonic—more certain and beneficial.

101. In aged persons humid asthma and chronic bronchitis are frequently so associated as to render it difficult to say which is the primary or predominating affection; and this complication is often further increased by obstructive organic disease of the heart, causing more or less congestion of both lungs, and aggravating the dyspnœa and bronchitic symptoms. In these cases the combination of such of the preparations of ammonia, of ammoniacum, of squills, or of cinchona, or of quinine, or of iron, especially the ammonio-chloride or the ammonio-citrate of iron, or the tincture of the muriate or of the ammonio-chloride of iron, or the tincture of sumbul or of valerian, as may be congruous with each other, or with such of those

preceding them as the peculiarities of the case will suggest, are the remedies most to be depended upon, especially when aided by rubefacient embrocations, liniments, plasters, blisters, &c. A due regulation of the excretions, both urinary and intestinal, by conjoining diuretics with the above, and by giving stomachic aperients, especially magnesia with rhubarb, or with sulphur and some aromatic or tonic powder, should receive strict attention.

102. The complication of chronic bronchitis with whooping-cough requires nearly similar remedies to those now enumerated; but with these the alkaline carbonates and anodynes, especially the hydrocyanic acid, may be advantageously conjoined. In this association, also, the frequent application of the terebinthinate embrocation between the shoulders, and the occasional exhibition of an emetic, with attention to the states of the excretions and of vital power, taking care to promote the latter, especially when depressed, by restoratives, tonics, and change of air, will generally prove successful.

103. When cases of chronic bronchitis are much protracted, and particularly when they approach the character of humid asthma, or are attended by dyspnœa, or shortness of breathing on exertion, or occur in aged persons, a suspicion of obstructive disease of the heart should be entertained, and its nature ascertained by a careful examination. In these cases, the preparations of

iron, especially the sulphate with the compound galbanum pill, or the other preparations with myrrh, balsams, and the medicines already noticed, are chiefly indicated. These, aided by gentle aperients, conjoined with tonics, by a mild digestible diet and restoratives, by attention to the states of the urinary and intestinal excretions, and by residence in a dry, temperate, and pure air, are the chief means of alleviating this complication, which rarely admits of complete cure. The treatment of other complications of chronic bronchitis will readily suggest itself from what I have already advanced.

CHAP. VIII.

PRACTICAL REMARKS ON REMEDIES RECOMMENDED FOR ACUTE, SUB-ACUTE, AND CHRONIC BRONCHITIS.

104. It cannot be overlooked, that the terms acute, sub-acute, and chronic, as well as sthenic and asthenic, active and passive, severe and mild, so generally and necessarily used in our descriptions of disease, are merely conventional; that sthenic and acute conditions of vital force and vascular action insensibly pass into asthenic and chronic, and that active and severe, silently lapse into mild or passive, according to vital and vascular states, and to diathesis and temperament, habit of body and age. These several conditions are manifested by disease, not only in different persons, but also by the same person in different periods of the malady. And, whilst these terms indicate merely the extreme degrees of the scale of vital force and vascular action, it should also be recollected, that the intermediate grades are more or less numerous, and that these, as well as the more extreme, require due recognition. Upon the ability, the acumen of the physician, to estimate these aright, an ability derived from close observation and experience, the safety of the

patient mainly depends. It is impossible for us to measure or to weigh these various and ever-varying conditions otherwise than by the use of these terms, than which we have none more precise to employ; and although the observing and experienced physician, while duly appreciating these, is also guided by still nicer or more precise distinctions, and by numerous minute modifications and circumstances, which hardly admit of description, and which can only be acquired in the course of practice, yet those now enumerated should be used in such a way as will mark both grades and amounts, and with as much precision as possible.

105. *A. Vascular depletion* in acute bronchitis, as well as in various other diseases, has been almost altogether relinquished for more than thirty years. For many years previous to 1830, and more especially during the first quarter of the present century, *blood-letting* was remarkably abused, as to both its quantity and repetitions. I had numerous opportunities of observing this, as regarded the diseases of intertropical as well as of temperate countries. In the first Part of my "*Dictionary of Practical Medicine*," published in 1832, as well as in subsequent Parts, I endeavoured to combat this abuse, and to show that, whilst some cases, even of the same disease, owing to different grades and states of vital force, to diathesis, to habit of body and to endemic or epidemic influence, admitted of, and were benefited

by, general or local blood-letting, and other antiphlogistic remedies, other cases required very different or even quite opposite means of cure. Since then, medical practice has run on to the opposite extreme, until vascular depletions, almost in every disease, have been disused by those who ought to be able to judge as to the propriety of having recourse to them. That they have not been so generally tolerated during the last twenty-five or thirty years, or borne to nearly the same amount where they were required as before this period, are admitted facts, and that the same stationary constitution or influence still continues, cannot be controverted. But reprobation of vascular depletions has been carried too far, until the opinion of those who are incapable of forming an opinion respecting the practice, has become so strong in opposition to it, that many are prevented from having recourse to it, in any way or amount, where it is manifestly required; and cases are occasionally observed, in which, at an early stage, inordinate vascular action, excited vital force, or vascular congestion or oppletion, might have been relieved by a moderate, or even a small and cautious depletion, more especially when resulting from impeded or interrupted exhalation, secretion, and excretion, as so frequently observed in the early course of many diseases. Therefore, although it may be conceded that many persons were subjected to vascular depletions where none were required, and others experienced an unnecessary

repetition of the practice,—that blood-letting was often excessively prescribed, as to amount and repetition, during the first quarter of this century, —and admitting that the stationary constitution or influence of that period warranted the practice of large vascular depletions, and that diseases required a recourse to them, yet it does not follow that the present stationary or prevailing constitution should either preclude a cautious recourse to depletions, or prevent all diseases, or all cases of the same disease, from being benefited by them when judiciously prescribed. It ought not to be overlooked, that the causes of disease in most cases act upon the living economy by impeding or interrupting the functions of exhalation, secretion, and excretion; and that in proportion to the amount of such interruption will the vascular system be overloaded, congested, and the blood even contaminated, owing to the overloaded state of this system, and to the irritation caused by the blood-contamination, increased vascular action, or re-action, or congestion, results which a moderate blood-letting may be reasonably expected to relieve, and thereby to admit of more rapid and more certain effects from remedies internally and externally prescribed,— especially if judiciously selected and congruously combined. To decide when vascular depletion ought or ought not to be employed, and to determine what cases, or even what stage of disease should or should not be depleted, is the duty of the physician; and he

ought to be able to discharge that duty, which can only be rightly discharged by estimating with precision the states of vital force, and of vascular action—by interpreting correctly the states of the pulse, and of the several natural, animal, and mental functions—of circulation, respiration, secretion, and excretion.

106. *B. Diaphoretics.*—The choice of these in this disease is deserving of attention. Early in the *first* and *second varieties*, I have usually preferred the solution of the acetate, or of the citrate of ammonia, and the preparations of the potassio-tartrate of antimony, with the spirit of nitric æther, and sometimes with small doses of ipecacuanha, and camphor mixture, &c. But, for infants and young children, for the aged, and for the *asthenic* or *third variety*, ipecacuanha is preferable to antimony—for the aged especially and combined with camphor, &c. In the more catarrhal or less acute states of the complaint, ipecacuanha with nitrate of potash and opium; and in the more sthenic states, the same medicines, in larger doses, will often prove equally serviceable with the preceding. While febrile excitement is much increased, diaphoretics and diuretics are frequently productive of little benefit, as the return of free cutaneous and urinary excretion is often the consequence of diminished or exhausted febrile commotion. The object, therefore, should be first to lower the vascular fulness and excitement by cautious and moderate depletion,

by purgatives and sedatives; and then to employ those diaphoretics which produce a lowering and refrigerant effect, until the strength of pulse and heat of skin are reduced.

107. *C. Emetics* are amongst the most beneficial remedies we can resort to in certain states of bronchitis, particularly in the *third variety*, and in the *second* after a small blood-letting, when it is required. In children they are often remarkably useful, especially when bronchitis is complicated with whooping-cough. They have the effect of unloading the bronchi of the mucus accumulated in them, of relaxing the cutaneous surface, and promoting perspiration. For children, ipecacuanha should be preferred; and for aged persons, and the *third form* of the disease, the sulphate of zinc. In the *second form*, and in all other subjects, in an early stage, the potassio-tartrate of antimony is the best emetic, as it operates both by vomiting, by lowering vascular action, and promoting perspiration. Emetics are more particularly required when expectoration is difficult or suppressed, the cough severe and suffocating, and when the disease is caused by the inhalation of molecules of mineral, vegetable, or animal substances. They, moreover, promote the operation of purgatives. In cases of extreme depression, with suppressed excretion of the secretions from the bronchial surface, the more stimulating emetics, as sulphate of zinc, with camphor, capsicum, &c., should be selected.

108. *D. Aperients, purgatives,* and *cathartics* have been considered by many writers as of doubtful efficacy in pulmonary inflammations; and, when expectoration is established, as being even prejudicial. But this opinion is not quite in accordance with my experience, which, at the Infirmary for Children alone, must have amounted to many thousand cases of the different forms of the disease. It should be kept in recollection, that the expectoration in bronchitis is not a salutary discharge from the lungs, the promotion of which is a beneficial indication of cure; but that it is the product of a morbid state, of the nature of which it is an index; and that this state is generally inflammatory, and always attended with determination of the circulating fluids, thereby keeping up the discharge. It is obvious, that whatever tends to increase the morbid determination to the bronchial surface will increase the disease, and, consequently, the expectoration; and that whatever derives from this situation will proportionally diminish both. That purgatives or cathartics, judiciously combined, have the effect of deriving from the lungs, by increasing the secretions of the liver and digestive mucous surface, must be evident; and I have accordingly found them serviceable when thus prescribed. Severe attacks of bronchitis, moreover, are favoured by congestions and accumulations of bile in the biliary organs, and by sordes retained on the mucous surface of the bowels. In all those cases more especially—wherein the stools

are generally very offensive—and at the commencement of all the forms of the disease, these medicines ought to be exhibited, with the view not only of promoting the abdominal secretions, and of removing fæcal matters and sordes, but also of deriving the circulation from the seat of the disease; and the bowels should be kept very freely open throughout the treatment. It is, of course, understood that we are not to prescribe cathartics to the extent of depressing the energies of the frame too low, especially when they are already weak. Indeed, purgatives may be as much required, and as beneficially employed, in asthenic cases, as in others of a more phlogistic description, particularly if the bowels have been neglected; effects of a very different nature from that of mere evacuation arising from a judicious choice and combination of them. Thus, when prescribed with bitters, tonics, stimulants, or antispasmodics, in the asthenic or suffocative states of the disease, not only will full alvine evacuations be procured, but also a tonic effect on the digestive organs, and, consecutively, a more moderate secretion in the bronchi, with an easier expectoration, will be produced. I have observed that the combination of purgatives, especially calomel, or those of the resinous class, with camphor, ipecacuanha or antimony, and hyoscyamus, according to the circumstances of the case, is particularly serviceable in bronchial diseases.

109. *E. Expectorants* have been much abused in inflammations of the bronchi; chiefly from the

circumstance of the expectoration being too generally viewed as a salutary discharge which ought to be promoted, instead of its being a product of the inflammatory state, or of active determination to the surface of the air-vessels. I consider them quite inadmissible when there is much fever or heat of skin, or when the sputum is abundant and fluid, the patient having sufficient strength to bring it up; and generally in the *second* variety of the disease. On the other hand, in the *third* variety, or when the expectoration is arrested evidently from want of power to throw it off or to excrete it, or from its great viscidity, expectorants are of much service. In such cases, *ammonia* and *camphor* should be first tried, as being generally least detrimental in doubtful cases, and most quickly beneficial. Where the admissibility of expectorants is evident, especially in the asthenic form of the disease, and in aged persons, *squills*, *ammoniacum*, *galbanum*, or *senega*, may be directed; with the precautions, and in the forms, already recommended. When expectoration is rendered difficult, and the cough suffocative, from the tenacity and consistence of the sputum, as is sometimes the case, *attenuants* and *alteratives*, as the fixed alkalies combined with ipecacuanha, &c., exhibited with camphor or ammonia, will be found of much service. In nearly all states of bronchitis, *camphor* is a most valuable medicine. Its virtues have been singularly overlooked by the writers on this disease; but, when combined with antimony,

nitrate of potash, ipecacuanha, &c., and given in small doses, in the more inflammatory and febrile states of the disease; or when prescribed in progressively larger quantities, with *diuretics*, the spirit. æther. nit., opium, &c., as the vascular excitement subsides, and febrile heat disappears; and in large doses (from three to five grains), with ammonia, ammoniacum, senega, opium, &c., when exhaustion and difficulty of expectoration from deficient power are urgent; it is one of the most valuable remedies we possess in this, as well as in several other diseases. The *Polygala senega* is also one of the most useful expectorant remedies in this affection. The subjoined formula* will generally diminish the expectoration without increasing the dyspnœa, render the pulse slow and fuller, and the respiration freer. The *Balsams*—the *Peruvian*, the *Canadian*, and *Tolu*—are all excellent restoratives and expectorants, and are severally beneficial in the various states of asthenic and chronic bronchitis, especially when judiciously combined with other medicines.

110. *F.* The *inhalation of emollient and medicated vapours* is occasionally of much benefit in the sthenic form of the disease, but chiefly in its first and second stages. The vapour arising

* No. 18. ℞—Potassæ Bicarbon. ʒjss.; Ammoniæ Carbon. ℈j.; Tinct. Camphoræ Comp. ʒss. (vel Tinct. Hyoscyami ʒij.); Spiritus Ætheris Nit. ʒss.; Decocti Senegæ ℥iv.; Syrupi Tolutani ʒss.; Aquæ Pimentæ ad ℥viij. Misce. Capiat Cochl. ij. larga, 4tis vel 6tis horis.

from a decoction of marsh-mallows, or from linseed tea, or from simple warm water, is the best suited to this state; and should be employed from time to time, the *temperature of the apartment* being duly regulated throughout the treatment, and constantly preserved from about 66° of Fahr. to 70°. Dr. PARIS recommends, during the dry easterly winds of spring (when the disease is so prevalent), the vapour of warm water to be diffused in the patient's apartment. In the early stage it may be of advantage. In the case of the son of an eminent medical writer, attended by Dr. GORDON, Mr. ANNESLEY, and myself, this was tried in the state of the air alluded to, but with no benefit. The case terminated fatally, from extension of the disease to the air-cells and substance of the lungs. When the expectoration becomes whitish, opaque, and thick, the vapour may be rendered somewhat more resolvent by adding a solution of camphor in vinegar, and extract of conium or hyoscyamus to the hot water, or to the emollient infusions now mentioned; and in the asthenic variety, particularly when the difficulty of expectoration and the fits of dyspnœa are distressing, or when the excretion of the morbid matter is impeded or suppressed from want of power, the medicated vapours and gases about to be noticed may be tried, according as either may be suited to the peculiarities of individual cases.

111. *G. The inhalation of*, or *fumigation with*

stimulating vapours, especially the vapour of tar and turpentine, has been recommended by CRICHTON, PAGENSTECHER, HUFELAND, FORBES, HASTINGS, ELLIOTSON, GANNAL, and others, and been disapproved of by some. I believe that they have frequently been used in too concentrated a state; or too much of the vapour has been diffused in the respired air, occasioning irritation of the bronchial membrane, instead of a gently tonic and healing effect. Whenever any of the vapours advised in this disease produces an increase of the cough, either its use should be left off, or its strength greatly reduced. The manner of having recourse to such vapours, as well as the choice of substances emitting them, have not, in my opinion, always been judicious. The tar vapour is occasionally of service, chiefly from the quantity of turpentine it contains; while the acrid empyreumatic fumes which it also emits counteract whatever good effect the former constituent might produce. Would it not, therefore, be preferable to try the effects of the substance from which the advantage is obviously derived? I have done so in some cases of this disease, and seen marked benefit result from it: and therefore recommend it to the notice of other practitioners. In former times, medication by fumigations and vapours was much resorted to; and it is probable that the early use of incense and various balsamic and aromatic fumes in religious rites had some relation to their prophylactic effect against disease,

or even to their curative influence, the more especially, as the priests of antiquity also exercised the healing art. In several of the productions attributed to HIPPOCRATES, the inhalation of vapours and fumes of various resinous and balsamic substances is recommended; and a number of writers in the 16th, 17th, and 18th centuries have advised a nearly similar method, and employed camphor, benzoin, amber, frankincense, myrrh, storax, assafœtida, sulphur, cloves, the balsams, &c., for this purpose. This practice was employed by BENEDICT (see his *Theatrum Tabidorum*) in consumptive diseases; and BOERHAAVE gives several formula in his *Materia Medica*, for fumigations with the above substances. MEAD, in his *Monita et Præcepta*, offers several remarks on this subject. He observes—"that fumigation with balsamics, &c., is of vast service in some cases; which is to be done by throwing the ingredients on red coals," &c. After noticing the undeserved neglect of this practice, and the propriety of thus applying medicinal substances directly to the seat of disease, he states, that the smoke of the balsam of tolu conveyed into the lungs, or the smoking this substance like tobacco, is of signal service in diseases of this organ. It appears from the writings of FRACASTORI that the fumes of *cinnabar* were much employed by inhalation in the treatment of the constitutional forms of syphilis, at an early period of the history of that disease, when it assumed a pestilential form.

112. Notwithstanding the unsuccessful attempts of BEDDOES to revive the practice, by employing the elementary and permanently elastic gases, but according to views too exclusively chemical, the practice of inhalation has long been neglected or undeservedly fallen into the hands of empirics. Very recently, however, it has been brought again into notice by M. GANNAL, Mr. MURRAY, and Sir C. SCUDAMORE; and *chlorine gas*, and fumes of *iodine*, and watery vapour holding in solution various *narcotics*, have been recommended to be inhaled. I have tried those substances in a few cases of chronic bronchitis; but in not more than two or three cases of tubercular phthisis. The chlorine was used in so diluted a state as not to excite irritation or cough. The sulphurate of iodine, and the *liquor potassii iodidi concentratus* were also employed; one or two drachms of the latter being added to about a pint of water at the temperature of 130°, and the fumes diluted with atmospheric air were inhaled for ten or twelve minutes, twice or thrice daily. The tinctures or extracts of hyoscyamus and conium, with camphor, added to water at about the above temperature, were likewise made trial of; and, although the cases have been few in which these substances have been thus used by me, yet sufficient evidence of advantage has been furnished to warrant a cautious recourse to them in this state of the disease.

113. *Inhalations* also of the fumes of the *bal-*

sams, of the *terebinthinates*, of the odoriferous *resins*, &c., are evidently, from what I have seen of their effects, of much service in the chronic forms of bronchitis: and I believe that they have fallen into disuse from having been inhaled as they arise in a column or current from the substances yielding them, and before they have been sufficiently diffused in the air. When thus employed, they not only occasion too great excitement of the bronchial surface, but also intercept an equal portion of respirable air, and thereby interfere with the already sufficiently impeded function of respiration. M. NYSTEN has shown (*Dict. des Scien. Méd.* t. xvii. p. 143) that ammoniacal and other stimulating fumes, when inhaled into the lungs in too concentrated a state, produce most acute inflammation of the air-tubes, generally terminating in death; and has referred to a case in which he observed this result from an incautious trial of this practice. The vapours emitted by the more fluid balsams, terebinthinates, the resins, creasote, camphor, vinegar, &c., and from chlorine and the preparations of iodine, should be much more diluted by admixture with the atmospheric air, previously to being inhaled, than they usually are. According to this view, I have directed them to be diffused in the air of the patient's apartment, at first in very small quantities, regulating the quantity of the fumes, the continuance of the process, and the frequency of its repetition, by the effects produced on the cough, on the quantity and state of the

sputa, and on the respiration. The objects had in view have been gradually to diminish the quantity of the sputum, by changing the action of the vessels secreting it; without exciting cough, or increasing the tightness of the chest, or otherwise disordering respiration.

From this it will appear, that *fumigation*, or the prolonged respiration of air containing a weak dose of medicated fumes or vapours, is to be preferred to a short inhalation of them in their more concentrated states. The want of success which Sir C. HASTINGS and others have experienced, evidently has been partly owing to the mode of administering them, and partly to having prescribed them inappropriately. When the patient complains of pain in any part of the chest, they are as likely to be mischievous as beneficial. Where benefit has been obtained, it will be found that it was when the fumes of the more stimulating of those substances were diffused, in very moderate quantity, in the air of the patient's apartments; or when he passed, at several periods daily, some time in a room very moderately charged with the vapour or fumes of the substance or substances selected for use.

114. *H.* There are various medicines which are occasionally useful, when exhibited in appropriate states and periods of the disease. Amongst these, *narcotics* and *sedatives* deserve an especial notice. *Opium* should not be exhibited alone, as long as febrile action is great; but, in combination with

antimony, or ipecacuanha, and nitre, it is often a most valuable medicine. It is best given in small or moderate doses, in conjunction with camphor and expectorants, where vital power is reduced and expectoration difficult. In general, when the skin becomes cool, the bowels are well evacuated, and the air-tubes remain irritable, opium, or some other narcotic or anodyne, is indispensable. Opium, and others of this class of medicines, particularly when judiciously prescribed, are then of service, not only by lowering the irritability of the system and of the air-passages, and by quieting the cough, the frequency or severity of which often aggravates the inflammatory irritation of, and determination to, the bronchial surface, but also by equalising the circulation, by determining to the skin, and promoting perspiration. In the more phlogistic states of the disease, and at its commencement, *colchicum* or *digitalis* has been recommended. When the sputum is thick and opaque, *colchicum* is less beneficial than at an earlier period, excepting in conjunction with diuretics, ammonia, and camphor. When the skin has become cool, it is no longer of use. In the *third* variety, it is seldom indicated, unless at the commencement of the disease, or when combined with ammonia and camphor; and then it should be given, if given at all, in very small doses. Upon the whole, both colchicum and digitalis are hardly to be depended upon in acute bronchitis. *Hyoscyamus*, *conium*, and the extracts of *poppy* and of

lettuce, are very generally serviceable in the different forms of the disease. But the amount of advantage will entirely depend upon the manner in which they are prescribed. In the sthenic and febrile states, and at the commencement, they should be associated with antimonials, ipecacuanha, refrigerants, demulcents, and emollients; with diaphoretics, and with diuretics. When the disorder assumes an asthenic state, or when expectoration is difficult, the cough distressing, and the skin cool, any of the sedatives particularised may be conjoined with either ammonia, camphor, or the fixed alkalies, or with other attenuants, and with expectorants and tonics, &c. according to circumstances. When the acute form of the complaint seems to be about lapsing into the chronic, the combination of *gentle tonics* with emollients and diaphoretics is often of service. The infusion or decoction of cinchona, or the mixture or infusion of cascarilla or of uva ursi, may be then prescribed*:—

115. *I. External measures* ought not to be overlooked during the course of the disease. *Blisters* are not admissible in the early stages of sthenic bronchitis. But, in the asthenic disease, or when inflammatory action and febrile heat

* No. 19. ℞—Decocti vel Infusi Cinchonæ ℥iijss.; Liq. Ammon. Acet. ℥j.; Mucilag. Acaciæ ℥ss.; Spirit. Æther. Nit. ℥ijss.; Tinct. Camphoræ Comp. ℥ss.; Extr. Conii gr. xii.; Syrupi Tolutani ℥ss. M. Capiat Cochleare unum amplum secundâ vel tertiâ quâque horâ, vel Coch. ij. quintis vel sextis horis.

have been subdued by depletions, &c., blisters are of much service, and may be applied either between the shoulders or on the breast; and, in some severe cases, re-applied or kept discharging for some time. In young children, and in adult or aged persons, when the secretion of the bronchial surface is profuse, and the powers of life much exhausted, I have derived more permanent advantage from the application of the terebinthinate embrocation over the chest or back, than from blisters. When blisters are employed, much benefit will sometimes arise from removing them as soon as slight redness of the skin is produced, and covering the part with a large warm bread and water poultice, which ought to be frequently renewed; or by applying a succession of warm fomentations. In some extreme cases of this description, I have seen much advantage derived from applying over the epigastrium and lower part of the chest, a flannel wrung out of hot water, the spirits of turpentine being immediately afterwards sprinkled over it, and allowing it to remain until severe burning heat of the skin is produced by it. If suffocation be threatened either by the profuseness of the secretion, by its difficult expectoration, or by exhaustion of the vital energy; and if we be, as we then unfortunately are, at a loss for any probable means of success; this application will sometimes have a remarkable effect, and save the life of the patient, particularly when assisted by the internal use of

camphor, ammonia, &c. I have often witnessed a beneficial result, in most dangerous cases of this description, from the internal as well as the external use of turpentine, particularly at the Infirmary for Children, where I have for many years had recourse to it in cases of danger.

116. The *tepid* or *warm bath*, or semicupium, or pediluvia, with salt and mustard in the water, will often be of service early in the disease; and in the course of it, sponging the surface of the chest or of the whole trunk with warm water and vinegar, and afterwards with warm water containing the dilute nitro-muriatic acids (one part of the nitric, to two parts of the muriatic acid), particularly towards the decline of the disease, or when we dread the lapsing of the acute or the subacute into the chronic or the asthenic form, will generally prove of essential service; and also will be of use, when the expectoration is profuse, the debility is great, and little or no febrile heat is present, or when the disease is more active, the habit of body being relaxed or leucophlegmatic. In these states of the system, a solution of common salt in warm or tepid water may likewise be used as a lotion to the chest or trunk; a pitch plaster, rendered more or less rubefacient by the addition of a portion of emplastrum lyttæ, may also be applied between the shoulders.

CHAP. IX.

REGIMENAL TREATMENT OF ACUTE AND CHRONIC BRONCHITIS.

117. *A. The regimenal treatment* of bronchitis requires strict attention.—*a.* In the *sthenic acute* disease it should be strictly antiphlogistic; and, at the commencement of convalescence, a farinaceous diet adopted, until out-of-door exercise may be taken, or shortly before. In the *asthenic states* of acute bronchitis, this regimen is chiefly applicable to the commencement of the disease: subsequently, nourishment in small quantities, suited, in kind and frequency of partaking of it, to the state of the symptoms, the powers of the digestive organs, and feelings of the patient, should be permitted; and even animal food of a digestible nature, in moderate quantity, may in some cases, particularly in the aged, be permitted once a day. The decoction of Iceland moss, jellies, mucilaginous and emollient soups; shell-fish; the different kinds of white fish, dressed either with sweet oil or the oil obtained by boiling their fresh livers; the lighter kinds of animal food; and, in the case of infants, attention to the milk of the mother, or a healthy wet-nurse; are all occasionally of service during early convalescence from the *acute* forms

of bronchitis, and in the progress of the more febrile states of the *chronic* disease. In the more asthenic cases of this latter, or when the expectoration is profuse, the skin cool and moist, and the habit of body lymphatic, relaxed, or wasted, animal food, especially fresh beef or mutton, underdone, and in moderate quantity, new eggs, or a due proportion of digestible and stimulating food, will be found most serviceable. In nearly all the *chronic* states of the disease, particularly in their advanced stages, a light nutritious diet is necessary.

118. *B.* The common *beverages* of the patient during the acute forms of the disease, should be chiefly regulated by the state of febrile action and of vital force, and by compatibility with the treatment adopted. Barley-water, with lemon-juice, the common imperial drink, or apple-tea, or tamarind-water, and various cooling and aperient fluids should be employed in the sthenic form of the acute disease. In the asthenic and chronic states, the Bordeaux wines, or the wines of Burgundy—generally reduced by one-third or one-half water; or ale, also reduced, to which a little of the liquor potassæ, or of Brandish's alkaline solution, has been added, may also be tried at meals; and either of these, or of the more cooling beverages, adopted, that may be found to agree best with the patient. If the disease evince a disposition to terminate in dropsy, the imperial drink, with the addition of a

little bi-borate of soda, will be most serviceable. In the advanced period of *chronic*, or during convalescence from *acute*, bronchitis, the sulphureous mineral waters will often be beneficial. Those of Harrowgate, Leamington, or Moffat, or the chalybeate waters of Harrowgate or Tunbridge Wells, may be taken according to the circumstances of the case; or of Enghien, Bonnes, Barèges, or Cauterets; or the artificial waters of Ems or Carlsbad.

119. *b. Change of climate* is one of the chief remedies for chronic bronchitis, and for the advancement of convalescence from the acute and asthenic varieties of the complaint. In the more obstinate cases of the chronic form, more especially when recurring sub-acute attacks are experienced from states of season or weather, or from exposure to cold or humidity, or when complicated with humid asthma, or whooping-cough, or with congestion of the lungs, a change of air, climate, or locality offers the most certain and permanent advantages. It is not, however, to low, humid, or relaxing situations that a change should be made. Neither places on the sea-coast, nor sea voyages present sufficient evidences of benefit in these cases and complications. I have, when treating of changes of air in cases of *tubercular phthisis*, stated, that after weighing the evidences in favour of low, humid, and temperate localities on or near the sea-coast, and those in favour of elevated, dry and temperate situations inland, the

latter predominate. This result being manifest as regards tubercular phthisis, it is still more so as respects the chronic and asthenic forms of bronchitis, and their chief complications. In the very elaborate communication in the Memoirs of the Imperial Academy of Medicine for 1855 by M. J. ROCHARD, the author has inquired into the mortality from pulmonary diseases, especially phthisis and bronchitis, in many of the seaport towns in France, Italy, Great Britain, Spain, the United States, and South America, and in vessels voyaging to various temperate and tropical places, and he has shown that it is much greater in these than in situations inland. M. ROCHARD'S researches confirm the opinion I had already expressed in my "*Dictionary of Practical Medicine.*" But he has not sufficiently considered the causes of this increase, which are much more influential in the places he has adduced than in inland localities. In ships, whether commercial or armed, the crews are confined, during their watches below, to close, insufficiently ventilated, and limited spaces, in which the air is so frequently respired as to become loaded with animal vapour, and most offensive to persons who visit these habitations and dormitories. When the watch is called on deck, the sailors rush into an open air, hot and perspiring, and generally insufficiently protected against the change. They are, moreover, exposed to the humidity caused by frequent washings, or wettings of the decks, and the evaporation from

ligneous surfaces. Seaport towns contain many sailors, fishermen, and boatmen who are either similarly circumstanced or who lead a precarious existence, and are more exposed to the causes of, and are hence more liable to, pulmonary diseases than to any other class of maladies. Notwithstanding these causes, and their effects in heightening the mortality in seaport towns and in shipping, it does not follow that persons voyaging for health, or passengers, or those who are not thus exposed, should suffer in any marked degree, or that in an early stage of consumption the sea-air should counteract the good effects which may be otherwise produced, when every comfort is furnished to them. There can be no doubt that voyaging at an advanced period of phthisis or of chronic asthenic bronchitis, more especially in very high temperatures, is most injurious and hastens a fatal issue. However, in weighing all the circumstances, without giving any one undue preëminence, I must come to the conclusion that a residence in an elevated, dry, and temperate inland locality, is preferable in tubercular phthisis, and still more so in chronic and asthenic bronchitis, and most of their complications, to a residence in a humid and sea-coast situation, although the air of the latter may be temperate and little liable to sudden or great changes.

120. The conclusion at which I have arrived agrees with the opinion firmly asserted by Dr. Rush, and by other eminent authorities, although

opposed to the practical recommendations of many physicians in this country. It is, however, very difficult to name the places to which a change should be made, especially in this country during the winter and spring months. In the summer and autumn many places in both England and Scotland will be found beneficial for chronic and asthenic bronchitis, especially HARROWGATE, TUNBRIDGE WELLS, MOFFAT, &c. In these a healthy air, and mineral waters most appropriate to the disease, will be found. Other places abroad have been recommended by my friends, Principal BARCLAY * and Dr. H. BENNET, who have derived marked benefit from a residence in them.

* The Reverend Dr. BARCLAY, Principal of the University of Glasgow, has given the following interesting and instructive account of his own case, and of the benefit he derived from a residence in Middle and Upper Egypt.

He states, that "in Middle and Upper Egypt, from the beginning of October to the end of April, the invalid may breathe, under a bright and cloudless sky, an atmosphere at once of a warm and equable temperature, of perfect purity, and free from all excess of humidity. The climate of other regions may be equally distinguished by one or more of these properties (though even that is doubtful); but assuredly there is no other habitable part of the globe in which they are all combined in so great perfection

"The malady for which I sought relief in a southern climate was chronic bronchitis in its most aggravated form. All the usual remedies, both external and internal, had been resorted to, and steadily persevered in, under the ablest medical advice, but with little temporary and no permanent benefit. I had tried, with the same unfavourable result, those places on the south coast of England which are usually recommended to invalids. The symptoms obstinately resisted every remedial measure. The

121. *D.* During the progress of convalescence from an attack of bronchitis the patient should

chronic character of the disease was frequently exchanged for attacks of a subacute form. These always commenced with inflammation of the pharynx, creeping insidiously down the glottis and trachea to the bronchial tubes, which became gorged with mucus throughout their whole extent; and on every spot on which the stethoscope could be planted over the lungs the mucous *râle* was to be heard. Dyspnœa, accompanied with loud wheezing, was at all times distressing; but its nocturnal exacerbations, which invariably occurred after a short sleep, like fits of spasmodic asthma, were often so fearfully violent as to threaten suffocation. The digestive organs were deranged, I had no appetite for food, my frame was emaciated, and my strength prostrated.

"I was so enfeebled as to be unable to encounter the voyage till the month of November; and thus I lost two months of the season suitable for the residence of an invalid in that country. Yet the benefit which, by the blessing of Providence, I reaped from that delicious climate, was most signal; and far exceeded all that my most sanguine hopes had ventured to anticipate.

"On the passage outward, I stopped five days at Malta, but found the heat so oppressive in the day-time, and the chills in the evening so severe, that I was glad to make my escape. The extreme humidity of the atmosphere in that island, notwithstanding its high temperature, must always render it, I apprehend, an unfit resort for a bronchitic patient; and the greatness of the diurnal range of the thermometer, at least in winter, makes it questionable how far it is an eligible residence for consumptive patients. It is believed that an inquiry into *results* will not tend to give a favourable idea of its sanative influence on that class of complaints. Of the climate of Alexandria also I have reason, as I shall show afterwards, to speak unfavourably. In Cairo, however, a very different climate was found; and I had not been many days there when I began to experience its effects in allaying the irritability of the respiratory mucous membrane."

endeavour to make his recovery as complete as possible in order that it may be permanent; but his physician has too often but little opportunity given him to aid this intention, or to direct those means which are required to prevent a return of the complaint. The secretions and excretions should be duly regulated and promoted by aperients conjoined with tonics, according to the exigencies of the case. The compound infusions of gentian and senna, with alkaline carbonates, or saline deobstruents, or diuretics may be taken; or the sulphate of iron, with the aloes and myrrh, and the compound galbanum pills, may be preferred, especially for females. Exercise in the open air, either on foot or horseback, ought not to be neglected when the weather admits of it. Even although exercise is freely taken, and the bowels are preserved in an open state, an occasional active cathartic will be of service, especially if the diet be liberal and invigorating. If indications of a return of the complaint appear, particularly if exposure to wet or cold or malaria have caused it, an emetic should be given and followed by a warm bath, and by diaphoretics suitable to the symptoms present. During convalescence, as well as during the course of the disease, flannel should be worn next the skin, and the diet and beverages allowed ought to depend upon the state and requirements of the case. Restoratives, stimulants, tonics, or wines, are often required during convalescence, — seldom however in children, but

frequently in aged persons; but these should be given at first with caution, and their effects watched, especially in young subjects, or after the more sthenic and acute forms of the disease.

CHAPTER X.

NOTICES OF CERTAIN MORBID CONDITIONS OF THE RESPIRATORY ORGANS SOMETIMES CONSECUTIVE OF BRONCHITIS.

CERTAIN morbid states of the bronchi and of the substance of the lungs are not infrequently connected with or consequent upon bronchitis, acute, sub-acute or chronic.—They may accompany first attacks or may follow upon without any necessary sequence, or may be produced by repeated attacks, or by protracted or exasperated states of the disease. The morbid conditions to which I will briefly advert are, congestion of the bronchi and lungs, bronchorrhœa, dilatation of the bronchi, and ulceration of the bronchi.

i. CONGESTION OF THE BRONCHI AND LUNGS.

122. The *characteristic indications* of this dangerous condition are, *urgent and continued dyspnœa; little or no cough or expectoration; anxious, pale, or livid countenance; soft, weak, and quick pulse; and often cold or clammy perspiration.*—This state of disease is seldom seen in a primary, severe, and general form; but it is very common in more slight and partial states, and as an attendant on typhoid, malignant, and pestilen-

tial diseases, and on exanthematous fevers, especially measles, scarlatina, and small-pox, either shortly before the breaking out, or upon the premature disappearance of the eruption, when it often assumes a very general and severe form; and it not infrequently, in slighter grades, ushers in other diseases of the bronchi, particularly hæmorrhage, bronchitis, humoral asthma, &c. General idiopathic congestion of the bronchi, to such an extent and degree as to destroy life, although rare, is sometimes met with. Several cases have been recorded of persons who, without any apparent cause, were seized with urgent dyspnœa, increasing until it terminated in death; and, on dissection, the only morbid appearance observed was general congestion of blood in the capillary vessels of the mucous and sub-mucous respiratory tissues.

123. *A.* The *symptoms* of this affection have not been sufficiently investigated; but they may be stated to consist of continued dyspnœa, more or less urgent; sometimes fever, little or no cough, and little or no expectoration; the sibilous or sonorous rhonchus in the large tubes, and absence of the respiratory murmur over the chest; diminished resonance on percussion, the sounds of the heart being loud throughout the chest; anxious, pale, bloated, or slightly livid countenance; purplish tint of the lips and nails of the fingers; anhelation, &c. When the congestion takes place in the course of febrile or exanthematous diseases, in addition to these, the pulse

becomes very quick, small, irregular, or intermittent, and the oppression at the chest extreme.

124. Congestions of the bronchi and of the lungs appear to be most frequently *caused* by exposure to great cold, by the inhalation of poisonous gases or effluvia; by close, overheated, and crowded apartments; by the ingestion of sedative or narcotic substances, or indigestible or poisonous animal or vegetable matters; by inordinate distension or oppletion of the stomach; and by the transition or metastasis of other diseases, or by their determination to the bronchial surface in a more especial manner. When this affection proceeds from poisonous or indigestible substances, and frequently also when it arises from other causes, the substance of the lungs is chiefly affected. It often precedes other pulmonary complaints, as hæmorrhage, and that modification of asthma, called dry catarrh, by LAENNEC. Congestion of the bronchi and lungs also occurs in the progress of several diseases of the heart attended with obstructed or impeded circulation through its cavities, particularly those of its left side; and is often one of those changes which supervene in the advanced stages of several acute diseases, especially the exanthemata, and to which death is more immediately owing.

125. *B.* The *treatment* must depend upon the state of the vital energies at the time, upon the nature of the cause to which the congestion is owing, and on the evidence of existing general plethora. The

state of the pulse, in respect of frequency and fulness, will indicate the degree of activity characterising the attack; but generally, when the congestion is considerable, the changes which take place in the lungs during respiration being impeded, the vital energies become proportionately reduced, and the pulse weak, quick, soft, or small. In the majority of cases it will be necessary, notwithstanding, to abstract blood by cupping; and if the depression of vital power be urgent, to exhibit simultaneously stimulants by the mouth, and in enemata; to employ frictions with irritating liniments, and revulsants, such as dry-cupping, sinapisms, blisters, mustard pediluvia, &c.; and to inhale, at brief intervals, and for a very short time, stimulating vapours, particularly those of ammonia, camphor, aromatic vinegar, &c., with the view of exciting the nerves of the bronchi, and thereby removing the distension of the capillaries, and accelerating the circulation through them. When, however, the patient, in addition to the symptoms indicating congestion, complains of a sense of heat, trickling, &c., in the course of the trachea, or under the sternum; and if the pulse retains its volume, and still more especially if it be sharp, full, or rebounding; we should infer that the fulness of the bronchial vessels is of an active kind, and that it most probably amounts to determination of blood; and possibly, is the early stage of hæmorrhage or of inflammation. In these cases, blood-letting, and afterwards counter-irrita-

tion and revulsants, mercurial purgatives, cathartic injections, the antiphlogistic regimen, &c., should be prescribed.

In every case a strict reference should be had to the cause, associated circumstances, and the complications of the attack, and the treatment should be varied accordingly. When it seems to have been induced or aggravated by hurtful substances taken into the stomach, warm stimulating emetics ought not to be omitted, and if they do not operate immediately the stomach pump should be used. The bronchial congestion, preceding, accompanying, or consequent upon, eruptive fevers, requires revulsants, dry-cupping, rubefacients, stimulating frictions of the surface, and emetics. The congestion of the bronchi and lungs consequent upon obstructive cardiac disease demands serious consideration, and is rarely relieved by vascular depletion. Revulsants, restoratives, warm stimulating expectorants, tonics, chalybeates, &c., as advised above for asthenic and complicated bronchitis (§ 80 *et seq.*), are indicated for these formidable cases.

ii. Of Bronchorrhœa.*

This complaint is *characterised by a flux of watery mucus or phlegm from the bronchi, with more or less cough and shortness of breathing, but without fever, often causing progressive exhaustion.*

* Bronchial flux; Pituitous catarrh; Mucous flux.

126. *A.* PATHOLOGY. This affection varies considerably. It is often a variety of chronic bronchitis; being consecutive of it in persons advanced in life, or those of a relaxed and phlegmatic or pituitous habit of body. In other cases it appears from the commencement, or consecutively of slight catarrh, as intermediate between chronic bronchitis and humoral asthma. This appellation may upon the whole therefore, be viewed as applicable to those cases which are attended with a more abundant fluid, and transparent expectoration, than is observed in chronic bronchitis, and are devoid of fever and all other signs of inflammatory action, whilst they are equally without the severe dyspnœa, the paroxysms of suffocation and cough, and the intermissions, characterising humid asthma.

127. *a.* Bronchorrhœa proceeds generally from similar *causes* to those which produce common catarrh or bronchitis, even although it be not consecutive of some one of the forms of bronchial inflammation. It is very frequently, either at its commencement or recurrence, connected with cold moist states of the atmosphere, or occasioned by exposure to cold in some one or other of its forms. When it occurs as a sequela of bronchitis, it may be viewed as arising from lost tone of the vessels and of the bronchial surface, the flux or determination to this part still continuing, from peculiarity of habit or some other cause, after all inflammatory and febrile symptoms have

been removed. Thus, it is very frequent in aged persons of relaxed fibres, who have experienced repeated attacks of pulmonary catarrh. Although sometimes appearing in the way now stated, it has occurred most frequently in my practice as a consequence of more or less congestion of the lungs consequent upon obstructive cardiac disease, especially of the left side of the heart; the causes now mentioned determining the morbid increase of secretion from the bronchial mucous surface.

128. *b. Diagnostic Symptoms.*—Bronchorrhœa may be distinguished from chronic bronchitis, tubercular phthisis, and humoral asthma, by the following characters: — The quantity of fluid expectorated is very great; being, in some cases, as much as four or five pounds in the twenty-four hours. The sputum is colourless, ropy, transparent, slightly frothy on the surface, and resembling the white of egg mixed with water. It is without the thickened sputa generally accompanying chronic bronchitis. There is considerable dyspnœa, with shortness of breathing even on slight exertion; there is often much dulness throughout the chest on percussion; and the cough, though sometimes slight, is often severe and suffocative. The sounds of the heart are often heard in distant parts of the chest, and the pulse is sometimes slow, intermitting, or irregular. In slighter cases the pulse and temperature of the skin are natural, and there are no night sweats. The appetite is generally unimpaired; and emaciation is not

remarkably, or not at all observed, unless the quantity of the sputum be extremely great. M. NAUCHE states, that the expectoration in this state of disease is always more or less acid, and reddens litmus paper, whilst that proceeding from inflammatory action restores the blue tint to this paper after being reddened by acids. *On auscultation*, the respiratory murmur is commonly weak, and is sometimes nearly or quite suspended. The sibilous rhonchus is heard more or less distinctly, and often mixed with the sonorous, and occasionally with the mucous rhonchus, the bubbles of which seem to burst upon the surface of a fluid of less consistence than in bronchitis. The heart's sounds are sometimes so loud as to mask or render bronchial *râles* indistinct or confused.

129. Bronchorrhœa usually commences with catarrhal symptoms, and frequently without fever. In other cases, after bronchitis has continued chronic for a longer or shorter period, the expectoration becomes less consistent and less opaque, more abundant, and similar to that described; and the affection becomes established,—aggravated at times by disorder of the stomach or bowels, or by changes of the air, especially by cold and moisture, or by arrest of the cutaneous transpiration from any cause,—and ameliorated at other times by a warm dry air, an open state of the bowels, and light nourishing diet, taken in moderate quantity. Vacillating in this manner, the disease may continue for years if it be not severe,

without materially affecting the strength. But more frequently the discharge increases, after irregularly prolonged and more or less slight intervals; the patient loses his flesh, and becomes paler; his strength is impaired; dyspnœa increases; and, in some cases, the affection either runs into humoral asthma, or the quantity of expectoration is augmented so as to exhaust his energies, and to occasion suffocating paroxysms of cough. In rarer cases the quantity of the bronchial discharge has been so great as to occasion the exhaustion and death of the patient. M. ANDRAL has detailed two cases of this description, wherein, upon *dissection*, no evidence of inflammation or congestion could be found in the air-tubes. I had opportunities of examining the bodies of three cases of this disease after death. In all there were more or less congestion of the lungs, and obstructive valvular disease, with enlargement of the left side of the heart. M. ROCHE has described what he has designated an acute form of this affection, which other French pathologists have named *catarrhe suffocant*; but it differs in no respects from the more humoral states of asthma, complicated with cardiac disease, and presenting all the symptoms of spasm of the air-passages, with a copious viscid expectoration; the spasm and other symptoms subsiding after the bronchi and trachea are unloaded of the secretion accumulated in them. Bronchorrhœa has, in rare instances, been the means of removing other

diseases. M. ANDRAL states that he has seen hydrothorax disappear after the establishment of a copious bronchial flux.

130. *B.* TREATMENT.—After the full exposition that has been given of the means of cure in the different states of chronic bronchitis, to some of which bronchorrhœa is closely allied, it will be sufficient to enumerate succinctly the various means which are applicable to this affection. As the disease essentially consists of an increased secretion and exhalation from the respiratory mucous membrane, owing to congestion of the organs of respiration, and deficient tone of the vessels distributed to the bronchi, the obvious *indications are,* to impart power and tone to the heart's action, to increase the secretions from other surfaces and organs, and thereby to derive from the lungs. I have never seen a case of the disease which has not been much relieved by purgatives; taking care, however, that they should not lower the energies of the constitution. They ought, therefore, to be conjoined with tonics, bitters, or stimulants, allowing sufficient light nourishment to admit of this mode of derivation being satisfactorily employed. In the intervals between the exhibition of purgatives, diuretics and diaphoretics may be exhibited, and the cutaneous functions promoted by constantly wearing flannel next the skin.

131. *Expectorants* have been very much employed in this affection; but some of this class of

medicines are seldom of benefit in it, unless combined with opium. The *balsams* and terebinthinates; the sulphate of iron or zinc, with myrrh, or the compound galbanum pill; and either of these, with camphor or opium, are often of service. Although astringents and inhalations may be required, yet we should be cautious in using them when the disease has been of very long continuance, particularly in persons advanced in age, or when there is any irregularity of the action of the heart, or physical signs of obstructive or other organic change of this organ complicated with it; inasmuch as the arrest of an habitual discharge will, in such circumstances, risk the supervention of effusion in the cavities of the thorax. It will be more judicious in these cases to confide in preparations of iron, in the decoction of senega, or other suitable expectorants; in purgatives combined with bitter tonics; in diuretics, and in diaphoretics, so as to moderate the discharge, and to prevent its increase or its exhausting effects upon the system. At the same time the vital energies should be promoted by the preparations of iron or cinchona or quinine, or by tonics given with alkaline carbonates; by a light nutritious diet, moderate exercise, and change of air, with the sulphureous, chalybeate, and tonic mineral waters. In other cases, where the age of the patient, the regular or healthy state of the heart's action, the absence of leucophlegmasia, and the circumstances of the case altogether are such as to preclude dread of the consequences of sup-

pressing this discharge, cold-sponging the surface of the body by the nitro-hydrochloric lotion, &c. and the liniments already noticed, with the internal use of more astringent tonics, particularly the sulphate of zinc or of quinine, in addition to the means already recommended, may also be prescribed.

iii. DILATATION OF THE BRONCHI (§ 68).

132. *A.* This alteration has been viewed as a consequence of, or an attendant upon, the more chronic cases of bronchitis, or of whooping-cough complicated with bronchitis. ROTIKANSKI has considered the dilatation to be caused by bronchitis of the terminal branches of the air-tubes, producing first obstruction of them and finally obliteration, dilatation following as a consequence. He takes into account the collapse of the air-cells of the portion of lung supplied by the obliterated capillary bronchi; and the space thus given to the bronchus by the collapsed and atrophied portion of lung, he believes to be the cause of dilatation. LAENNEC considered that the dilatation was the primary lesion and the condensation of the lungs parenchyma was consequent upon it. Dr. CORRIGAN, however, believes the disease to be analogous to scirrhus of the liver, and calls it therefore, scirrhus of the lungs. He supposes that the atrophy and obliteration of the pulmonary tissue is the primitive affection, and the dilatation a secondary result or consequence of this; arising not only from an

attempt to fill up the space left vacant in the contracting lung, by the forcible expansion of the bronchi, during the act of inspiration, but also by the mechanical dragging apart of the walls of the tubes from the shrinking of the pulmonary tissue itself. Bronchial dilatation, when considerable, owing to the collapse and atrophy of large portions of the lungs which attend it, causes more or less obstruction of the circulation through the lungs, consecutive active dilatation of the right ventricle, congestion of the venous system, and cyanosis by interrupting the changes of the blood in the lungs. The permeable portions of this organ are excessively developed, and their action being increased, bronchial and pulmonary hæmorrhage sometimes supervenes. Bronchial dilatations when slight, or not very extensive, are not easily detected, and even when very great, they may be mistaken for tubercular cavities owing to the physical signs, to the emaciation, dyspnœa, cough, and expectoration attending them. The marked cachexia, the partial cyanosis, and lividity of the countenance, lips, and extremities, the distended state of the veins, anasarca, &c., often indicate more extreme dilatation. The state of the expectoration is also important, for besides being puriform and copious, it is often fœtid—a diagnostic symptom of this alteration, without which M. Louis, and other pathologists who have devoted much attention to pulmonary diseases, have sometimes failed of distinguishing it from phthisis.

133. *B.* The TREATMENT of this alteration is nearly the same as that which has been recommended in the more chronic states of bronchitis. The means which are especially indicated consist of the *inhalation* of balsamic and terebinthinate fumes; of those of creosote, chlorine, iodine, &c. (§ 111 *et seq.*); the internal use of balsams, tonics, and bitters, particularly the sulphates of quinine, or of zinc, or iron; and preparations of cinchona or steel; with the use of the liniments already noticed; or the nitro-hydrochloric acid lotion on the chest. The chlorate of potash, alkaline carbonates, tonic infusions or decoctions, the compound cascarilla mixture, &c., are indicated in this form of the disease. An open state of the bowels, an occasional cathartic, nutritious diet, and change of air, are also evidently required. In other respects, the treatment already detailed (§ 96 *et seq.*) may be followed; or modified according to the peculiarities of the case.

iv. ULCERATION OF THE BRONCHI (§§ 56, 57).

134. *A.* This is another alteration which is produced by, or is attendant on, the advanced stages of chronic bronchitis; most frequently, however, when complicated with tubercular phthisis. It is often met with, particularly after bronchitis occasioned by the mechanical irritation of mineral, vegetable, or animal molecules. The existence of ulceration, when seated in the bronchi, is not indicated by any sign in addition to those which

accompany the most chronic states of bronchitis, or tubercular disease, when it arises from, or is complicated with, this change. When affecting the LARYNX or TRACHEA (see Part II.), it may frequently be suspected, or occasionally prognosticated. I have readily recognised it before death when occurring in the trachea; but have surmised it merely when existing near the bifurcation of the large bronchi, and then rather by the history of the case and the character of the expectoration than by any precise symptom or sign.

135. *B.* The TREATMENT of this lesion, even could its existence be ascertained during life, cannot be different from that required in some other states of chronic bronchitis. That ulceration may take place in the bronchi and heal, as evinced by the appearance of cicatrices, has been ascertained by LAENNEC and other pathologists. In addition to the means of cure already adduced, the establishment of local drains or derivatives of the most active kind is obviously required. Blisters and issues applied to a distant part have not been found of use by LAENNEC. When the latter are large and effective they may prove of more service. M. LAENNEC prefers the repeated application of small moxas, as near the seat of disease as possible, and the preservation of absolute rest and silence. The inhalation of anodyne, balsamic, and terebinthinate fumes may likewise be tried; and the terebinthinate embrocation be assiduously applied to different regions of the chest in suc-

cession. If the disease be devoid of marked febrile excitement, the expectoration abundant, and the vital powers depressed, the treatment recommended for dilatation of the bronchi may be employed.

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