Asthma and chronic bronchitis / by John C. Thorowgood.

ASTHMA

AND CHRONIC BRONCHITIS

THOROWGOOD

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1897.

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AND

CHRONIC BRONCHITIS.

BY

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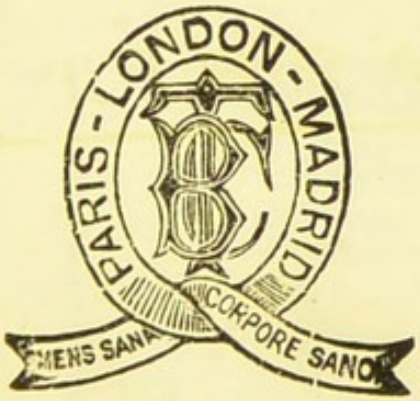
A NEW EDITION

OF

NOTES ON ASTHMA AND BRONCHIAL ASTHMA.



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NOTICES OF PREVIOUS EDITIONS OF NOTES ON ASTHMA.

'Chapter on bronchitic asthma as well as chapters on the spasmodic forms may be read with great advantage.'—*Lancet.*

'Contains a good deal of information.'—*Medical Times and Gazette.*

PREFACE.

In the present work I have reproduced much of what has been already published in the later editions of 'Notes on Asthma,' and in the Lettsomian Lectures on bronchial asthma given before the Medical Society of London in 1879.

The work is based upon such notes of the various forms of asthma as I have been able to make during thirty years' experience among patients at Victoria Park Hospital and elsewhere.

The cases recorded range themselves in two divisions, the first comprising instances of pure spasmodic asthma, due to constitutional and hereditary diathesis, or to individual susceptibility to some specific exciting cause. Among these, the purely nervous form of asthma can be well studied.

In the second larger division may be placed instances of complicated asthma; that is to say, asthma in the sense of a spasmodic or paralytic neurosis, engrafted upon such pulmonary diseases as chronic bronchitis, emphysema of the lungs, or a complication of both these maladies.

Many new and trustworthy remedies for asthma have been brought to notice within the last ten years, and I have endeavoured to mention such as I have found of real value.

While making the treatment of asthma by diet and medicine a prominent matter, I have not gone into the special operative treatment of nasal polypi, and vascular and adenoid growths, which are so often the reflex centres from which the asthma starts. Recent works by E. Schmiegelow of Copenhagen, and Drs. De Havilland Hall and Ball, will be found abounding in the latest information on such points.

A special chapter (X.) is given to gout in connection with asthma, as the recognition of the gouty diathesis in a bronchitic or asthmatic patient is of great practical importance.

The last chapter contains hints as to the management of hay asthma and summer catarrh. Much has been added to our knowledge of these disorders of late years, and progress made in methods of palliation and cure.

WELBECK STREET,
CAVENDISH SQUARE,
July, 1894.

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ASTHMA AND CHRONIC BRONCHITIS.

CHAPTER I.

Early opinions on the nature of asthma--Observations of Floyer, Cullen, and Bree—Proof of the spasmodic nature of the attack, and evidence of contraction of bronchial muscles—Contradictory opinions as to the state of the chest during the fit—Expiratory and inspiratory dyspnœa—Young people may grow out of asthma—Congestion secondary to the spasm of the bronchi.

COMMENCING with a short account of the history of asthma, it will not be without interest to trace the views held by some painstaking observers of old, who lived before the days of auscultation, and before the discovery of reflex and excito-motory movements. Modern research in experimental physiology, diagnosis, and pathology has done great things in solving the causes of many kinds of breath difficulty formerly regarded as simple asthma; but there still must exist in our nosology such a complaint as spasmodic bronchial asthma, an independent and essential disease, dynamic in nature, and not of necessity connected with any structural or inflammatory lesion.

Asthma, in the sense of dyspnœa, or difficult breathing, has been described by Hippocrates, Galen, and Celsus. The last of these writers, speaking of asthma, says:

'Est etiam circa fauces malum, quod apud Græcos aliud aliudque nomen habet. Omne in difficultate spirandi consistit; sed hæc dum modica est, neque ex toto strangulat, δυσπνοια appellatur. Cum vehementior est, ut spirare æger sine sono et anhelatione non possit ἄσθμα; cum accessit id quoque, ne nisi recta cervice spiritus trahatur ὀρθόπνοια.'

From these lines we see that the Greeks, as quoted by Celsus, confined the term *asthma* to a difficulty of breathing attended with sound, and more severe than the breath-struggle called *dyspnœa*. Asthma seemed to imply a mean of breath difficulty, while dyspnœa and orthopnœa were terms applied to the two extremes. As knowledge and observation progressed, the intermittent character of the breath difficulty of asthma was duly observed and insisted on; and we find Boissier de Sauvages, in his 'Genera Morborum' (1768), defining asthma as 'difficultas spirandi *periodice* recurrens, chronica.'

We now know that the intermitting or paroxysmal character of a dyspnœa is not enough to mark it at once as spasmodic bronchial asthma. We find paroxysmal dyspnœa to be a sign of very different diseases: it may be associated with grave pathological changes of incurable kind in organs other than the lungs, as, for example, the brain, the heart, or the kidneys.

Sir John Floyer wrote on asthma in 1698, and recognised contraction of the bronchia as the cause of asthma. Like many others who have written on asthma, he was himself a great sufferer from the malady, and he often referred the chief seat of his distress to the diaphragm, which seemed to him rigid and spasmodically drawn up by some contractile force within the thorax; and this force he considered to be the air-tubes

and lungs, contracted by an inflation of the membrane lining the chest and covering the lungs.

The second edition of Sir John Floyer's work was published in the year 1717. I give some of his statements and theories, as indicating the condition of knowledge at that time.

He says: 'First I shall observe that that is the most useful notion of asthma from whence we can take our indications for practice, and which is deduced from an exact and full sensible history of the disease.' He then continues: 'I have assigned the immediate cause of the asthma to the straitness, compression, or constriction of the bronchia; and in the continued asthma the causes must be constant, as dropsy, tuberculum, etc. The return of periodic asthma depends on the defluxion of humours on the primæ viæ. Thus, the old notion of the asthma being a defluxion of serous humours is certainly true, because evident to our senses in the evacuation of serosities.'

'Some,' continues Floyer (p. 43), 'express their feeling, during a fit of asthma, as if the lungs rose, and were drawn upwards to choke them. Contraction of the vesiculæ is very probable, because the bronchia are contracted, and the vesiculæ have the same muscular fibres to help expiration, by which they may be drawn so up as not to admit the air.'

The motion of the chest and lungs Floyer ingeniously compares to that of a bellows. 'We can,' says he, 'move the bellows easily; but suppose a bladder tied within the bellows over the nozzle, so as to receive the air and suffer none to get into the cavity of the bellows, it will follow that in a perfect stoppage of all the entrances of air the bellows could not be opened; and if no more entered than may be contained in the bladder,

the bellows would be opened but a little way, and would inspire difficultly. So it appears in the business of the asthma, the inspiration is difficult and laborious, because but little air can be admitted into the contracted bronchia, and the vesiculæ drawn up. This puts the scapular and intercostal muscles and diaphragm upon a violent endeavour to press in the air and open the lungs, which *nisus* authors have mistaken, and supposed the pneumonic muscles, especially the diaphragm, to be convulsively affected; but it may easily be apprehended that the diaphragm cannot press the viscera downwards to enlarge the breast if the air cannot be admitted into the lungs to follow its depression and fill the cavity of the breast; and this is the true reason why the diaphragm cannot move in the asthmatic fit. The contraction and stiffness of the lungs during asthma causes a catalepsis or rigidity of the diaphragm—the part most unjustly accused of this tyrannic oppression.'

Thus we see that Floyer, while fully cognisant of the rigid state of the diaphragm during a fit of asthma, does not agree with those who believe a tonic spasm of the diaphragm to be the essential cause of asthma. Floyer considered the wheezing noise in expiration during asthma to be due to narrowing of the smaller air-tubes in consequence of contraction of their muscular fibres. That this symptom is not due to phlegm in the tubes, he says, is evident, because the hysteric, who have no phlegm, wheeze much.

Floyer was in error in assuming the presence of muscular fibre in the wall of the pulmonary vesicle. The small bronchi are muscular and elastic—the cells are elastic, but not muscular. What Floyer meant by inflation of the membranes around the lungs by humours, I take to mean bronchial œdema and congestion; but that

he regarded the contraction as brought about by mechanical pressure rather than by nervous influence seems clear, from his saying that certain writers of his day, Van Helmont and Dr. Willis, were wrong in regarding asthma as a convulsion, to be treated by anti-spasmodics, hot tinctures, gums, volatile salts, and sulphur medicines. The proper method is by evacuants, and remedies calculated to promote secretion and effect the discharge of humours —anti-congestive rather than anti-spasmodic treatment.

Passing on from Floyer to Dr. William Cullen, the distinguished nosologist of Edinburgh, we find him, in his 'Synopsis Nosologiæ Methodicæ,' published in 1772, defining asthma as 'spirandi difficultas, cum angustiæ in pectore sensu, *per intervalla* subiens.' Cullen appears to have regarded spasmodic asthma as essentially due to constriction of the bronchial muscles, and in his nosology he divides asthma into three groups:

First. Idiopathic asthma, of which kind he enumerates eight varieties.

Second. Symptomatic asthma, two varieties, viz., 1. Gouty, asthma arthriticum; 2. Syphilitic, asthma venereum.

Third comes a long list of asthmas, dyspnœas, and orthopnœas symptomatic of cardiac and pulmonary difficulties and obstructions.

The belief held by Floyer and Cullen, that the spasm of bronchial asthma was due to contraction of the smaller bronchial tubes, receives plenty of support in the present day. The late Dr. Hyde Salter has expressed himself strongly and decidedly as an upholder of the bronchial constriction theory, and among other celebrated men of the same way of thinking I may name Trousseau,

Romberg, Bergson, Biermer, Théry, Williams, Walshe, Fuller, Watson, Radclyffe Hall, Gerlach, MacGillivray, and others.

There comes next to be noticed, in the history of the growth of our knowledge of asthma, the theory put forward and supported by Dr. Robert Bree in 1801. Dr. Bree, when in considerable practice as a physician at Leicester, was attacked so severely by paroxysms of asthma, that in 1793 he felt compelled to abandon his profession and accept a commission as captain in a regiment of militia. Under these altered conditions of life Dr. Bree lost his asthma—to return, however, some years later with great severity, rendering the latter portion of his life a period of constant suffering, and at times of the most agonizing distress. In 1796 Dr. Bree resumed the practice of his profession in Birmingham, and while there he published his treatise entitled 'A Practical Inquiry into Disordered Respiration, distinguishing the Species of Convulsive Asthma, their Causes and Indications of Cure.' This work reached a fifth edition, and conferred upon its author a very high reputation, while it brought him also considerable practice. In 1833 Dr. Bree died at his house in Park Square, Regent's Park, at the advanced age of eighty years. The great point in Dr. Bree's theory of the cause of the asthmatic paroxysm was the presence in the air-tubes of some peccant irritating matter which excited the lungs powerfully to effect its discharge. When, by the expulsive efforts of expectoration, the peccant mucus was thrown off, then the spasm in the air-tubes came to an end, the desired object having been attained in the expulsion of the mucus.

He who, in the present day, is the nearest exponent of Dr. Bree's theory is Leyden. This observer found, in

the viscid gray mucus expectorated on the subsidence of a fit of asthma, brownish masses of cells undergoing granular degeneration, and among these could be made out colourless octahedral crystals soluble in hot water and in acids and alkalies, but not in ether, and consisting probably of a substance analogous to mucine. Leyden believes that these sharp crystals irritate the peripheral extremities of the vagus nerve, and produce reflex spasm of the bronchial muscle.

Attempts to prove the connection by experiment appear to have failed, and the presence of these angular crystals is not peculiar to the sputum of asthma, for similar crystals have been found in the expectoration of persons suffering with ordinary catarrh and croupous bronchitis.

Persistent mechanical irritation of the air-tubes by the inhalation of various kinds of dust will produce irritability, swelling, and various degrees of thickening in the lining membrane of these tubes; but asthmatic paroxysms are by no means a constant accompaniment of these pathological conditions.

Workers at dusty employments, millstone-dressers, knife-grinders, and chaff-cutters, get their lungs greatly irritated by the dust and fine steel particles they inhale while at work, and the effect is very obstinate chronic bronchitis. Asthmatic paroxysms may co-exist, but such co-existence is certainly not the rule, and depends on the presence of a nervous element in the case. In six cases of mechanical bronchitis, detailed by Dr. Headlam Greenhow, I find no mention of asthmatic attacks. The tendency of the disease was towards change of structure, rather than to nervous spasm. The authority just quoted, in speaking of the asthmatic complications of the so-called 'dry catarrh' of Laennec, attributes the

dyspnœa partly to narrowing of the bronchi by swelling of their lining mucous membrane, and partly also to spasm of these tubes. That irritation leading to local congestion of the pulmonary mucous surfaces may become the cause of an acute attack of dyspnœa I do not doubt; but before entering further upon this question, I wish to place before the reader the reasons that make me uphold the doctrine of the existence of purely spasmodic bronchial asthma, dynamic in nature and symptomatic of nervous perturbation in the system; at times centric and emotional, at other times reflex, in its mode of origin; capable, too, of artificial production by direct irritation applied to the trunk of the vagus nerve.

The reasons that prevail to maintain in my mind the conviction that we can have severe dyspnœa of purely nervous origin may be thus arranged:

First. The absence of any notable change of structure in the lungs of those who may die. The asthmatic patient while in a fit presents abundance of symptoms distressing enough to endure or to witness; and yet when things seem to be at the worst, and the patient almost at his last gasp, a remission comes on, the spasm yields, air enters the lungs, and the attack subsides, coincidently often with access of cough and mucous expectoration.

During the intervals between his attacks the patient probably enjoys fair health, and, as a rule, lives to a good age; should he, however, be cut off prematurely by death, what do we find as the morbid anatomy to explain the well-marked symptoms seen during life?

Practical experience may answer this question in the words of the late Sir T. Watson, uttered years ago in his lectures: 'The bodies of asthmatics have often, on being examined after death, presented no vestige what-

ever of disease, either in the lungs or in the heart—evidence that the phenomena attending a fit of asthma may be the result of pure spasm.'

So, too, the late Dr. Hyde Salter, in his classical treatise on Asthma, says: 'A man may have been known during his life to have had attacks of asthma, he may have seemed over and over again almost *in articulo mortis* from want of breath; and yet, if death from some other cause gives an opportunity of examining his lungs, they may be found apparently in every way healthy—no trace of inflammation or its products, the vesicular structure perfectly normal, the passages leading to it lined by a healthy and unchanged membrane, the cavities of the pleura free from all abnormal products, their surfaces smooth and apposed, the tissue sound. The disease shows no cause, and has left no trace either in the respiratory or circulatory systems—in fact, no trace anywhere. Where, then, shall we locate it? What is its starting-point? We may, I think, lay it down as a rule that all those diseases that leave no organic trace of their existence produce their symptoms through the nervous system' (p. 30, second edition).

While, then, it is possible for a person to have violent attacks of spasmodic asthma without there being present any obvious structural change in the lungs, yet, after awhile, the serious perversion of lung function, caused by repetition of the fits, cannot but lead to some alteration of tissue, and the microscope will probably show some granular or fatty degeneration in the air-cells of the lung, though to the naked eye appearances may be normal.

In cases of asthma developing after the age of forty, it very commonly happens that there is atheromatous disease of the vessels connected with the heart. In

these cases there will usually be noted very marked accentuation of the second cardiac sound just to the left of the sternum. These are the cases, too, in which we meet with attacks of angina, varying in severity. Dr. Thomas Young, at the age of fifty-six, was attacked with asthma in the month of February, and died in the May following. After death the disease proved to be ossification of the aorta (Roll of College of Physicians, vol. iii.).

Second. Since morbid anatomy tells us but little in explanation of the cause of spasmodic asthma, we must seek our knowledge from the teachings of physiology, and from the observed phenomena of the asthmatic paroxysm, seeing that our present purpose is entirely with spasmodic asthma, uncomplicated with lesion of lungs, heart, or other organ.

The essence of a fit of spasmodic asthma consists in tonic spasm of the bronchial muscles, these bronchial muscles being the unstriped contractile fibres which encircle the air-tubes of the lungs, just as the muscular fibres of the intestines surround those tubes with a contractile force.

The larger bronchial tubes have their cartilaginous rings as elastic spring-openers ; the smaller tubes, lying nearest to the vesicular parts of the lung, have no cartilaginous rings, but are entirely muscular. Laennec Reisseissen, and Gratiolet, have detected muscular fibres in air-tubes less than one line in transverse diameter. The contractility of these fibres under the influence of electrical, chemical, and mechanical stimuli was proved in a series of ingenious and conclusive experiments by the late Dr. Williams many years ago.

Longet and Volckmann have shown how irritation of the vagus nerve will produce contraction of the circular

muscle of the bronchial tubes with force sufficient to blow out the flame of a candle.

Biermer thinks that the bronchial muscle in its spasmodic contraction may form a sphincter-like occlusion more readily overcome in inspiration than in expiration, and that thus the escape of air from the pulmonary alveoli is prevented.

The obvious result of this state of things would be over-distension of the air-cells and production of emphysema, and this is what we constantly find to occur in cases of asthma.

Biermer observes that the bronchial muscles antagonize the muscles of inspiration, and so prevent over-distension of lung. When, by frequent attacks of spasm, the nutrition of the bronchial muscles begins to fail, they no longer are able to antagonize the force of inspiration, or, by their contraction, to assist expiration, and thus that permanent condition of lung distension known as emphysema is brought about.

It seems, therefore, that the bronchial muscles act during inspiration and expiration. They act with irregular vehemence in cough; with clonic spasm in whooping-cough; with tonic spasm in asthma.

The rapidity with which an attack of asthma may come on is evidence of its neurotic character.

My own observation has shown me that a most severe fit of bronchial asthma, requiring the inhalation of chloroform for its relief, may develop in the space of two minutes. In another case, a youth going up for examination at Burlington House is breathing with comfort, when the anxiety due to the non-arrival of the carriage to convey him to the place of examination causes a speedy attack of asthma, which subsides as the carriage draws up at the door.

Dr. Chowne reported a case where a dash of cold water over the foot invariably and immediately induced a paroxysm of asthma in a gentleman fifty years old. Dr. Salter affirms that he has seen severe asthma developed in as short a time as thirty seconds.

I have observed a rapid development of asthma follow at once on the application of diluted powder of tannin to the fauces.

In 1834 John Ross reported a sudden and severe paroxysm of asthma, brought on by the smell of a parcel of new feathers.

The late distinguished French physician, Trousseau, who was the subject of inherited asthma, used to relate how the worst attack of asthma he ever experienced came on in the course of a few minutes, with intense dyspnœa and oppression, relieved in eight or ten minutes by smoking a cigar. Trousseau was at the time of his seizure up in the hay-loft watching his coachman, whom he suspected of dishonesty, measuring oats, and he attributed his severe attack to emotional agitation. 'It could not have been the dust of the oats,' says Trousseau, 'for I have often been exposed to far more dust, and yet had no asthma.' The profuse running from the eyes and nose, however, that Trousseau had make me think his seizure was catarrhal asthma due to inhaling dry pollen in the oat-dust; this might have caused the profuse coryza; the asthma, doubtless, was emotional and spasmodic.

Trousseau gives a good example of the nervous nature of asthma in the case of the brother of the Chancellor of the Chamber of Peers in Paris, who used to free himself at once from his difficult breathing by having four or five bright lights brought into his apartment. A bad asthmatic, whom I have known for years, declares to me

that the contemplation of himself in a looking-glass gives relief to some of his worst attacks. With some, the mere presence of a cat, a dog, or a hare-skin, in a room, at once brings on asthma.

Walshe gives a striking instance of asthma occurring as a primary neurosis of emotional, or centric, origin in the case of a man, very liable to spasmodic asthma, who always carried in his pocket some cigarettes made of belladonna and stramonium. One day, at a distance from home, he suddenly found he had forgotten his cigarettes. Instantly he had a violent paroxysm of asthma.

Salter has noticed asthmatic seizures to alternate with those of epilepsy; and Eulenberg has seen paroxysmal breath seizures occur in alternation with hemicrania and angina pectoris.

The great relief to the asthmatic fit often obtained by the inhalation of the fumes of tobacco, stramonium, and belladonna further goes to prove the neurotic nature of the attack.

The musical wheezings heard in the air-tubes of a person during a fit of asthma are, as Salter says, positive evidence of bronchial contraction, and the sudden way in which these wheezy sounds may shift from one part of the chest to another is proof that the contraction is spasmodic, and not due to mucous congestion or œdema. 'Thus,' says Salter, 'we see by evidence as certain as sight, that in asthma bronchial spasm must, and does, exist, and that no other conceivable supposition will explain the phenomena.' When considering the causation of asthma some time ago, I got the idea that if the lung be contracted air must be squeezed out of it like water from a sponge, and that then we ought to have impaired chest resonance on percussion. I found, however, such

loss of resonance to be the exception rather than the rule. Dr. Walshe, in the fourth edition of his work on the lungs (p. 548), says: 'The gradual evacuation of the supplementary, and in some measure even of the residual, air which takes place in both lungs during the fit of asthma, slightly impairs the resonance on percussion.' 'This,' says Dr. Walshe, 'I repeatedly ascertained in a girl named Harmer, a hospital patient; but, on the whole, this sign is rarely to be established.' Investigations of my own, with special reference to this question of impaired chest resonance during the asthmatic fit, make me say that the sign is a very rare one. The bronchial muscle may form a sort of sphincter round the opening of the air-cell. Air is slowly admitted through the narrowed bronchus into the cell, from which it does not escape; thus the cells get distended while the bronchi are contracted, and we must admit that the simile, wherein the asthmatic lung is likened to a squeezed sponge, is not quite a correct one. I can understand how, as a result of contraction of the bronchial muscle, inspiration and expiration may both be impeded and imperfect. Generally, according to observation, and experiments of MacGillivray, the expiratory act is the one specially impeded, the result of such impediment being over-distension of the air-cells, and the gradual development of emphysema. This over-distension of the air-cells takes place most readily in persons of mature years, causing tightness in the upper thorax, with tympanitic, bandbox-like note, elicited by percussing the chest wall. Lately a good deal has been said as to the inspiratory or expiratory character of the dyspnœa during a fit of spasmodic bronchial asthma, and this is a question well worthy of study in its bearing on certain modifications of the asthmatic paroxysm. To me it

appears that both respiratory acts are impeded more or less. Sometimes inspiratory difficulty is most urgent; at other times, and in other cases, expiratory effort is pronounced and unmistakable. My own reports of cases show me one group of patients who unhesitatingly refer their breath difficulty to the act of inspiration; others say that their sufferings during the paroxysm of asthma are so intense that they hardly can tell whether inspiration or expiration is most laborious. A third group, composed of emphysematous asthmatics, often spontaneously affirm that the desire they have is to get the air out of the chest rather than to get it in.

In proportion as lung emphysema is developed, especially if slight bronchitis co-exist, so does the expiratory dyspnœa obtain the ascendancy. In young persons, where spasm is marked without much emphysema. inspiratory dyspnœa is often most severe and distressing; and not long since I saw in the case of a middle-aged man, who had long been afflicted with most severe attacks of almost asphyxiating asthma, a good example of inspiratory dyspnœa. 'Decidedly,' said he, 'my difficulty is in inspiring.'

In this case, I observed thoracic distension was in no way marked, and on listening to his chest six hours after one of his very bad attacks, I could hear no sibilant expiratory wheezings, and expiration seemed free. I further noticed that the percussion resonance did not come up to the normal standard of clearness, and this imperfect resonance of chest after a fit was remarked on by the patient himself. The patient was a strong vigorous man, with no sign of degeneration of tissue, and his asthma resembled that which one observes in quite young persons. I have been struck with the fact, just exemplified, that on examining the chests of patients of the

class described, where inspiratory distress is intense, and chest distension by no means marked, I have failed, on the day following a bad night of asthma, to find about the chest any of that prolonged sonoro-sibilant expiration with which we are so familiar when we listen to the chest of an asthmatic shortly after his fit. Another point I have investigated is the position of the diaphragm in these cases, and I have found it to be drawn up rather than pressed down. The shoulders of the patient are nearly always high, for the thorax is drawn powerfully up by the muscles of inspiration. The normal movement of the ribs outwards and forwards does not take place, so that true divergence of ribs and expansion movement is not appreciated by the applied fingers. I would here observe how a great inspiratory effort can be made by drawing up the thorax in the way just described; and also how a similar effort can be made, of a more abdominal character, in the performance of which the diaphragm descends and the abdomen protrudes; but in this last effort the lung must be fully expanded, and if dyspnœa occur it will be more of an expiratory than of an inspiratory character. Abdominal diaphragmatic respiration I note to be a matter of difficulty with many asthmatic people.

Either of these conditions of thorax and abdomen may obtain in cases of asthma. In each case the muscles of inspiration act to aid that elastic resilience of the chest-wall which Dr. Douglas Powell has demonstrated to be an active force in ordinary tranquil inspiration. The embarrassed breathing and asthma are due to want of corresponding action between the lungs and the thorax, for these organs have their expansive power limited by the spasm of the bronchial muscle and cannot follow the chest-walls as they expand. One is reminded of Floyer's

simile of the bladder tied within the bellows (see p. 11). The lungs are in arrest of action, and in the first case, where chest and diaphragm are drawn up, the air is in a great measure evacuated from the lower part of the lungs, and is kept out by the bronchial stricture; hence the straining inspiratory effort, while the pulmonary spasm causes a sense of tightness or tearing in the upper chest; and here, indeed, air may be held pressed into the apices of the lungs, just as it is pressed into these parts by the violent expiratory efforts of coughing. In the other case, where the diaphragm is down and chest overfull with air, we get very prolonged expiratory wheezings, the bronchial spasm retarding expiration. In the first case the condition is one of permanent *expiration* with desire to *inspire;* in the second the chest is in a state of permanent *inspiration*, and the desire is for *expiration*. I shall hope shortly to follow these views a little further when treating of emphysema of the lung. Placing them as simply as I can, I make no reference to imperfect aëration of blood in the lungs as a possible cause of determining, in a reflex way, powerful inspiratory efforts; and speaking of inspiratory difficulty, I exclude all laryngeal or tracheal disease in the way of congestion or chronic stenosis of these parts. I have endeavoured, by an analysis of the notes of a number of cases, to illustrate the varying conditions of the chest and abdomen during the asthmatic fit, and thus to explain how it is that authors differ so decidedly in the descriptions they give of the state of the thorax during such fit.

This same impression of want of unanimity of description seems to have been made on the mind of Dr. Berkart, a recent writer on asthma, and he has placed the various descriptions so well together that I cannot

do better than quote them just as they are given, with the authorities:—

Respiration retarded to from 9 to 7 per minute (Salter, 77).

The lungs are unusually collapsed within the thoracic cavity and the parietes drawn in (Williams, 91).

Inspiration is difficult; expiration, short, easy, superficial (Bergson).

Thorax sounds dull on percussion (Williams).

While inspiration shows nothing that varies from an ordinary powerful and somewhat forced effort, expiration presents the picture of a most laborious and tormenting, and at the same time fruitless, struggle (Bamberger, Ziemssen, iv. 562).

Respiration augmented to 40, 60, or 80 per minute (Canstatt, Ferrus, Wunderlich).

The chest remains distended, its walls are kept fixed in the extreme inspiratory position, such enlargement involving all the diameters of the thorax (Salter, 76).

Expiration mainly is impeded, the patient labours 4 to 5 seconds to empty his chest (Biermer).

Percussion induces a hyperresonant note (Biermer).

Inspiration is violent and painfully ineffective; expiration is much prolonged, but unaccompanied with notable anguish (Walshe).

Some observers speak of the abdomen as distended, others as retracted; the fact being, as I have shown, that sometimes one condition, sometimes the other, obtains.

Some years ago, it appeared to me that sufficient attention had not been paid to the part taken by the diaphragm in the mechanism of asthma. That this muscle is much concerned in the dyspnœa of old emphysematous persons, I fully believe; but I cannot agree with Wintrich and Bamberger, who deny the influence of bronchial stricture in producing asthma, and attribute the seizure to tonic spasm of the diaphragm. True diaphragmatic spasm is seen best in some forms of hysteria, and it is marked by short hurried inspiration, short pause, and rapid expiration. In a case of this description, shown to me by my house physician, Mr.

MacDonald, the respirations were as many as eighty in the minute; a short quick movement at the epigastrium was observed; auscultation revealed no abnormal sound. The patient was a young woman, and had had similar attacks before during the last few years. Bamberger believes, with Wintrich, that with a depressed position of the diaphragm there can be no bronchial stricture. Wintrich, moreover, says it is impossible to explain the enlargement of the lungs with increased air contents by a spasmodic contraction of the bronchial muscles. Bamberger further says that bronchial spasm is in the highest degree improbable, for in such case inspiration and expiration, especially the former, must be laborious and prolonged. Against these statements we have the fact, testified by several highly competent to judge, that inspiration and expiration in asthma are both very laborious acts; and we find Biermer stating, most correctly as I think, that a depressed condition of the diaphragm and acute pulmonary distension are quite compatible with bronchial spasm. I have myself during the last few years seen many cases of most severe asthma, with every evidence of bronchial spasm, where the chest was large and round, and the diaphragm undoubtedly depressed. During the intervals of actual spasm very little air movement can be heard on listening to the chest of such patients, and this is an unfavourable sign.

Acute pulmonary dilatation follows on acute obstruction, just as chronic pulmonary dilatation and emphysema follow on obstruction of air-tubes by old bronchial catarrh.

Before I had an opportunity of studying the observations of the writers just quoted, I had given up my idea of diaphragmatic spasm as a cause of asthma, while I

am convinced that a kind of inertia, or partial paralysis, of the diaphragm may have a good deal to do with the expiratory dyspnœa of old emphysematous persons. The condition is one often very notably relieved by massage judiciously applied along the border of the diaphragm.

From what I have observed in cases of spasmodic asthma coming on very suddenly, and sometimes brought on by some great expiratory effort, such as a fit of violent coughing or laughing, it seems that the thorax is drawn up and fixed ; but on looking at the lower part of the thorax, quick, short, and very limited movement of the diaphragm and lower ribs may be observed, by which respiration is kept going and life maintained. The distress in cases of this kind, often met with in young persons, is markedly spasmodic and most severe, so that chloroform inhalation is often the only agent that gives effectual relief.

The following is a typical case of this form of asthma :

A young man in good health had his first attack of asthma take him quite suddenly after a fit of excessive laughter. Here was an example of spasmodic arrest of breathing after a complete expiration. On another occasion I saw this youth pass, in the course of two minutes, from sudden exposure to cold to the surface, into an intense paroxysm of asthma, and during this seizure I noticed the state of the chest. There was great drawing up of clavicles and thorax, with fixation of these parts. The abdomen, at xiphoid cartilage, was powerfully retracted, and the diaphragm elevated. Respiration counted 64 per minute ; pulse, 110, very small. The breathing act seemed carried on by a slight rapid and very limited movement of the diaphragm and

lower ribs. There was no laryngeal difficulty; chest resonance deficient in clearness; expiration wheezy, jerky, and prolonged; inspiration short, and quickly followed by expiration. The inhalation of chloroform soon gave relief to the spasm, and the patient was released from his fixed bent position over a table, which he assumed on the fit taking him.

This young man found, like many other cases that I have observed, that when he was able to cough and get up some mucus he felt better; and a pill of pil. hydrargyri and pulvis scillæ gave notable relief, apparently by promoting expectoration. Dr. Bree would explain this by saying, 'Your pill fetches up the irritating mucus from the lungs, and so does good to the asthma;' others would very reasonably attribute the benefit derived from the pill to its relieving congestion of the bronchial mucous membrane. Against the exclusive truth of the theory of congested mucous membrane as the sole cause of dyspnœa, I would urge that the congestion and subsequent mucus flux result from the pressure put upon the capillary vessels by the spasm of the bronchial muscles. The great suddenness of the invasion of asthmatic dyspnœa, compelling the patient to leap from his bed and rush to the open window, and the speedy relief often afforded by inhaling the vapour of ether or chloroform, or the smoke of burning tobacco or stramonium, point to nervous spasm rather than to acute congestion. The spasmodic constriction of the bronchial muscle induces stasis of circulation and congestion, and if flux and secretion can be determined, the patient feels much relief. Thus I have often observed the spasm of asthma to subside when bronchitis comes on and causes free secretion; and people say, 'When I get bronchitis my asthma goes away.' In the dynamic form of bronchial

asthma, illustrated in the case just noted, there is to all appearance, as well as on the emphatic declaration of the patient, marked inspiratory dyspnœa. Seeing how often these intense fits of bronchial spasm follow on an exhaustive expiratory effort, one can comprehend the inspiratory character of the breath difficulty. Previous expiration has pumped the air out of the lower part of the lungs, and forced some up into the apices, just as we see in the expiratory effort of coughing; here this air is held, for the thorax is raised and drawn up in powerful inspiratory effort, and the tension in the upper chest becomes very distressing; meantime, the retracted condition of the lower part of the lung causes the diaphragm to rise up with the thorax. Patients under the influence of this form of bronchial spasm have volunteered to me the statement that they feel as if their lungs were drawn up—drawn up to choke them, as Floyer used to say. A young man described his fit to me also in these words: "Cold air seems to draw together and contract my air-tubes, and then I pass into one of my bad fits;" and the fits in this case were as intense as any I have met with, setting at defiance the best-planned remedies of numerous physicians. It is in the young we often see these very severe attacks of bronchial spasm. Dr. Fuller says that the most frightful paroxysm of asthma he ever saw was in a child aged thirteen. Salter describes an alarming attack in an infant not two years old, and I expect not uncommonly the bad pulmonary attacks of infants during dentition, if carefully investigated, would be found to have more of the element of spasm than of inflammation about them. The drawing up of the diaphragm was well exemplified in the instance of an asthmatic little boy who used to gasp out, 'See how hollow I am!' as he pointed to his retracted epigastrium.

With respect to this elevation of the diaphragm, I find that Wood, of Philadelphia, describing a fit of asthma, says: 'A hollow in the epigastrium is produced by the unusual elevation of the diaphragm, while expiration is much less difficult than inspiration.' Walshe, too, already quoted, says: 'Efforts at inspiration, convulsively violent and painfully ineffective, are accompanied, in the purely dynamic form of the disease, with sinking of the epigastrium, falling in of the lower part of the sternum, and elevation of the diaphragm. Expiration in these cases is prolonged, but unaccompanied by notable anguish (p. 546, fourth edition).

In these cases of asthma in young persons not due to whooping-cough or antecedent bronchitis, and very prone to come on after an expiratory effort, the prognosis should be favourable; for though inspiratory spasm is alarming, with great sensation of internal constriction or cramp within the chest, yet the chance of co-existing emphysema is not great, and we may see in impairment of percussion resonance, elevation of diaphragm and absence of excessive chest distension, evidence on which to found a hopeful prognosis.

The fact—and of this I become more and more convinced—that young people do grow out of this uncomplicated spasmodic asthma, or, better still, perhaps, that they can be cured of it, if it be due to some reflex irritation—as worms in the bowels, or enlarged bronchial or tracheal glands in the chest—shows that no high degree of emphysema can have been produced. 'The asthma of children,' says Riegel, 'often ceases spontaneously after a short time, or else at the period of puberty' (Ziemssen, iv. 566).

The theory of Lebert, that the spasm beginning in the bronchial muscles, and thus narrowing the tubes, causes

a great excess of inspiratory effort to force the air through the constricted bronchi, and then that this increased respiratory stimulus, reflected to the medulla and respiratory centres, induces reflex spasm of the diaphragm through the agency of the phrenic nerve, is ingenious and worthy of notice. The theory appears to accord with the fact that we see cases of what I call ingravescent or culminating asthma, slight at first, but getting gradually worse: want of air increases till a state bordering on true apnœa is produced; then come on most violent inspiratory efforts, and every auxiliary muscle is called into violent action. The power of these extreme inspiratory efforts was demonstrated by the experiments on asphyxia made before the Royal Medico-Chirurgical Society a few years ago. These facts show how wise it is to try and cut the asthmatic fit short *in initio* by antispasmodic inhalation in the early stage. Experienced asthmatics know this well. '*Obsta principiis*' is their motto.

The theory of Weber and Störck, already casually referred to, that asthma is due to tumefaction of the bronchial mucous membrane in consequence of dilatation of the bloodvessels by vaso-motor nervous influence, is full of interest and importance, especially in connection with certain varieties of asthma and catarrh. Störck says he has seen the mucous membrane of the larynx, trachea, and right bronchus in a state of hyperæmia during an attack of asthma. To see as much as this in the windpipe of an asthmatic during his fit reflects credit on the patience and perseverance of observer and observed, and I am inclined to think that anyone who can manage to keep the laryngeal mirror in the throat of an asthmatic for but a short time will be pretty sure to obtain evidence of congestive hyperæmia. Be this as it

may, there is the oft-made complaint by asthmatics of tightness and obstruction in the nose, the tendency often to profuse nasal flux, and the liability at times to the formation of mucous polypi in the nasal passages, all pointing to a congestive hyperæmia of these parts.

My reasons for believing the congestive hyperæmia and flux to be secondary effects of nervous spasm have been already set forth. Biermer, whose views on the nature of asthma seem to be fully in accord with the results of experiments and the observation of clinical facts, and who, like myself, is a supporter of the bronchial spasm theory, regards a fluxionary hyperæmia of the bronchial mucous membrane as quite a possible cause of asthma.

I agree in this, as in most other points, with the excellent observer just named; and, in considering the therapeutics of asthma, it is well to be mindful of the condition of bronchial hyperæmia, be it primary or secondary. Furthermore, for purposes of treatment, it is of importance to discover whether the breath difficulty be one of inspiration or of expiration.

CHAPTER II.

Influence of vagus nerve on contraction and expansion of lung—Reflex asthma—Skin affections and asthma—Nasal polypi and chronic rhinitis—Adenoid growths in pharynx—Gastric, intestinal and uterine disturbances as centres of reflex asthma.

In this chapter a few words will be said on reflex asthma and some of the centres from which it may arise. Reflex asthma is non-inflammatory, causes no persistent increase of temperature, and may pass away as suddenly as it came on. Darwin, in his 'Zoonomia,' says that *asthma convulsivum* has the same character as all other cramps and epilepsies, and that it can originate from nearly all distant parts of the body.

Paul Bert, Traube, and others, have demonstrated how the bronchi become constricted and the respiration arrested by irritation of the pneumogastric or vagus nerves also of those supplying the Schneiderian mucous membrane of the nose.

The arrest is more easily obtained during expiration than inspiration, and it is well known how liable asthmatic people are to an attack after an extreme expiratory effort, as in a fit of coughing or laughing.

Dr. Auld, in his recent work on bronchitis, p. 81, observes how Roy and Graham Brown found that stimulation of one vagus with an induced current caused powerful contraction of the bronchi of both lungs. Section of one vagus caused a marked expansion of the

bronchi of the corresponding lung. From their experiments the authors conclude that the vagi nerves contain constricting and expanding, or inhibitory, fibres.

Thus contraction or expansion and distension of lung as in emphysema may be due to the influence of the vagus nerve.

At page 89 we find Auld saying: 'Any unbiased observer will admit that a spasmodic constriction of the bronchial muscles is not only possible, but, so far as our present knowledge goes, is the only legitimate explanation of the chief phase of the asthmatic paroxysm.' That congestion and mucous flux follow upon the spasmodic state is the experience of most, and then the case becomes one of moist or humoral asthma.

In considering some of the starting-points of reflex asthma we may begin with the skin.

Sudden chilling of the surface of the body may at once cause an asthmatic fit. Numerous cases are recorded in which severe attacks of asthma have ceased when a cutaneous eruption such as eczema or urticaria has appeared on the body. Some have thought that actual eruption of urticaria or eczema may exist in the bronchi of asthmatic persons, causing their fits of difficult breathing, but proof of such a condition is not forthcoming.

Stokes of Dublin gives some remarkable instances of the rapid subsidence of bronchial irritation on the appearance of squamous and lichenous eruptions on the skin.

The incessant cough that often precedes the eruption of measles, ceasing as soon as the rash appears, is a good example to show the sympathy existing between the bronchial and cutaneous surfaces.

Severe reflex asthma often is due to irritation in the

nose, throat or ear. Nearly all asthmatic people complain of stuffiness and obstruction about the nose, and when the nasal passages are examined there is found more or less tumefaction of the membrane over the turbinate bones, with undue vascularity, thickening and chronic rhinitis. Further exploration may disclose polypi in the nose, and polypoid or adenoid growths extending downwards into the pharynx behind the soft palate. Bony spiculæ are seen sometimes in cases that have been over-treated by the galvanic cautery.

In children adenoid growths in the pharynx and enlarged tonsils should be looked for, as these are very common causes of asthma and emphysema. The cure of these sources of reflex bronchial spasm is obviously of importance.

In the case of a young man in Victoria Park Hospital, a great sufferer from spasmodic asthma, we found the nose quite blocked up with polypi. These were removed by Mr. Macready, the surgeon, and the patient very much relieved.

The operation of removal brought on fits of most violent spasmodic cough, followed by a severe but transient attack of asthma, showing how certain reflex centres in the nose had been excited by the forceps of the surgeon. It is not uncommon to find local treatment of the throat and naso-pharynx bring on an immediate attack of asthma. Insufflation of powders is very apt to have this effect, and Professor Trousseau found how very soon ammonia solution applied to the pharynx caused a dangerous spasm in the larynx. Spray inhalations are in these cases preferable to powder insufflations.

According to Kratschmer, the olfactory nerve takes no part in propagating the irritation to the lungs, but

section of the trigeminus breaks off every influence that irritation of the nasal mucous membrane may have over respiration.*

E. Schmiegelow of Copenhagen, in his valuable work 'Asthma in relation to Nasal Disease,' considers that chronic rhinitis is much oftener than nasal polypus a cause of asthma (p. 18).

Among thirty-two patients with chronic rhinitis, nearly a third part were asthmatic.

There is a very sensitive zone about the inferior half of the lower turbinate bones of the nose, where there is erectile cavernous tissue. Hay asthma specially appears to be associated with the irritable condition of this tissue in the nose.

The sphenopalatine nerves contain the vaso-motor threads that control the filling of this erectile tissue. The obliteration of this reflex centre of erectile tissue by the galvanic cautery or by chromic acid applied, appears often to have a curative effect over the asthma. Of this Schmiegelow gives many examples. Persevering use of spray inhalations will do much to cure rhinitis, and Sommerbroth and Götze have seen chronic bronchitis, that defied every other treatment, disappear after local treatment of chronic rhinitis. Removal or destruction of the erectile tissue at the end of the turbinate bones does not cure the asthma unless the chronic rhinitis be also cured; sometimes, indeed, the removal of the polypi makes the patient worse, as larger parts of mucous membrane become exposed to the influence of change of temperature and dust. After examining the throat and nasal passages, it is also well not to forget the ears.

Dr. Rudd Leeson, in *Lancet* (1879, p. 833), records the

* E. Schmiegelow, on Asthma, p. 27.

instructive case of Mrs. V——, who had a persistent bronchitis with vomiting of glairy mucus. So violent was the cough that the bowels and bladder expelled their contents, and no kind of medicine seemed of any avail. One day the lady was so very deaf that the doctor set to work to syringe out both her ears, and from each meatus he extracted a mass of hard cerumen. The hearing was restored, and from that day the cough vanished, as also did the sickness, and she regained excellent health after two years of suffering. The centre of irritation in the ear passed down to the pulmonary plexus and recurrent laryngeal nerve, and so caused the violent cough.

The larynx and vocal cords should be examined in all cases of asthma.

I have had a patient come complaining of asthma and shortness of breath, when he has been really a sufferer from cancer of the larynx, requiring almost immediate tracheotomy to save his life.

In cases of breath difficulty where the patient is unable to form a proper cough, it will generally be found that one vocal cord is paralyzed and does not approach its fellow. Hence the rima glottidis cannot be closed, and no true expulsive cough can be produced. Of this condition I have met with very good examples.

Marked *inspiratory* stridor is an indication of narrowing of laryngeal and tracheal channels by spasm, chronic thickening, or by compression from morbid growth in the chest. In the *Lancet* of 1864 is recorded a remarkable case of severe dyspnœa due to chronic thickening of the larynx and trachea, that came under my notice at the hospital. Eventually tracheotomy was performed, but the patient only survived a short time.

Gastric and Intestinal Reflex.—Patients who by careful

attention to diet have got rid of asthma, become very eloquent upon their conviction that asthma is entirely a stomach complaint, and anyone who wishes to be cured of it has the means in his own power. So complete are some recoveries under a well-regulated system of diet, that I do not wonder at this enthusiasm.

When we observe how quickly many obstinate coughs are cured by treatment directed to the stomach and bowels, we easily recognise the reflex sympathy which exists between the gastric and pulmonary branches of the pneumogastric nerve.

The violent cough, often like whooping cough, that children get from worms in the bowels, and that ceases, as if by magic, when these parasites are expelled by vermifuge medicines, is a familiar example of reflex cough. Uterine irritation and displacement is another source of reflex asthma, and cases are met with of women who suffer severely with asthma at the menstrual epoch.

From what has been briefly said in this chapter, it becomes obvious how much the cure of the case is promoted and assured by the discovery of the source whence the reflex irritation originates.

CHAPTER III.

Bronchial congestion and flux—Asthma due to direct irritation of the mucous membrane—Hay asthma and catarrh—Treatment different to that required in spasmodic asthma—Illustrative cases.

It is customary to draw a distinction between dry and moist, or humoral, asthma. In the first, spasm is the ruling element; in the second, vascular congestion with catarrh, mucous flux, and, more or less, bronchitis, are the prominent features.

Purely nervous asthma, for example hysterical asthma, may exhibit plenty of symptoms and yet pass away with no secretion. Floyer, already quoted, says, 'The hysteric who wheeze much have no phlegm.'

Passive congestion of the bronchial mucous membrane may cause severe breath difficulty, requiring for its relief methods different to those employed in cases of reflex spasm. The gasping orthopnœa of cardiac asthma is commonly due entirely to passive bronchial congestion, and is best relieved by such means as will promote secretion. Hypodermic injections of nitrate of pilocarpine I have seen very useful in these cases, while fuming antispasmodic inhalations are often worse than useless.

Persons affected with this congestive asthma who have been told to smoke tobacco and stramonium soon find that this smoking makes them worse, and to feel as if they would die in a faint. We may get at times attacks

of muscular spasm in these cases, caused by the vascular congestion disturbing the rhythmical action of the bronchial muscle, and only then is it that antispasmodics may be temporarily needed. Salter was very strong on the sympathy of the bronchial muscle with the irritated mucous membrane, and went even so far as to express his 'belief that severe chronic bronchitis never exists without asthmatic complication'—a belief in which I am far from agreeing with my late valued friend.

Asthma due to direct irritation of the bronchial mucous membrane is exemplified in bronchitic asthma, of which more will be said hereafter, and also in cases of hay and dust asthma, where a specific irritant acting on an unduly sensitive mucous surface, as the Schneiderian membrane in the nostrils, or the mucous membrane of the bronchi, brings on rapid congestion with profuse catarrh and flux; and then, after a period of varying duration, bronchial spasm and asthma come in as secondary effects. In the symptoms and progress of summer catarrh, or hay asthma, we have an admirable example of the points to which I wish to draw attention.

A small boy, who had enjoyed up to the age of eight years very good health, was playing in a hayfield in the month of June, when suddenly he was seized with profuse flow of tears and swelling of the eyelids to an extent of well-nigh blinding him; at the same time came on a violent fit of sneezing. He was taken by his companions into the house, and soon recovered. These attacks continued to recur in the summer whenever the patient was exposed to their exciting cause; but what is of especial interest in the case is the fact that it was not till he was twenty years old that true asthma and breath difficulty were added to the already established catarrh. 'Asthma at night,' says the patient, 'becomes

my great trouble towards the beginning of June; after a few whiffs of a cigar I can get my breath easier and manage a deep inspiration, which seems to burst open the contracted bronchial tubes, but they soon contract again, and reset themselves at a diminished calibre. That which gives real and continued aid in my distress is smoking strong tobacco in a pipe until I am approaching a condition of collapse. A failing pulse and a damp sweating skin are always accompanied by marked alleviation of the sufferings, the relaxation of the contractile tendency affecting the bronchial as well as the other muscles' (Salter, 328).

Here, then, is an example of hyperæmia and flux, due to direct irritation of the mucous membrane, existing for some years, and eventually complicated with a severe form of spasmodic bronchial asthma.

Other forms of catarrh and spasm of similar type are seen in examples of asthma caused by the aroma of fresh coffee, by inhaling the dust of lamp-black, of ipecacuanha powder, and of linseed and mustard meal. Two cases of very severe spasmodic asthma due to excitation of the naso-pulmonary mucous membrane by these two last-named agents have come under my notice. One patient begged me on no account to prescribe ipecacuanha in any form; 'for once,' said he, 'I had fifteen drops of the wine of ipecacuanha given to me, and it brought on such a paroxysm of asthma that I was well-nigh choked: my lower chest seemed powerfully retracted, the difficulty of drawing in my breath was extreme, and perspiration rolled off from me.' Here the ipecacuanha wine might have acted in a reflex way, through the gastric branches of the vagus nerve.

When we examine into the history of cases of hay asthma and summer catarrh, we find nearly always that

the coryza and catarrh precede the asthma. Possibly, as in the case lately narrated, several years may elapse before the summer catarrh becomes complicated with breath difficulty and spasm.

Another point, brought out by inquiry into the history of cases of hay asthma, is the ingravescent nature of the affection. It grows worse with every fresh attack, and the susceptibility to the exciting cause increases and becomes more deeply rooted in the system. The blood-vessels more readily congest, and the congestion goes deeper down into the air-tubes. The sudden advent of the catarrh is familiar to all, and one need not go far to find those who can describe all the distress attendant on the attack. A lively and telling account of catarrhus æstivus, hay, rose, or peach, cold or asthma, is given by Dr. Dobell, in his work on 'Winter Cough,' and is a lively bit of reading, in full detail. 'The cross of my life,' says the writer quoted by Dobell, 'is DUST, and I print the word in capitals. Once exposed to dust, every particle is to my eyes as a grain of cayenne pepper; and itching eyes, snuffing, sneezing, and vexed temper, are at once my lot.' The writer then goes on to describe the dyspnœa which follows on the catarrhal state, presenting the usual characters of bronchial asthma.

The catarrh begins in the eyes and nasal passages, and we may get speedy asthmatic complication of reflex type, owing to irritation of the Schneiderian membrane. Then the asthma reminds us of the attacks we see occasionally caused by the irritation of a nasal polypus, and which either cease or are mitigated when the offending polyp is removed. If the direct irritation of the Schneiderian membrane does not determine the asthmatic complication early, we observe the catarrhal state, as attacks recur year by year, to pass downwards into the air-tubes, and

then we behold the asthma in full force. Under these conditions we must admit bronchial congestion as an important factor of the asthma.

Dr. Blackley finds attacks of hay fever to be most prevalent and severe about June 28, and at this period of the summer he found he could collect on glass slides, moistened with glycerine and exposed to the air, the largest number of pollen granules from flowering grasses.*

The first person to demonstrate by actual experiment the power possessed by pollen to excite catarrh and sneezing was Dr. W. P. Kirkman. He says that a day or two before Christmas he noticed in his hothouse for flowers one single plant of the *Anthoxanthum odoratum* in blossom loaded well with pollen. He thought it would be a capital opportunity for trying this particular grass; so he plucked it, rubbed the pollen with his hand, and sniffed it up his nose. Almost immediately it brought on sneezing and all the symptoms of hay fever, which continued for an hour and then left him.

Some writers have attributed summer catarrh and asthma to the inhalation of the vapour of benzoic acid given off at a low temperature. Careful experiments by Blackley gave no support to this theory of the origin of the disease; and a series of most interesting experiments in reference to the presence of ozone in the air gave no support whatever to ozone as an exciter of hay asthma. Dust, so bitterly complained of by those subject to hay asthma, was found by Blackley often to excite the disorder in his own case; but he nearly always observed that in the dust there existed pollen granules from flowering grasses. Pollen granules may be carried about in

* 'Hay Fever: its Causes, Treatment, and Prevention,' second edition.

the feathers of fowls, and in the fur of such creatures as cats, hares, and rabbits. In one case of a young man I have known the smell of a roasted hare always bring on very bad asthma. In experimenting with actual pollen, Blackley found some kinds more active than others in bringing on the symptoms of catarrh; but the pollen of all the grasses gave more or less unmistakable evidence of its power to excite catarrh when applied to the nose or inhaled into the bronchi. One patient of mine observes that it is only when the first crop of hay is being gathered in that she suffers from asthma. During the gathering of the second crop in September, when there are no grasses in flower, she has no distress whatever in her breathing. The pollen of rye, *Secale cereale*, was especially active, and caused violent sneezings, with profuse flow from the nostrils. I do not find whether Blackley has proved or disproved the statements of some hay asthmatics, that it is only European grasses that cause them to suffer; in India they are free. The congestion of the mucous membrane of the nostrils in summer catarrh soon increased so much that no air could be drawn through the passage; and it was observed that after both passages had been equally closed for a time, if the patient reclined on one side, the uppermost nasal passage after awhile became quite open and free, evidently from gravitation downwards of exuded fluid.

In many cases of ordinary asthma we find the patients complaining of tightness, pressure, and obstruction across the bridge of the nose, and we may accept this as a sign of the congestive character of the asthma. True hay asthma is eminently a congestive form of dyspnœa, and if the mucous œdema affect much the tissue of the larynx and trachea, the disorder may assume a serious aspect. That, however, a neurotic

element is present, as well as congestion, seems borne out by the circumstance that the asthmatic breathing has been brought on by looking at a picture of a hay-field; and that a young lady who, in the proximity of a stable, had to sit up all night in extreme dyspnœa, next day could dance and sing with ease and comfort.

How far nervous influence may control and affect catarrh and congestion I will not seek to inquire, but there are curious and interesting facts that come under our notice from time to time that are worth recording. The man to whom dust was so very baneful, declared that if when perspiring he got a chill, catarrh and asthma were the immediate results. The sympathy of the internal mucous membrane with the external skin has been already brought under our notice. Often we see spasmodic asthma associated with definite skin disease, and the remedy that cures the one often cures the other too. A child may have a running eczema of the skin, and at the same time obstinate bronchial catarrh, and probably any very sudden check of the external flux would tend to increase the catarrh; while a well-chosen method of constitutional treatment, on the other hand, would cause the subsidence *pari passu* of both the external and internal disorder.

Mrs. R. G., living in Warwickshire, had been for several summers liable to very profuse catarrh during the haymaking season, but knew nothing of asthma till one day she had a great fit of laughter, and then found she could not get her breath. From that time she became decidedly asthmatic, the attacks commencing with a great itching under the chin, a good deal of coryza and flux, and great tightness across the upper part of the chest. But little expiratory wheezing was heard after the fit, and great relief was gained by taking moderate

doses of hydrate of chloral. In this case I especially noticed a red erythematous rash, which appeared on the chest whenever the asthma and catarrh came on, indicative, I thought, of vaso-motor disturbance and vascular congestion. The rash did not seem connected with taking the chloral hydrate. To show how long-continued congestion of the nasal mucous membrane tends to cause chronic rhinitis and polypi, I may mention the fact that some years after I saw this lady I found she was under the treatment of Mr. Lennox Browne for rhinitis and obstructions in the nose.

In 1871 I had a medical man, æt. 32, under my care for very troublesome asthma of catarrhal form, and almost always this gentleman observed an eruption of real urticaria to appear on his skin whenever he had his catarrhal asthma. In this case the catarrh preceded by some years the bronchial spasm. The remedy found most useful by this patient was the production of free sweating.

In another case a young man, æt. 21, had been subject to spasmodic asthma, with catarrh, for nine years; previous to that date he had suffered much from moist eczema on the skin. These instances show the reason there is for admitting vascular disturbance in the way of congestion and hyperæmia as an element in the causation of catarrhal asthma.

In hay asthma bronchial spasm appears as a neurosis secondary to pre-existent catarrh. To attribute the whole of the dyspnœa to congestion alone is what I am not prepared to do; for that mucous congestion intense enough to cause complete obstruction of the nostrils, as in hay catarrh, should extend in like degree by continuity of tissue down to the smallest bronchi, can hardly be accepted, for surely then larynx, trachea,

and bronchi would be so occluded as to cause actual asphyxia.

Asthma due to, or associated with, bronchial congestion, usually gets speedily bad when the patient lies down at night.

A boy, æt. 9, was under my notice in 1873, who never knew anything of asthma till the age of four, when he passed through an attack of scarlet fever. He had no anasarca, but ever after the scarlet fever he remained liable to asthma, which was always worse when he lay down in bed, but was relieved often by sneezing, as well as by coughing up mucus. The urine was normal, save excess of lithates. The inspiration was attended with a few sonorous sounds. A dry bracing air did more good than any medicine in this case.

Dr. Blackley, in his observations upon himself when affected with hay catarrh, found that if he lay flat on his back he could easily bring on all the distress of a true asthmatic attack. Blackley considers congestion the sole factor of the asthma. Here I do not agree with him. The congestion causes dyspnœa, but true bronchial asthma requires for its production that muscular spasm be added to bronchial congestion.

Illustrations of muscular spasm, induced by contiguity of inflamed membrane, are often brought before us. I may instance spasm of the laryngeal muscles coming on suddenly as a most dangerous complication in laryngitis. Already I have referred to bronchial spasm and asthma as a secondary neurosis resulting from bronchitis; and I may instance the case of a member of our profession who, while travelling about to get rid of a persistent bronchitis, suddenly, while passing a night at Gibraltar, was taken with spasmodic asthma; and so severely did

this asthma keep its hold, that, when consulting me, this gentleman informed me that for 340 nights out of 365 he had to sit up for two hours or more fighting for breath, 'and you may judge what that is,' said he, 'to a man actively engaged in practice during the whole day.' This physician was eventually much relieved by the use of citrate of caffeine taken in coffee.

In another case the course of events tended to a different issue. The patient was a clergyman of ample means, who, in consequence of very troublesome bronchitis, was sent many years ago to Madeira, whence he returned with dysentery as an unwelcome addition to his bronchial inflammation. He told me he knew nothing of asthma till he went to Torquay, and there he was seized quite suddenly at night, and he learned that five people of his acquaintance at Torquay had all experienced severe asthmatic attacks during that same night. The case of this clergyman—referred to by Salter in his table of cases—was instructive, and illustrative of the course of many cases of asthma connected with bronchitis. First, the poor man had troublesome bronchial inflammation, which appeared to irritate the nerves from the pulmonary plexus, which Remak has shown to be distributed to the bronchial muscle. Then, under some peculiar atmospheric exciting cause, this muscle was thrown into spasm, and the patient surprised by a fit of asthma; and from that time bronchitic asthma clung to him for the rest of his life. Gradually the spasmodic seizures became less severe, while very marked atrophous emphysema of the lungs came on, expiration being notably difficult and prolonged. It seemed, therefore, as if spasm and inflammation together had worn out the strength of the bronchial muscle, and during the latter years of this patient's life his distress was from over-

distended lungs and impeded expiration with paralytic and wasted condition of the bronchial muscle.

Eventually this gentleman died of cardiac failure and syncope—not an uncommon termination in these cases of atrophous emphysema, for the heart partakes in the atrophic process, becoming thin and feeble, and perhaps the cardiac muscle undergoes a fibroid or fatty change; hence it is that death by cardiac failure is so often the end of these cases.

CHAPTER IV.

Premonitory symptoms of an attack—Treatment by applications to the chest—Coffee and Caffeine inhalations—Chloroform—Iodic ether—Nitrite of amyl—Cigarettes—Nitre-paper—Sprays—Internal medicines—Trinitrine tabellæ—Hypodermic injections.

THERE are certain symptoms which the sufferer from spasmodic asthma learns from his experience rightly to interpret, which show that a fit of asthma is coming on. Thus, the individual may be irritable and restless, or perhaps heavy for sleep; often there is itching of some part of the body, as, for instance, of the nose or eyes, and a peculiar itching under the chin is a marked premonition of the asthmatic seizure. In a lady aged thirty, liable to very severe catarrhal asthma, itching under the chin and the appearance of an erythematous rash on the chest usually ushered in the attack. In another case a feeling as of a tight stirrup across the instep was the usual warning. In some persons flatulence and dyspepsia precede the fit, though the diet has been discreet and simple.

The best methods for averting a threatening attack of asthma are to some extent matters of individual experience, but yet there are certain general principles which will guide us in dealing with all cases. We should try to promote the respiratory action by placing the patient with his elbows and arms resting on some fixed point, so that the muscles of the arms and shoulders

may help to expand the chest. Sometimes emotional excitement, or a strong effort on the part of the patient, whereby the attention is diverted, will avert the paroxysm. In one case in my experience, a patient was leaning against the side of a river steamer, fighting laboriously against an attack of asthma, when suddenly the boat came into collision with another steamer and was in peril of sinking. The patient lost his asthma at once and was able to exert himself for his own safety and that of those around him. Another patient of mine ascended the Matterhorn, and told me he believed that the excitement of the expedition kept off his asthma during the whole time. Dr. Salter tells of a case where a lady could stave off her asthmatic fit by sitting down to the piano, and of another instance of one who had his asthma stopped by being put on a horse which ran away with him. Seeing how profoundly asthma is influenced by atmospheric conditions, it is well for the asthmatic, provided he be yet able to move, to try getting from one room to another on a different level, or to go out of doors. If he suffer specially in a dry air, then let the air of his room be made moist by having a kettle placed on the fire, and allowing the steam to escape into the air of the chamber.

The movement of the diaphragm in expanding the chest is very greatly dependent on the condition of the abdominal viscera. Fabius found that purgation of the bowels by lenitive electuary increased the vital capacity of the chest by 250 cubic centimetres.

We therefore understand how important it is that a loaded state of the stomach or bowels should be properly attended to and relieved by an emetic or purgative; and if the feet be cold, they should be at once placed in hot mustard and water. Placing the arms also in a

hot mustard bath gives ease to one of the greatest sufferers from asthma I have ever met with.

Strong counter-irritation to the surface of the chest and back is a remedial measure on which experience has taught me to place great reliance. I have known a free application of croton-oil liniment to the surface of the chest productive of speedy relief to the breathing. In another case, after minute scarifications had been made over the chest and a rubefacient liniment applied, the patient assured me that, though the smarting of skin was severe, the relief to his breathing was very great. Ten drops of the volatile oil of mustard dissolved in one ounce of spirit of camphor, after the formula of Sir A. Garrod, forms a convenient and cleanly preparation, which may be sprinkled on flannel or on spongiopiline, and so used locally to the chest. Diligent and persistent friction of the chest with the compound camphor or soap liniment is a measure well worthy the attention of asthmatic patients.

To one liable to gout and acidity, a draught should be given containing twenty grains of bicarbonate of soda or potash, with half a drachm of aromatic spirit of ammonia, in a wineglassful of peppermint-water. In another case, a tumbler half full of *very hot* brandy, gin, or whisky, with water, may be serviceable. Hot coffee, also without milk, is a well-known and very efficacious remedy, especially if two or three grains of caffeine, or its citrate, be dissolved in the coffee. It is seldom that such a draught, slowly taken, fails to relieve.

If, despite the employment of these means to avert the paroxysm, it nevertheless increases, the patient's words becoming fewer and shorter, his face congested and chest difficulty very great, he should at once resort to the inhalation of the fumes of burning nitre-paper;

or if this be not at hand, he need not hesitate to try a few whiffs of chloroform.

The speedy and decided relief obtained from the inhalation of chloroform in a fit of spasmodic asthma has now been long recognised. In the *Medical Times* for December, 1847, is published the case of a lady, aged 56, who for twenty years had been subject to attacks of spasmodic asthma, for the relief of which 'the resources of the Pharmacopœia had been exhausted in vain.' On December 6, after an attack of the then prevalent influenza, this lady was seized with her asthma, with extreme dyspnœa, great sense of constriction, and acute darting pains through the chest and epigastrium.

Half a drachm of chloroform was now administered on a sponge; after a time unconsciousness came on, with relaxation of the limbs, and as she lay back in bed, the inspirations became prolonged and deep, with considerable intervals.

There was no return of the spasm, and the patient remained comparatively well, feeling no ill effect from the inhalation. The vapour of sulphuric ether had been previously tried in this case, but it seemed to increase the sufferings of the patient.

Employed with due caution at the onset of an asthmatic fit, a very small quantity of chloroform vapour will often suffice to avert the coming mischief; and where the asthma is truly spasmodic, there seems reason to believe that this practice of checking the onset of the fit by a little chloroform may in time break through the habit entirely.

Iodide of ethyl, or iodic ether, was introduced as a remedy for asthma in 1870 by M. Huette. My experience of its use in spasmodic asthma has been favourable. Six or eight drops of the iodic ether may be inhaled

from a piece of lint held on the palm of the hand. One of my house physicians was able to detect the presence of iodine in the expectoration, and also in the urine, of those who had inhaled the iodic ether. In the dyspnœa met with in fibroid phthisis, and in old-standing bronchitis, the iodic ether certainly is beneficial.

In the case of Annie E., æt. 16, from Tunbridge Wells, sudden attacks of asthma were relieved, and the frequency of their recurrence diminished, by the inhalation of ten drops of iodic ether as soon as the breath difficulty commenced. The cough was moderated, and expectoration facilitated. The note speaks of nitrate of pilocarpine, one-twenty-fourth of a grain, lobelia, and citrate of caffeine, given internally, not appearing to afford an amount of relief equal to that obtained from the iodide of ethyl.

A patient, who for twenty years had suffered much from asthma and bronchitis, told me he attributed a great improvement in his case to the use of iodide of ethyl for three weeks. 'I think' (writes he) 'it tended to discuss or lessen the swollen condition of the bronchial tubes; my doctor wishes me to continue it, but being a new remedy I am rather afraid, though it gives me more permanent relief than anything else I have tried.' The iodide of ethyl seems to be antispasmodic, and, further, an anti-congestive remedy, allied in action to iodide of potassium, a salt which, when freely and perseveringly given, is well known to be a trustworthy remedy in congestive asthma.

It sometimes happens that nitrite of amyl inhaled will relieve the asthmatic spasm. This liquid appears to act by causing paralysis of the organic nerves, which govern the contractility of the blood-vessels; it is, therefore, a relaxer of muscular and arterial spasm.

When five drops of nitrite of amyl are inhaled, there is increase of pulse rate, throbbing of carotids, with flushing and tension of the face. These effects follow in about thirty or forty seconds, the action of the inhalation rapidly causing dilatation of the blood vessels.

In some forms of angina pectoris and syncopal epilepsy, the nitrite seems useful, but its effects in asthma are apt to be disappointing. Intense pallor of face and pain at heart are indications for the use of the nitrite.

Burning or smoking the dried leaves of the datura stramonium is a method of treating asthma well known both to the profession and the public. The old-fashioned way of smoking the chopped-up stramonium in a pipe with tobacco is now in a great measure superseded by the cigarettes which are made with camphor and stramonium ; and of these, those that are prepared from the leaves of datura tatula, first introduced into use by Messrs. Savory and Moore, are, in my experience, both safe and effective. Several asthmatic patients under my own care feel that the use of one of these cigarettes, whenever they feel the fit impending, averts or greatly mitigates their distress, and adds much to the comfort of their lives.

The cigars made with the rolled-up leaves of the stramonium are not so efficacious and hardly so safe as the camphorated cigarettes ; but whatever form the patient may use, it is well at once to stop the inhalation of the smoke as soon as any feeling of faintness and giddiness comes on ; inattention on this point has led to serious, and even fatal, consequences from smoking stramonium leaves in an ordinary pipe.

In the well-known Espic cigarette, solanaceous and

other plants are combined according to the following formula :

℞ Folii belladonnæ, gr. vi. ;
„ hyoscyami, gr. iii. ;
„ stramonii, gr. iii. ;
„ phellandrii aquatici, gr. i. ;
Extracti opii, gr. ¼ ;
Aquæ lauro cerasi, q. s.
The powdered leaves are wetted with the ext. opii. dissolved in the laurel-water, then dried, and put up in cigarettes.*

I have met with patients who get prompt relief from these cigarettes, and from these alone, others having little or no effect in relieving them.

Grimault's cigarettes, which contain Indian hemp, will, in many cases of troublesome asthma, relieve when others have failed.

A patient who was always free from asthma when in London, had scanty glutinous sputa, and was invariably worse in a damp atmosphere, found Grimault's cigarettes afford relief after he had vainly tried those made with stramonium.

Useful cigarettes are made of the nitre-paper in the following way :

White blotting-paper is cut into small slips about seven inches long, and one and a half broad ; these are soaked in a solution, made by dissolving four ounces of nitre in half a pint of hot water, then dried and rolled round a pencil to give them a cigarette form, and are at once ready for use.

The nitre-paper, made with a saturated solution, can also be kept in squares ready for burning in the patient's room ; often it is not until the room is well filled with the fumes of the burning paper that the asthmatic obtains relief. In one case under my observation, nitre-

* Trousseau, Clin. Med., vol. i., p. 648.

paper burnt in the patient's bedroom will prevent the asthmatic attack without awakening him, if one is at hand who can ignite the paper as soon as ever difficult respiration in the sleeper shows that his enemy is near at hand.

Nitre-paper is, I believe, the basis of the 'Papier Fruneau' and 'Papier Ricco,' often valuable in asthma, and also of a very useful paper prepared by Mr. Dowling, of Reading, which I have used with excellent results.

The 'Ozone Paper' prepared by Mr. Huggins, of the Strand, contains chlorate of potash and iodide of potassium, and of its efficacy I have had abundant evidence.

The chemical products resulting from the combustion of nitre-paper have been examined by M. Vohl (see *Journal de Pharmacie et de Chimie*, 1866, p. 155), and he found the nitrous fumes to contain watery vapour, traces of cyanogen, carbonic acid and nitrogen gases, ammonia, and nitrite of potash. To the ammonia and nitrite of potash M. Vohl attributes the antispasmodic action of the nitrous fume. The constituents of the fume being allied to the adventitious impurities found in the air of smoky towns, I went over Salter's table of his 223 asthmatics, to see if I could make out that those persons who are put down in the table as being notably relieved by the nitrous fumes were also those who were either much relieved or quite cured by London air. I found that of the twenty-two who are reported to have obtained marked relief to their breath from the air of London, there were nine to whom the nitre-paper was very valuable. Two, who are said to have been quite cured by London air, found the paper more serviceable than anything else they had tried. One, who suffered much

in London, found nitre-paper rather harmful than otherwise. To the ammonia we may attribute some of the antispasmodic action of the burning paper, for diluted ammonia vapour will speedily cut short an attack of bronchial spasm. Salter reports one case where the spasm was at once nipped in the bud by cautiously inhaling the vapour of diluted ammonia. An asthmatic sea-captain was free from his breath trouble when conveying a cargo of guano, a product which slowly evolves ammonia.

Nitrites are formed during the combustion of the paper, and nitrites by inhalation, and also by the mouth, are valuable agents in relieving various forms of spasm.

The vapour of arsenious acid has a special action on the respiratory organs, and I am informed, on the authority of Captain Thomas, of Camborne in Cornwall, that men who work in the Cornish arsenic works are seldom affected with phthisis. Indeed, in one instance, all the symptoms of phthisis, with hæmoptysis, seemed to be removed by exposure to the vapour of the arsenic subliming flues. Whether this happy result was due to the antiseptic action of arsenic vapour, or to some special action of the same on the nerves of nutrition, I cannot say. The fact reminds us that the smoking of arsenical cigarettes has been highly commended by good authority in the treatment of chronic phthisis.

There are various formulæ given for preparing the arsenical cigarettes, known as cigarettes of Dioscorides, of Boudin, and of Le Vasseur. Trousseau recommended that each cigarette should contain one grain of arsenite of potash—rather too strong a dose, for a few full inhalations of a cigarette containing half, or less than half, this amount of arsenite will usually answer the desired purpose well.

It is well known how, in Styria, the peasants eat small quantities of white arsenic to improve the breathing powers, and with the British public the use of arsenical inhalation to relieve asthma is not unknown. Dr. Wilks told me of a former out-patient of his at Guy's Hospital who, in his occupation as a stuffer of birds and animals, used much white arsenic. This man was a smoker, and very liable to asthma, and he said he always found a ready cure for his breath-spasm by adding a little arsenic to the contents of his tobacco-pipe.

Arsenic-smoking in a pipe is known as the Chinese remedy for asthma. Cauvin (*Lancet*, 1861) reports the case of an asthmatic lady who in an experience of twenty-five years found no remedy equal to a quarter of a grain of arsenious acid three or four times a day, mixed in a stramonium cigarette.

The value of arsenic internally will be treated of in the next chapter.

In using any kind of inhalation, it is necessary to draw the medicated vapour well into the lungs. Want of attention to this point often leads to failure in the treatment.

The practice of applying solution of ammonia, mixed with an equal quantity of water, on a brush to the posterior part of the pharynx, was introduced some years ago by Duclos, and he claimed to have effected cures by this practice. It is a method to be tried with the utmost caution, for the first touch of the saturated brush on the wall of the pharynx may cause a reflex paroxysm of suffocation that is dangerous and alarming, though afterwards the patient may remain for a time free from asthmatic fits.

The posterior wall of the naso-pharynx is a very sensitive part, and in using powders by insufflation it is

well to be prepared for a rapid development of asthma. Moist sprays are much better than dry powders, and spraying the naso-pharynx and nostrils with solution of cocaine will often speedily cut short very severe asthma. A five per cent. solution of hydrochlorate of cocaine may be used with a spray atomiser or painted into the nostril with a brush. Sometimes a small tabloid of one-eighth of a grain, inserted within the nostrils, will give relief in hay asthma. The too frequent employment of cocaine spray is not likely to prove permanently curative; indeed, it appears to me that the more it is used the more often is it needed, and its protracted employment relaxes the vessels and keeps up a condition of passive congestion by no means favourable to the cure of asthma.

Spray of paroleine, a fatty tasteless oil first made by Burroughs and Welcome, is soothing to the irritable mucous lining of the naso-pharynx, and if five to ten grains of menthol be dissolved in one ounce of paroleine, a spray will be obtained soothing and curative in cases of chronic rhinitis and nasal ozæna.

Spraying the throat with tincture of lobelia has been found useful in relieving a paroxysm of asthma. Vinum ipecacuanhæ diluted with an equal quantity of distilled water, and well filtered, gives a spray that is of great value in the cure of bronchitic asthma. If used too often or for too long a time, this spray may cause vomiting, but this can be obviated by directing the patient to spit out any of the wine that may collect in his mouth, and not to swallow it. Dr. Ringer recommends the patient to hold his nose, depress his tongue, and inhale the spray deeply. Of its great value when thus employed in chronic bronchitic asthma I have had ample proof.

A few words may now be said on such medicines as

can be employed during the actual fit for the sake of relieving the patient. Antispasmodics appear to be at this time most helpful, and of these one of the best to use is the tincture of the datura tatula, after this formula:

℞ Tinct. daturæ tatulæ, ♏ x.—xx. ;
Sodæ bicarb., gr. x.—xx. ;
Spir. chlorof. ♏ xv., vel. spir. ætheris, ♏ xxx.—lx.
Aq. camphoræ, f. ℥i. M, Ft. Hst.

This draught may be taken every two or four hours, according to the urgency of the symptoms.

Belladonna I find a useful antispasmodic in asthma. Like stramonium, belladonna appears to quicken the respiration; sometimes belladonna appears to surpass stramonium as a reliever of the spasmodic form of asthma. Where there is fever and dryness of mouth and skin, belladonna and stramonium are not likely to be of much service.

In very troublesome dyspnœa, due to old-standing cardiac disease, with lividity of the face and congested surface generally, I have found the tincture of belladonna, in doses of five drops three times a day, give an amount of relief, and reduce the congested look of the face and surface in a satisfactory way.

Experimental inquiry tends to prove that belladonna stimulates the respiratory centre, as well as the sympathetic system, while it depresses the activity of the vagus nerve. Belladonna quickens respiration and circulation, and hence it is of use in congestive asthma. Opium appears to depress the function of the sympathetic system.

The dose of belladonna should be small at first, say five drops of the tincture; but if this does not seem to affect the patient soon, the dose should be quickly increased,

and it is often not till we are giving six to ten drops in the dose that we get curative effects.

The tincture of the seeds of stramonium (B.P.) is a good and efficient medicine, and may be given in doses of ten to twenty drops. The extract of the seeds is five times stronger than the extract made from the leaves, and the spirit extract of the B.P. may be given in a pill containing from a quarter of a grain upwards.

If the asthmatic be complaining much of flatus in the bowels, then a small teaspoonful of the sp. ammoniæ fœtidus in a wineglass of mint water, or brandy-and-water, will probably afford relief.

Among other remedies may be named the tinctures of cannabis, of sumbul, and of henbane. They are rarely preferable to the stramonium for medicinal efficacy, but at times one may be glad to use one or other for a change. The tincture of sumbul, in doses of fifteen to twenty drops, is an elegant, pleasant medicine, and certainly possesses decided antispasmodic properties; like the other tinctures, it will go well with ether or spirit of chloroform. The hydrate of chloral, in dose of ten or fifteen grains, sometimes relieves asthma in a wonderful way, but, like many other remedies, it cannot always be depended on.

Chloral in full dose makes respiration slow and full, and it appears to do this by acting on the respiratory centre at base of brain, for Rajewsky observed this action of chloral on the respiration after the vagi nerves had been divided. Consideration of these statements would lead us to expect good from chloral in cases of asthma due to disturbance of respiratory nerve centre.

In Braithwaite's 'Retrospect' for 1841 is recorded a remarkable cure of laryngeal asthma in an elderly lady

by the rubbing in of veratria ointment to the back of the neck. Here probably the central respiratory centre was the seat of the disorder.

Thin gelatine capsules containing a few drops of ether, or some of the trinitrine tabellæ of the B.P., can be carried about easily, and one or two of either of these, swallowed, will often quickly relieve an attack of commencing spasm and dyspnœa.

Before quitting the subject of the immediate treatment of the paroxysm of asthma, a word may be said on the use of subcutaneous injections as a means of affording relief. The subcutaneous injection of one-eighth of a grain of acetate of morphia under the skin of the arm will often give the greatest relief in five minutes.

The combination of one-eighth of a grain of morphia and one-hundredth of atropia is a very effective injection. I have found this injection succeed in a case where morphia alone was of little service.

At present, the best way to employ the acetate of morphia hypodermically is in the form of the Injectio Morphinæ Hypodermica of the B.P. One to five minims may be injected, the larger dose representing half a grain of acetate of morphia.

Injections of the nitrate of pilocarpine made by dissolving one grain of the crystals of the nitrate in twenty minims of distilled water may be used in doses of two to five minims in cases of congestive asthma, and also in laryngeal œdema. The injection promotes secretion, relieves congestion, and in some cases gives much ease to the breathing. Pilocarpine is antagonistic to both atropine and morphine.

Care should be taken not to employ morphia hypodermically in cases where there is albumen in the urine, as dangerous coma may be the result, especially if the

pupil be contracted. Those who find relief to the breathing from the hypodermic injection of morphia are very apt to acquire the morphia habit and resort to injection habitually from mere nervousness; hence, in susceptible people, it is not well to encourage the use of hypodermic injections.

CHAPTER V.

Management of the asthmatic patient in the intervals of his attacks —Three considerations to guide us in treatment—Nerve-tonic medicines of use—Caprice of asthma with respect to atmospheric causes prevents our laying down any absolute directions as to climate—The air of towns generally agreeable—Ozone and sea air—Exercise by riding, walking, and swimming—Diet—Medicinal treatment—Tonics often of service—Cases illustrating effects of treatment.

WHEN a patient has recovered from a bad fit of asthma, he naturally inquires, 'What can I do to prevent these attacks?' In answer, we may assure him that he can do a very great deal to avert the fits if he will but exercise some resolution, and not rest content that he is doing all that can be done in swallowing two tablespoonfuls of physic three times a day, and taking pills every night.

The treatment must be aimed, first, at the removal of any morbid condition from which reflex spasm may arise. Naso-pharyngitis must be cured or a polypus removed. Secondly, any gouty or rheumatic tendency in the constitution must be dealt with by suitable diet and medicine. Lastly, persistent bronchial inflammation and thickening of the air-tubes, as in bronchitic asthma, must be removed by suitable treatment.

That certain medicines of the nerve-tonic class—such as zinc, quinine, arsenic, phosphorus, and salts of iron and silver—act as curative agents for asthma, I have proved in a goodly number of cases; but such is the notorious caprice of asthma, that we often fail, even

after trying remedies that experience leads us to think promise well, thoroughly to cure the complaint by our medicines; hence, it becomes of great importance to point out to the patient certain rules of living which, faithfully carried out, will add much to his chance of recovery.

With respect, first of all, to the climate adapted for the residence of a person liable to spasmodic asthma. This is so entirely and peculiarly a matter of individual experience, that it is vain to attempt to lay down any universal and absolute law upon the subject. General experience would, I expect, make out the city of London to be a spot agreeable to many asthmatics who have little or no bronchitis.

The wonderful relief to breath difficulty experienced by many asthmatics in the close air of a town is continually brought to our notice. One patient of my own, with a most comfortable home in the northern outskirts of London, finds himself glad to quit it and pass a winter in residence at his business premises in Cornhill. Another, who declares that he has vainly tried all the resources of medical art, passed six weeks in Queen Anne Street, Cavendish Square, without feeling a trace of asthma. On going to Surbiton he got such a bad seizure that, though well versed by sad experience in his sensations, he was obliged to send urgently in the night for the doctor. One great sufferer in the country breathed well in London, but wrote me word that on returning home the asthma received him with a most warm welcome. Those who have read Walshe's work on the lungs will remember the case of the man sorely tormented with asthma at Hampstead, for whose relief every known remedy had been vainly tried, and who was cured in an almost miraculous way by changing his

residence to the central region of the Seven Dials. To explain why town air suits some asthmatics so well is not easy. Finding that ozone inhaled causes pulmonary irritation, I thought that it might be the absence of ozone that rendered the air of towns sedative to excited nerves in the respiratory passages.

In connection with this question I may refer to the observation of Schönbein, the discoverer of ozone, who, in his experiments, found that air highly charged with ozone when inhaled brought on a painful affection of the chest—a sort of asthma with a violent cough, which obliged him to discontinue for a time his investigations. Struck with this, Schönbein got several physicians at Basle to compare their lists of catarrhal patients with his table of atmospheric ozonometric observations, and he and they were struck by the unusual prevalence of catarrh on the days when the iodine test-papers showed that ozone was unusually abundant in the air. The observations of Dr. Carl Haller, of Vienna, prove that catarrhs and pulmonary inflammations rise and fall in frequency very much in the ratio of the presence or absence of ozone in the air.

We often notice, specially in young persons, very severe attacks of bronchial spasm induced by the air of some of our most bracing seaside resorts.

Young asthmatics often suffer severely at Margate, while with old people, emphysematous in lung and weak in heart, I have noted the air of Margate in the summer and autumn to prove most beneficial.

A sudden fall of temperature is a potent cause of asthma; so when cold sets in, the asthmatic must protect his chest by warm clothing, and his respiratory organs by a silk handkerchief, which forms an excellent respirator.

A fall in the barometer is usually attended with great discomfort to those who are the subjects of bronchitic asthma with much secretion. In consequence of the diminished atmospheric pressure the superficial vessels of the skin and mucous surfaces become gorged, and secretion is readily effected ; but, owing to the air being already charged with humidity, evaporation does not take place, hence the oppressed condition of the patient.

Seaside air is particularly bad for some, while others, especially those subject to hay asthma, or summer catarrh, are much relieved by it; moisture in the air, soothing to some, is very oppressive to others. The rooms inhabited by the asthmatic should be warmed by an open fire rather than by a stove or hot-water pipes. Candles are better than gas as a means of lighting the apartment. The bedroom must be kept well aired, and the asthmatic must take care that his mattress and pillow are not stuffed with anything that may prove a cause of his fit assailing him as soon as his bed gets warm. Sometimes a feather bed will prove an efficient maintainer of a tendency to nocturnal asthma. One patient told me that the use of an old coffee-bag for a pillow enabled him to sleep well and escape his asthma. Daily exercise in the open air should not be neglected; and several cases testify to the effect of a steady walk in preventing an attack of asthma even when it already threatens. Horse exercise is especially beneficial ; it promotes regular movement of the diaphragm, and is one of the best forms of exercise the asthmatic can indulge in. When the patient is free from any trace of bronchitis, swimming is an exercise that promotes full inspiration in a satisfactory way.

The dietetic management of asthma is a point on

which universal experience teaches that much stress should be laid; and here it is that the patient must exercise some amount of resolution and self-denial.

In the first place, he must avoid any special articles of food that prove indigestible and provocative of asthma, and he must beware of overloading the stomach. A distended stomach acts mechanically, by its pressure upwards against that very important respiratory muscle the diaphragm, to embarrass the free action of the heart and lungs, besides being also a source of reflex irritation to the pneumogastric nerve. If, however, the overloaded stomach does not happen thus to become an immediate exciter of the asthmatic fit, the probability is that the acidity and flatulence likely to be generated in the imperfect digestion of a large mass of aliment will most certainly bring on before long an attack of asthma likely to prove severe and persistent.

The digestive powers of asthmatic patients are, as a rule, weak; hence they must never be overtaxed, and it is a point of some moment to see that the asthmatic is not allowed to take much food when under the immediate influence of any excess of fatigue. He must rest quietly, and then begin to take food slowly and sparingly, using for drink either weak brandy-and-water or else dry Manzanilla sherry. In the general mode of living, it is best for asthmatic persons to make their chief meal in the middle of the day, from one to three o'clock, and to try and take little or nothing after this unless it be some unsweetened rusks, or bread with milk, or a cup of cocoa or tea with plenty of milk in it, not later than seven o'clock.

The dinner should consist of some wholesome meat, as mutton or poultry; fish may be allowed, and so may a light pudding. All shell-fish (with exception of oysters),

cheese, pie and pudding-crusts are notoriously bad, and must be carefully avoided, as should also dessert. The coarser vegetables, such as turnips, carrots and parsnips, are best avoided, and potatoes should be well broken up or mashed.

But little drink should be taken with dinner; but two or three hours after the meal some toast-and-water, or, if the action of the heart be very feeble, pale brandy or whisky and water may be allowed. Highly aerated waters should be taken sparingly, for their habitual employment at meal-times tends to cause flatulence with over-distension of the stomach; thus their ultimate effect is weakening and lowering.

Malt liquors of all kinds are bad, and should be avoided. Sweet and imperfectly fermented wines are also prejudicial.

Dining early in the day ensures the completion of the digestive process before the patient goes to bed, and very greatly diminishes the severity of nocturnal asthma, if it does not entirely prevent the attack coming on.

In the morning, it is to be hoped the patient will have a fair appetite, and breakfast is the meal when this may be indulged with least risk of mischief. Cocoa or tea, with eggs, mutton chops, cold meat, or game, are allowable on the breakfast-table of the asthmatic. Coffee is best kept in reserve for use when the fit is on.

By this practice of taking a good breakfast and an early dinner of wholesome food, with little or nothing during the after-part of the day, it is surprising with what comfort an asthmatic can get through his nights. To submit to this strict regimen always requires some determination, and many persons, especially those who have free expectoration with their asthma, have the very erroneous belief that anything short of three good meals

of meat in a day is a dietary quite insufficient to enable them to bear up against the presumed weakness and exhaustion which must, as they suppose, accrue on protracted attacks of asthma and expectoration. I never yet knew or heard of one patient of this class who was not made in every respect worse by this bad practice of high feeding, with the liberal alcoholic stimulation which is sure to go along with it. The reason of this is that, owing to the high feeding, much blood is made, and this stagnates and congests in the pulmonary capillaries, which can only relieve themselves by secretion of mucus and copious expectoration.

This plan of high living keeps up also a condition of congested liver and abdominal plethora that greatly interferes with the action of the lungs and heart. An Indian gentleman told me some years ago that he knew his liver was becoming congested by the difficulty he felt in performing on his favourite cornet. I have also known a glass of spirits and water to bring on very speedily great oppression in the breathing from producing congestive swelling of the liver and impeded descent of the diaphragm.

To see what good results can be obtained by a severely strict plan of diet and regimen, anyone need only peruse the cases published by Mr. Pridham, of Bideford. One case, first published in the *British Medical Journal* for 1860, is a most impressive one. A clergyman, seventy years of age, had been asthmatic for ten years. He was not able to lie down in bed, and for years every night he had anticipated death before morning; when, however, a copious heavy expectoration had been thrown off the lungs, he was relieved, and was able to get up and move about in much discomfort.

His diet was as follows: At six in the morning, a cup of coffee; at nine he had tea or coffee, toast, eggs, or a

chop; lunch at one, on bread, cheese, and porter; afterwards a good substantial dinner, followed by both tea and supper!

This patient, despite his rather forcible remonstrances, was persuaded to take off three-quarters of the total amount of food taken in the twenty-four hours. The result was that, at the end of a week, he could lie down and sleep; and while his expectoration decreased, his appetite improved. This improvement continued, and in due time he became able to sleep during the whole night with comfort, and resume his clerical duties, which had been for ten years suspended.

This is a well-marked and interesting case for the encouragement of the asthmatic to persevere in habits of self-denial and care in eating and drinking.

In the *Medical Times and Gazette* for February, 1870, is an account of the Abbot of La Trappe, who was a bad asthmatic till he was submitted to the extremely rigid diet of the convent, involving abstinence from meat, and then he quite lost his asthma.

The system of diet which Mr. Pridham recommends for a confirmed asthmatic is as follows—it is certainly a rigid one, but of its curative properties, in many inveterate cases of asthma, there is good evidence:

Breakfast, at eight a.m., to consist of half a pint of tea or coffee, with cream, and two ounces of stale bread.

Dinner at one.—Two ounces of beef or mutton, and two ounces of dry stale bread or boiled rice. Three hours after dinner, half a pint of brandy-and-water (weak), or sherry-and-water, or else toast-and-water *ad libitum*.

Supper at seven.—Two ounces of meat and two ounces of bread.

As a general rule, I prefer to allow the patient a moderate dinner at two or three o'clock, and then to dispense with supper entirely, though a small quantity of toast or bread with butter may be taken at tea-time.

Many patients will be content, and do very comfortably on this restricted system of diet, but others are met with, true asthmatics, to whom rather more license must be given, or they will get into a weak and highly nervous state very adverse to throwing off the asthmatic tendency.

To these cases we must allow a larger number of meals, taking care that they never at any one time have more than from six to eight ounces of food, and as a rule the food should be of a fleshy or nitrogenous character rather than farinaceous or saccharine. Examination of the urine, as to excess of urea, and presence of oxalates or lithates, is a very good guide as to the kind of diet most suitable in a given case.

In some of these cases, where debility is an obvious symptom, I do not hesitate to advise a cup of hot milk during the night, as a means of preventing great exhaustion. If the milk be taken hot, it is not needful to add brandy.

Beef-tea, with pepsine, or lactopeptine powder or pepsine wine, is also a capital food in the daytime in these cases. Benger's pancreatized food with milk forms a good meal for those who require something late in the evening.

When the patient recovers his strength, and the volume of blood circulating in the body and the lungs increases, then it will be requisite to cut down the diet a little, or there will certainly be premonitions of the return of the attacks of breath difficulty. The quantity and quality of the blood, as well as of the air, going

through the lungs of the asthmatic, require to be adjusted; disturbance in the balance of these two circulations is sure to cause difficult breathing.

When we have managed the important but often difficult matter of getting the asthmatic patient to abide by a regular system of diet, and when a short experience has proved to the patient that he is *not being lowered*, but, on the other hand, *manifestly invigorated*, both in body and mind, by what may at first appear to one who has been a high feeder rather scanty fare, then is the time to endeavour by medicines to overcome the asthmatic tendency in the constitution.

The medicines that appear to me most generally useful in overcoming the tendency to asthma are of the tonic and nervine class; thus, iron, quinine, mineral acids, silver, zinc, arsenic, with many others, possess good claims to our notice.

To give a tonic during the day and an antispasmodic at night I often find a successful practice, as the following case shows:

Case I.—Sarah H., æt. 22, living at Limehouse, came to the Victoria Park Hospital in the summer, in consequence of attacks of asthma. Her mother died of this disease, and she has two brothers, between 20 and 30, who are great sufferers, and in whom the asthmatic physique is already developed, though this is not the case with the patient, who is well made, and of healthy, rather florid aspect.

She has been ill two years, and is worst in damp weather; always has some amount of dyspnœa, but the worst attacks come on when in bed.

There is no history of gout or rheumatism in the family, nor of any skin disease.

Chest fully resonant, breathing feeble. No râle or rhonchus. Tongue moist. Pulse 74. Bowels not open.

This patient for the space of five weeks took no other

medicine than a quarter of a grain of extract of stramonium every night, and a mixture of

Ferri sulph., gr. i.
Mag. sulph., ℈i.
Aq. menth. pip., ℥i.

three times daily. At the end of this time she declared herself to be free from difficulty in the breathing, and was discharged cured.

The tendency in this case clearly was to the production of an emphysematous state of lungs. The constant sense of dyspnœa and hereditary predisposition pointed to this, and it is in these cases where iron preparations, especially when combined with a saline laxative to relieve congestion of the abdominal viscera, are so very beneficial.

Congested liver a cause of asthma and emphysema of long standing; much relief from Carlsbad salt.

Case II.—Rev. W. B., æt. 51, seen July, 1871. Family history good, both parents having lived to a great age, and both free from gout. Patient has been troubled with fits of asthma during the last twenty-three years. No history of any inflammatory attack in the chest, no relief from stramonium, belladonna, or nux vomica, all of which remedies appear to have been fully tried. The fit of asthma comes on in an ingravescent way at any time of day or night; it gradually gets worse, but when a glutinous expectoration is discharged, patient feels relieved. On examination patient has a distended chest, full abdomen, with enlargement of liver, heart sounds weak and muffled, with systolic apex murmur. Pulse 92, soft. Throat and tongue dusky-looking. Urine loaded with lithates. Extra resonance of chest, breath sounds feeble, expiration prolonged, with wheezy râles.

I prescribed a small teaspoonful of Carlsbad Sprudel salt in warm water first thing in the morning three

times a week, and the use of one of Joy's cigarettes whenever the asthma seemed impending.

Though this patient did not get quite well, he repeatedly assured me that he never got such relief from his asthma before as he obtained when he had for some few weeks persevered with the Carlsbad salt. He continued for many years in fair health, and eventually died of cerebral apoplexy.

Both of these cases show the great importance of attending to the abdominal organs of asthmatic people, and I have repeatedly obtained much credit by the use of a prescription of sulphate of magnesia with tincture of calumba and mint-water in cases where a variety of sedatives, inhalations, expectorants, and tonics had been administered during periods extending sometimes over months, and not uncommonly over many years.

Habitual dyspnœa, cough, and irritation of throat are symptoms often complained of much by this class of patients, and we find them usually carrying about various lozenges for the relief of the throat troubles.

Care as to diet and a mild alkaline laxative to relieve abdominal plethora soon enable them to throw away all their lozenges. A small tumblerful of the Ems water at bedtime I find very beneficial in cases of mucous catarrh of the throat and fauces, and preferable to astringent lozenges, which so often impede digestion and constipate the bowels.

Asthma due to bronchitis; spasm a feature in the case, long course of treatment, and at last complete cure by oxide of silver.

Case III.—Isaac P., æt. 24, a pale dark youth, has been some time under treatment for cough and difficult breathing, the result of a severe cold caught six months ago.

Seen by me August 5. He has just come back from Hastings, and while there had very little cough and very little asthma, but since his return to the vicinity of London his cough has returned, and at night he has sudden and bad attacks of difficulty in the breathing.

The chest resonance is good, breathing feeble, skin cool, pulse quiet.

℞ Ext. stramonii, gr. ½ om. nocte.
And mixture of phosphoric acid, ether, and mint-water three times daily.

August 12.—Much relieved; rests well.

August 19.—Worse, breath very bad; add to mixture, tr. lobel. ether, ℥ xv.

I did not see him again until September 23, when he came to me quite as bad as he was when first seen; he says the stramonium pill has lost all its effect; and at night he starts up with sudden attacks of dyspnœa, pallor of face, abdomen strongly drawn in at epigastrium. The pulse is weak, but no cardiac disease to be detected.

From October 7 to 21 he took, twice daily, a pill containing a quarter of a grain of oxide of silver, and a mixture with some dilute nitric acid, and this treatment told at once on his asthma, so that at the end of October he seemed to be perfectly cured.

This was a complex case. The origin of the asthma was bronchitis; the mild air of Hastings gave relief, but it was a nervine tonic medicine acting specially on the gastric mucous membrane that was curative. In 1787 Dr. Withers recommended oxide of zinc in dose of five grains three times a day for the cure of asthma, and this oxide appears of value in some cases, but to me its action has not seemed so well marked as that of the silver oxide.

In 1889 I observed very marked benefit from the use of small doses of nitrate of silver in the case of a gentleman who suffered severely from asthma and flatulent

dyspepsia. Oxalates were abundant in the urine, but the lungs were sound and free from disease. By causing this patient to live very simply and dine always in the middle of the day, while he took about one-twelfth of a grain of nitrate of silver three times daily, a permanent cure of his asthma seems to have been effected.

Spasmodic asthma after bronchitis; relieved by oxide of silver, cured by arsenic.

Case IV.—Charles W., æt. 36, has been liable to asthma for two years since he got wet. The attacks come on very early in the morning, and pass off with cough and expectoration of clear mucus. Chest resonant, heart-sounds feeble generally.

℞ Argenti oxidi, gr. i.;
Ext. lupuli, gr. ii.

This pill was taken at bed-time with speedy relief. One night he omitted the pill, and the attack at three a.m. was as bad as ever.

He kept well for some time, but after taking cold the asthma returned, and the pills failed to relieve; a change was therefore made to the liquor arsenicalis, three drops three times a day in infus. calumbæ. Under this medicine he got quite well.

Arsenious acid and the liquor arsenicalis (Fowler's solution), which is arsenious acid dissolved by carbonate of potash, are both valuable remedies in the cure of spasmodic asthma.

The arsenious acid may be given in a granule or pill made with manna, in a dose of one-fiftieth to one-twentieth of a grain with perfect safety, and the liquor arsenicalis may be given in a dose of ♏ iii. to ♏ viii., the larger dose representing one-sixteenth of a grain of arsenious acid.

The liquor sodæ arseniatis, which contains a definite

arseniate of soda in the proportion of four grains to the ounce, is also a good preparation, and may agree better with the stomach than the arsenious acid preparations.

The following cases illustrate the effect of arsenic as a remedy for asthma :

Spasmodic asthma of ten years' standing ; great relief from Fowler's solution.

Case V.—In October Edward G., æt. 33, came to the hospital. Been liable to asthma for ten years ; from age of twelve had a cough and shortness of breath. At times is free for some weeks of all breath difficulty. Face cheerful, pale, no congested look. Heart and lungs good. Not worse in damp weather, always breathes best when in London ; lives at Bethnal Green.

The attacks come on about four a.m. with sense of tightness across the chest, and go off with cough and mucous expectoration.

Never any hæmoptysis, gout, rheumatism, or skin disease.

℞ Hst. ferri et quassiæ c. mag. sulph., gr. xx. t. d. s.
Pil. conii co., o. n. s.

November 1.—*In statu quo* in all respects *pt. omnia.*
November 8.—Worse. Had a bad attack.

℞ Liq. Fowleri, ♏ iii., ex inf. calumbæ, t. d. s.
Pt. Pil.

Once or twice feared an attack was coming for the first week, but persevered with the medicine, and on November 29 felt well enough to be discharged, greatly relieved. In this case the intervals of perfect freedom from breath difficulties should be noticed as a favourable element.

In uncomplicated asthma of children the Fowler's solution is often very serviceable. I select one from among many instances in proof :

Spasmodic asthma in a boy cured by liquor arsenicalis.

CASE VI.—Henry W., æt. 10 years, a fair lad, was sent to me at Victoria Park Hospital by Dr. Borlase Hicks.

The boy has bad attacks of nocturnal asthma, obliging him to sit up at night; he is worse in hot weather, but gets relief when at the seaside. He has a good deal of cough; wheezy sounds with very prolonged expiration are audible over his chest. Tongue clean and moist.

He once had eczema of the scalp, and as this eruption got well the asthma developed itself.

Belladonna and bromide of ammonium gave no relief whatever, but during the month of July, when his attacks were at the worst, I put him on small doses of the liquor arsenicalis, with speedy and most decided relief to all his bad symptoms.

The presence of some amount of bronchitis and gastric disturbance need not prevent the curative action of the arsenical solution.

Severe attacks of asthma of long standing, with chronic bronchitis; complete cure by Fowler's solution.

CASE VII.—In the following case the curative effect of Fowler's solution was both prompt and permanent.

On July 7, 1864, at the end of a rather heavy afternoon's work at the hospital, a patient, looking the picture of misery from chronic chest troubles, came to me for advice.

Her age was about 50, and her complaint was of cough and much yellow expectoration, with extreme dyspnœa, debility, loss of appetite, and frequent vomiting of her meals.

The chest was tender but resonant, respiration very feeble. Tongue red-edged and furred in centre. This patient was ready with a long account of the advice she had had and the amount of physic she had taken, but, not having time left to hear all this, I advised her to

take the following draught three times daily, with the pill at night, and come to me again in a week:

℞ Hst. calumbæ c. soda.
Liq. Fowleri, ♏ ii., t. d. s.
Pil conii co., gr. v. om. nocte.

In a week's time the relief to all the symptoms was most remarkable; she continued the treatment till the hospital letter was out, and on May 27, 1867, I saw her looking stout and healthy; and she said she had not needed any treatment since she left Victoria Park Hospital in August, 1864.

Complicated asthma; symptoms aggravated by arsenical solution, relief by other remedies.

Case VIII.—Mrs. Mary B., æt. about 50, has been attending at Victoria Park Hospital for ten years, in consequence of great difficulty in the breathing, with dark expectoration, at times mixed with blood.

Stout, not unhealthy in aspect, has severe cardiac palpitation at night. No murmur heard.

Ordered on February 20, 1866, to take

Liquor Fowleri, ♏ ii., ter die.

March 1.—Much worse. The spitting of blood has been very troublesome. Omit the medicine, and take the following:

Sodæ hypophos., gr. v.
Sodæ bicarb., gr. v.
Aq. menth. pip., ℥i., m. t. d. s.
Pil. zinci et hyoscyami, om. nocte.

March 22.—The 'jumping' of the heart is almost gone, the breath is better, and she rests better; continued well till November 5, 1866, when, as the cold weather came on, she returned, and when asked, stated that she had kept pretty well since her attendance in the spring.

I should not now prescribe arsenic where hæmoptysis and a feeble heart were present as prominent symptoms.

CHAPTER VI.

Medicinal treatment of asthma continued—Value and safety of arsenical preparations—Cases—Mont Dore waters—Phosphorus and hypophosphites—Sulphur and its compounds—Waters of Amélie and Cauterets—Many cases of asthma must be treated on general principles with a view to allaying irritation of the pneumogastric nerves—Illustrative cases.

It is now more than twenty years since I first became convinced of the value of arsenical preparations in the treatment of certain forms of asthma, and during that period I have never once seen harm of any kind from the careful employment of this medicine. The remedy is not new, for A.D. 54 Dioscorides used the sulphuret of arsenic in the treatment of difficult breathing. Arsenic, like sulphur, may act by correcting some morbid diathesis in the blood. Arsenic also seems to me to possess some special power over the pneumogastric nerve.

Some years ago I had under my care a mother and daughter, the first suffering severely with irritative dyspepsia and vomiting, the second with bad attacks of spasmodic asthma. In each case the relief obtained from the use of one drop of Fowler's solution three times a day was most decided, far surpassing that from all the numerous medicines previously tried. It seems here reasonable to suppose that in each case the pneumogastric nerve was in a state of irritation; in the daughter the irritation showed itself in the pulmonary

branches of the nerve, in the mother in the gastric branches. The same medicine proved curative to both patients. Some asthmatics are much tried at times by feeling a most inordinate and voracious hunger, which, if indulged, is sure to bring on a bad fit. Here, doubtless, the vagus nerve is concerned.

To explain the nature of undue irritability of the pneumogastric nerve seems impossible, but the fact continually comes before us in practice. One person gets violent dyspepsia, is in fact poisoned if he partakes of certain articles of food that to most others are harmless; a second individual gets a stoppage of his breath and spasm at the chest if he inhales the smell of hay, of linseed meal, or of ipecacuanha powder—substances the odour of which is without effect on most of mankind. In these cases the pneumogastric is poisoned at its pulmonary rather than at its gastric extremities. The following cases further illustrate the curative action of arsenic :

Spasmodic bronchial asthma; much relief from arsenic and Gicquel's cigarettes.

Case IX.—Mrs. E., æt. 40, was laid up with bronchitis eighteen months before I saw her in September, 1875. The bronchitis got quite well, but during the last two months this lady has had attacks of severe asthma every night, obliging her to sit up in bed, and passing off with cough and expectoration.

During the day she is quite well, except when the air is clear and cold. Appetite good, respiratory sounds over chest feeble. Pulse 60. Throat healthy, tongue clean.

A course of iodide and bromide of potassium gave very slight relief. Subsequently she was ordered to take five drops of liquor sodæ arseniatis in infusion of gentian three times daily, to have the chest well rubbed

every night with a stimulating liniment, and to inhale the fume of one of Gicquel's cigarettes whenever an attack of asthma was threatening. In answer to inquiry, in March, 1876, I was informed that since using these cigarettes and the arseniate of soda medicine she had been quite free from asthma. The Cigares Anti-asthmatiques de Gicquel (of Saint Malo) are well known in France, and, in cases of asthma with bronchitic tendency, they answer much better than nitre-paper. Phthisical patients who suffer much with spasm in their breathing have told me that these 'cigares' often afford them ease.

The Mont Dore waters are said to owe their anti-asthmatical properties to the presence of arseniate of soda. The Bourboule water has a proportion of one-thirteenth of a grain of arsenious acid to the pint. That in asthma, with chronic catarrh of the throat and air passages, these waters are valuable is well proved, and numbers of invalids resort to Mont Dore every summer, often with great advantage. Dr. Emond claims much for the spray treatment at Mont Dore in cases of obstinate rhinitis, and such experience as I have had bears out this claim. The power of small doses of arsenic to increase the strength of respiration is well illustrated in the case of the peasants of Styria; these so-called *ratsbane-eaters* being reported as very strong and healthy, while they often take one or two grains of white arsenic daily. It is, indeed, reported that far larger quantities than the above are taken, but recent inquiries appear to throw doubt on such assertions.* In the case of a young woman under my care in Victoria Park Hospital, who lost her severe asthmatic attacks entirely under treatment by arsenic, we noticed a decided gain of weight during the course of treatment.

* Wood's 'Therapeutics,' p. 315.

Arsenious acid is soluble in the proportion of 1 in 100 of cold, and 1 in 20 of boiling water, and I have used such solutions in the spray atomiser, diluted so that about one-twenty-sixth of a grain in solution was used at one time. I cannot, however, report any extraordinary results from this practice.

It will be observed that in Case VIII. phosphorus, in the form of the hypophosphite of soda, did good after arsenic had failed.

The hypophosphites of soda, potash, and lime are salts that I have long used with advantage in many forms of pulmonary disease. When properly prepared, these salts are so rich in phosphorus that they burn when heated on a spatula in the flame of a lamp; they are very soluble salts, and rarely disagree with the stomach, though sometimes a good deal of flatulence is complained of shortly after taking a dose of the hypophosphite.

The hypophosphite salts are preferable to arsenic in cases of asthma, with tendency to bronchitic complications and congestion of lung. The following case illustrates this:

Asthmatic attacks at night, with intensely susceptible chest; cure by the hypophosphite of lime.

Case X.—Ann G., living at Peckham, æt. 42, has been ill one month with severe cough and frothy expectoration; at night she is seized with attacks of asthma, with spasmodic pain across lower part of chest. She is much worse if it be at all wet, and one night, on its coming on to rain, she was at once woke up from her sleep and obliged to have the fire lighted before the breathing was at all relieved.

The chest is resonant, and bronchitic râles are audible on both sides.

℞ Calcis hypophosphit., gr. v.
Aq. menth. pip. ℥i., m. t. d. s.
Pil. conii co., gr. v. om. nocte.

Tincture of iodine applied to the chest.

In a fortnight the relief to the breathing was very decided; she began then to take quinine. In a week more the susceptibility of the chest was greatly diminished, and all signs of bronchitis had entirely vanished.

This is one, as an example, of a class of cases of very susceptible chest, associated with more or less bronchitis, though the difficulty of breathing and asthma is out of all proportion to the amount of bronchitis present in the lungs. The hypophosphites of soda, potash, and lime may often be given with great advantage in these cases, and I believe these salts act partly by their invigorating effect on the nervous system.

At times phosphorus, one-fiftieth of a grain, with sufficient solid fat to make a small pill, or phosphorated oil in a capsule, will answer better than the hypophosphite salts in relieving the dyspnœa. It is in cases of bronchial and pulmonary congestion that phosphorus appears to act with most advantage.

In the case of a lady æt. 43 years, who, in consequence of a severe cold, had got chronic bronchitis of eighteen months' duration, with very bad attacks of nocturnal asthma, I tried stramonium, arsenic, mercury, and iodide of potassium without in any way relieving the dyspnœa. After between two and three months of treatment to very little purpose, I tried the phosphorus pill, one-fortieth of a grain, three times daily. After a short time the relief obtained was decided, and for a while, indeed, I thought the patient was cured, but I hear that recently, while away from town, she has had rather a bad relapse.

Sulphur is another medicine valuable in the treatment

of spasmodic asthma. It was suggested years ago, by Duclos of France, that asthma was a manifestation in the air-tubes of a herpetic diathesis, the varieties of asthma corresponding with various forms of skin disease. On this hypothesis Duclos placed much reliance on arsenic and sulphur as remedies for asthma.

Sulphur is best employed in the form of some of the sulphur waters found at Harrogate, in Yorkshire, and at Eaux Bonnes and Amélie les Bains, in the south-west of France. These waters must be employed only when inflammatory action is quiet. The warm and mild climate of these two last places will tend to check any bronchitic irritation of the chest, and so prepare the way for the use of the waters.

The hot sodaic sulphur springs of Amélie, used in vapour bath and by inhalation, have proved eminently curative in cases of asthma due to sudden suppression of habitual perspiration of the feet.

Another thermal sulphur station is found at Cauterets, the sulphur existing in the form of the sulphide of sodium, together with chloride of sodium, silica, and organic matter.

The water of the Raillère spring, at a short distance from Cauterets, enjoys an increasing reputation for the cure of chronic laryngitis and pharyngitis, and especially is this water praised for cases of humid asthma.

If there be any tendency to blood-spitting, the cool and bracing air of Cauterets is preferable to the milder and more sedative climates of Amélie and Eaux Bonnes.

The sulphur waters of Marlioz, near Aix, in Savoy, used by inhalation, have done great things for a patient of mine long subject to catarrhal asthma. It is in bronchorrhœa and humid asthma that we may, according to Dr. Macé of Marlioz, expect benefit from the use of

these sulphur waters. In rheumatic cases, too, these waters are strongly indicated.

Inveterate asthma is often kept up by chronic pharyngitis and rhinitis, the follicles of the tonsils, pharynx, and nasal passages being swelled and irritable; often I believe this affection is a true herpes, and in these cases sulphur is one of the best medicines that can be employed.

When circumstances prevent the patient from resorting to any of the sulphur springs, we may try the effect of administering the sulphur in powder, or as the confection of sulphur of the B.P. Well-washed sublimed sulphur is generally preferable to the precipitated sulphur, and it may be given in doses of from five to ten grains night and morning, with an equal quantity of heavy carbonate of magnesia mixed in milk.

The oleum sulphuratum, or balsam of sulphur of the Ph. Lond., 1824, is made by dissolving one part of sublimed sulphur in eight parts of olive-oil, and is a brown viscid substance with a most unpleasant smell; the dose is forty to fifty drops, and it has proved a good remedy to my knowledge in some forms of asthma. Allen and Hanbury's anisated balsam of sulphur is a more agreeable form than this balsam of sulphur. The anisated balsam is best taken in drops on sugar.

Another preparation of sulphur that I have found serviceable is the sulphurated potash of the B.P. This salt may be given in the form of tincture, or as a pill, containing one grain to the dose.

While the action of preparations of sulphur, phosphorus, and arsenic in cases of asthma is often strikingly curative, yet there are cases where these medicines fail, though the case may be one of uncomplicated asthma.

This class of cases must be dealt with on general

principles, the object of treatment being to allay irritation of the nervous system and to invigorate the same by means of nerve tonics.

Where the tendency to asthma is due to rheumatism, the patient being invariably worse in damp weather, the iodide of potassium or ammonium combined with the carbonate of ammonia may be given with confidence. Camphor water or plain water with syrup of orange, is generally the best vehicle for the administration of these salts. The addition of tincture of belladonna to the iodide mixture appears often to add much to its efficacy.

The two following cases illustrate the value of treatment directed to the diathetic state:

A case of asthma with rheumatoid affection; cured by iodide of potassium.

Case XI.—William P., an elderly man, has long suffered with what he calls rheumatic gout affecting the smaller joints, and in May, 1865, he came under my care at Victoria Park Hospital for attacks of dyspnœa of extreme severity, together with a cough, attended with expectoration, sometimes clear and frothy, at other times yellow and thick. No signs of structural change to be detected in the heart or lungs.

The treatment here was simple and successful.

He got a mixture of—

Potass nitrat. } āā gr. v.
Pot. iodid. }
Aq. menth. pip., ℥i., t. d. s.;

and this after a fortnight was followed by a chalybeate tonic.

In six weeks the man was discharged cured, and a month or two after wrote a note spontaneously, to express his satisfaction at the immunity from asthma, as well as from any fresh gouty attacks, which he now enjoyed. No expectorants were used in this case,

the treatment being mainly directed at the diathetic state.

Some time ago I had under my care, at the West London Hospital, a man who had most severe attacks of nocturnal asthma; his general health was good, he had not much cough, but the asthmatic configuration of chest was marked with some slight evidence of a rheumatic diathesis. I prescribed for him stramonium, ipecacuanha, conium, and one or two other medicines without the least benefit.

One day, in my absence, the house surgeon, Mr. Hill, ordered this man a mixture with iodide of potassium; and he told me he never had anything before that gave him such relief; he took the mixture for some time, and was discharged greatly relieved.

Obstinate asthma with bronchitis; much relief from iodide of potassium.

Case XII.—A coachman who was of a marked rheumatic diathesis was admitted into Victoria Park Hospital with marked dyspnœa and cough with expectoration. He attributed his illness to frequent colds taken in the pursuit of his calling. This man told us he had tried every remedy for asthma that he had seen advertised, but with very little benefit. Belladonna and decoction of euphorbia pilulifera were not of much use, but a most marked amendment in all his symptoms took place when he was placed upon doses of iodide of potassium and carbonate of ammonia, of each five grains, in camphor-water three times in the day.

Hereditary asthma in a brother and sister—coexistence of skin affection; relief from sulphurated potash.

Case XIII.—The following case, already casually alluded to, illustrates well the supervention of bad hereditary asthma.

Henry B., a clerk, æt. 16, living in Essex, came for advice to Victoria Park Hospital, September 21. He is a healthy-looking youth, and he complains of severe

attacks of spasmodic asthma. States that his father had asthma for thirty-six years, and he has a sister a few years older than himself who has been asthmatical for six years. Mother is free from all sign of the complaint.

Patient first began to be affected with asthma when 13 years of age; the attacks usually come on about seven in the evening; he has them also in the night.

For an hour before the attack there is much tightness about the chest, and a feeling as if the chest would burst. He has fits of violent shaking cough, but never much expectoration.

He is always much worse in close, thundery weather; he cannot at such times remain in bed with comfort.

Tongue is clean and appetite good, but he never touches butcher's meat; says he cannot swallow it; eats much bacon. The throat, when examined, looks healthy, except that the palatine arch on the left side seems more ample than that on the right.

The action of the heart is feeble, but regular. Note is made of prolonged expiration on both sides.

This patient received a mixture containing some of the tr. nux vomica, with dilute phosphoric acid, and while taking it he thought there was less of the constrictive pain about the chest.

In October, as he drew attention to an eruption about face and neck, he was ordered some of the liquor arsenicalis; and after fourteen days this was changed to a mixture containing three grains of hypophosphite of potash three times in the day, and pil. conii co., five grains every night. Under this last medicine he improved, so that he had but two attacks of asthma during the week. At the same time the cutaneous irritation subsided, and he was greatly relieved. After this he appears to have got notable relief from a pill containing half a grain of sulphurated potash three times in the day.

He remained in comfort till some wet weather set in, early in November; then his asthma came on as bad as ever again, and he had six or eight bad attacks in a week. During these seizures the distension of the chest

was so great as almost to burst his clothes open. The chest in the intervals was extra-resonant, its expansion free, expiration very prolonged, and no râle or rhonchal sound could then be heard anywhere.

A pill of ext. stramonium, half a grain, was now given every night, and he was advised to inhale one or two of the ' Cigarettes de Joy ' every day.

In February this patient suffered severely, his asthma taking him at all times, obliging him to hurry out of church and get to a warm room, where his breath seemed easier. At this time a pill of the ext. belladonna was tried at night, but from it no sort of relief was obtained ; indeed, he thought he was worse on the nights when he took this pill.

An important feature in this case was a great tendency to constipation of the bowels, and an appetite that at times was voracious for such things as he could eat, and he seemed to prefer the asthma to the strict dietary that I constantly urged upon him. I was the more anxious as to the diet from observing that the worst attacks usually occurred on Sunday, when he was at home in the country and took a good dinner of bacon.

This young man's sister had dry asthma, with well-marked psoriasis of the skin, and in her case the liquor arsenicalis was of great service.

CHAPTER VII.

Effects of inveterate asthma on the lungs, heart, and system generally—Asthma complicated with organic disease of the lungs—Its signs and symptoms—Production of emphysema in asthma—Paralytic condition of the lungs, with difficult expiration—Treatment—Expectorants—Nux vomica—Quinine—Grindelia Robusta—Euphorbia Pilulifera—Inhalations—Condensed air—Use of galvanism—Climate—Regimen.

SPASMODIC asthma, though in the first instance a nervous affection, will, if unrelieved, produce sooner or later actual disease and structural change, not only in the lungs, but also in the heart, and thus serious and often incurable evils accumulate upon the unfortunate patient. Nervous irritation appears often to antedate the development of tissue change. We see this exemplified in cases of actual disease following obscure pain and neuralgia, also in the troublesome itching which annoys elderly people before a true eczema appears on the skin.

It is when asthma begins to manifest itself in those who are somewhat advanced in life that these effects are most certainly and most rapidly developed; hence when a patient over forty years old begins to be troubled with asthma, with or without catarrh, it is of the greatest consequence that all proper means should be taken to cure the complaint as fast as possible, or it will probably soon cause dilatation of the heart, and congestions of the lungs, liver, and brain will appear as very serious features in the aspect of the case.

Where the asthma begins its attacks during youth the system becomes much more tolerant of the strain and perturbation to which it is subjected, and it is a common thing to find aged asthmatics who have been harassed by the complaint quite from an early age, and who, with the exception of some chronic bronchitis and emphysema of the lung, seem but little damaged.

In the case of a gentleman, sixty years old, asthma had become developed during youth, and was now, after thirty years, complicated with bronchitis and emphysema of the lung. Advice in this case was sought on account of the severe asthmatic paroxysms, and when free from these the patient's life was one likely to last for many years.

The supervention of fits of asthma in a youth, in whose family gout is hereditary, at a time of life when it was usual for this last-named disease to make its first appearance, gives every prospect of a very troublesome, though not dangerous, form of asthma; and if, when the asthma is fairly set in, the patient rather rapidly should increase in bulk and become stout, another sign is shown of the tendency of the asthma to settle and be confirmed in the system.

We may feel convinced that the pulmonary organs are beginning to suffer damage from protracted asthma when we observe that there is no longer complete freedom from all breath difficulty in the intervals between the fits of severe dyspnœa. The patient is always more or less short-breathed, but especially bad in the morning when he rises and begins to move about, and cough and persistent expectoration become more and more annoying. The originally dry asthma will thus become quite of the moist or humoral character, the susceptibility of the chest to cold increases, and the expectoration after a

while becomes sometimes frothy, sometimes purulent, under the influence of attacks of bronchitic inflammation.

Gradually the lung tissue loses its elasticity, and the lungs are not sufficiently emptied of air in expiration; the chest movement is therefore small in the way of direct expansion. The chest, especially in cases originating in neglected bronchitis, may be bulged and barrel-like, with an up-and-down, rather than an expansive, motion in respiration, or it may be flattened from atrophous emphysema of the lung. The former state is, in asthmatics, the most common, and usually indicates chronic bronchitis of some standing, with more or less of emphysema, tending to the atrophous form as years advance. On percussion, the chest is extra-resonant and drummy, and in large-lunged emphysema it may not be easy to make out the area of cardiac dulness, in consequence of the heart being overlaid by resonant emphysematous lung. Powerful impulse of the right ventricle may often be felt at the epigastrium in these cases. In those whose asthma dates from early childhood the lower part of the thorax is usually flattened and collapsed in consequence of imperfect expansion of lung and pressure of the atmosphere on the yielding cartilages.

It is well to note that, as Dr. Walshe has stated at page 487 of the second edition of his work on the lungs, a condition of over-distension of the lung can be so far improved by treatment that the area of the heart's superficial dulness can be demonstrably increased. This fact should be borne in mind, or otherwise examination of the heart may lead to the erroneous idea that we have demonstrated enlargement of this organ instead of diminution of the lung, and we may be prophesying evil at the very time when we are doing manifest good by our treatment.

When the face becomes congested and the jugular veins swollen, the urine loaded with lithates, the ankles œdematous, and a distinct impulse is seen and felt at the epigastrium, then it will be found that the right side of the heart is becoming enlarged, and the case becomes one of very grave aspect.

Such is a short outline of some of the symptoms by which we may infer that a case of asthma is becoming more or less complicated with structural disease, and we must arrange our prognosis according to the degree in which these symptoms exist, and the way in which they progress, and the climatic and general surroundings of the patient.

A certain amount of emphysema of the lung is nearly always found associated with asthma, and, indeed, the emphysema being hereditary,* is often, as a congenital infirmity, at the bottom of cases of asthma met with in young children, and which cannot be traced to any attack of bronchitis, whooping-cough, or chronic enlargement of the tonsils. Here the emphysema is the cause, not the effect, of the difficult respiration. In those other cases where the primary disease is purely nervous in its character, emphysema with dilatation of the air-vesicles of the lung is gradually brought about by the excess of respiratory effort, and is pretty uniformly observed in both lungs. In 1885 I met with a very obstinate case of hereditary asthma and emphysema. One day the patient said that his brother had his first fit of asthma after rowing in a match. The asthma never left him, and eventually issued in heart disease and dropsy.

By degrees, after the emphysema has attained some extent and existed for some time, we get atrophic changes produced in the lungs. The nutrition of the

* In the proportion of 60·4 per cent. (Fuller).

air-cells suffers from insufficient supply of blood, because, as M. Pousseuille has shown, with excessive inflation of the lung a less quantity of fluid passes through the capillaries in a given time; the cell walls, therefore, become granular-looking, fatty, lose their natural elasticity, and fail progressively in function.

The lung, failing in nutrition and power, becomes increasingly liable to attacks of bronchitis and congestion; hence we usually find more or less of chronic bronchitis going along with emphysema, though, in the first instance, the emphysema is evolved without any bronchitis of necessity being present. A fibroid condition of lung may be developed in some cases without that inflammatory process which is usual in fibroid phthisis, and we do not, in atrophous emphysema, observe the extraordinary contractions and displacement of organs so common in fibroid phthisis.

The majority of asthmatics who come under treatment present instances of asthma complicated with emphysema and chronic bronchitis, and when these conditions have for some time existed in a severe and aggravated form we get a class of cases of organic or complicated asthma presenting features and symptoms different to those we meet with in spasmodic asthma, and requiring some modification in our method of treatment.

These are the cases that have been already alluded to, where the difficulty in the breathing is presumed to be of a paralytic rather than of a spasmodic nature. The labour with these patients is in *expiration;* they cannot, to quote the words of a veteran member of the medical profession once under my care for this kind of asthma, 'get the air out of the chest.' Another elderly man said it seemed as if a door opened to let the air in, but that he could not get it back again out of his chest.

The *expiratory* difficulty in chronic bronchial catarrh has been demonstrated experimentally by Waldenberg. See Ziemssen's 'Cyclopædia,' vol. v., p. 401, where is depicted Waldenberg's ingenious instrument for promoting expiration.

In these cases of paralytic dyspnœa the nervous irritability is exhausted by repeated attacks of spasm, verging on paralysis, and though this be not a very promising aspect of affairs, yet it is certain that much good can be done, and relief afforded without any very complicated process of medication. The bronchial spasm of emphysema is probably, as Biermer thinks, reflex, and due to over-distension of the lung-cells. The air is retained in the lung just as urine may be retained in a paralyzed bladder.

The use of sedatives in these cases is very limited; opiates, indeed, are harmful, and expectorants do little else than disturb and nauseate the stomach, without rendering us much help for the chest. I have thought sometimes that the tincture of lobelia, in doses of thirty to sixty drops, the tincture of benzoin, and the tincture of larch bark, have done temporary good where there has been a good deal of puriform expectoration; but I have never seen anything like the permanent good effect from any of the above-named remedies that I have seen come of a careful use of tonics, all expectorant remedies being banished from the field of action at the same time. That which, from its occurring more than once, has impressed me as remarkable, is the circumstance that some of the patients of the class above described have a strong prejudice against taking tonics. An old gentleman, who, under the belief that his asthma was due to suppressed gout, and who was often told that he 'ought to have the gout,' and had been thoroughly drenched with a variety

of alkaline waters to no purpose, told me that whatever he took it must not be a tonic. The medicine he had, and the only medicine that he declared had ever done him good, was the tincture of nux vomica with dilute phosphoric acid; and we never entered upon any discussion again as to whether tonics were suitable or not.

Probably this aversion of the emphysematous asthmatic to the use of tonics has its foundation in the circumstance of these remedies having been inopportunely or prematurely, and perhaps rather pertinaciously, tried at some earlier period in the case, when the indications were rather in favour of the use of antispasmodics alone, or at a time when some passing attack of true bronchitic inflammation might have required the temporary use of salines or expectorants.

It is when there is absence of true inflammation, and when expectoration and difficult breathing seem always to be worse as the patient gets weaker, that expectorants are of so little service, while bark, iron, and quinine come in as invaluable remedies permanently to benefit the dyspnœa by invigorating the general system.

When we consider further what the condition of the respiratory organs appears to be in these cases of old standing complicated asthma, we shall see why tonics and remedies likely to improve nutrition are so strongly indicated.

The chest is in a constant state of over-distension, and the lungs themselves are over-full of air, just as they are when they are paralyzed by section of the vagus nerve, and there seems good reason to think that in some of these cases it is insufficient innervation of the lungs that is the cause of the dyspnœa rather than any great amount of emphysema of the lung substance. I have for a long time practically felt that we must recognise this paralytic

form of asthma with very difficult expiration as distinct from spasmodic asthma with closed lungs, and I observe that both Dr. Walshe and Dr. Fuller recognise the same distinction. That this form of asthma may be a true paralysis is proved by Dr. Fuller, who has traced some of these cases after death, and found very trifling emphysema of the lungs, though during life the dyspnœa had been excessive (Fuller on the Lungs, second edition, pp. 375, 376). In these cases of dyspnœa the movement of the lower part of the chest-walls and especially of the diaphragm should be closely watched.

In one of the most highly-developed instances that I ever beheld of pulmonary emphysema, as I judged, of atrophous kind, resulting from severe asthma of thirty years' duration, the patient remarked on the relief that he derived from the process of percussion over his chest. The thumping with the fingers over the chest seemed to dislodge the stagnant air from the lungs, and so had a reviving effect on the patient. In another case vigorous massage along the region of the diaphragm relieved the patient greatly, and answered better than did the inhalation of compressed air from Waldenberg's spirometer. These cases do sometimes get good from breathing a condensed and concentrated atmosphere in a chamber built for the purpose. Though there is much that is discouraging in the prospect of attempting to treat the case of one, the air-cells of whose lungs are losing their natural elasticity and undergoing a process of degeneration, yet we must recollect that it is impossible to obtain absolutely certain evidence that real degeneration of tissue has set in, and in a large number of these cases of paralytic and emphysematous asthma the real and permanent good that can be done with the tincture of nux vomica, and with very small doses of strychnia, is un

mistakably great. The tincture may be given in doses of from three to five drops, and the liquor strychninæ of the British Pharmacopœia in doses of two to five drops.

My own plan is to keep up for some time the administration of very small doses in a simple medium, such as mint-water; and given thus carefully I have never seen the slightest evil effect produced. Great benefit has been found to result from small doses of the extract or tincture of nux vomica in cases of dyspnœa where the expiration is very much prolonged. In one case that was cured by nux vomica under Dr. Duncan, electricity had been previously tried with no effect.

In the cases of those who are markedly worse when there is much damp about, the iodide of potassium, with or without the addition of tincture of belladonna or stramonium, is worth a trial. The dose should range from one to eight grains with ammonia in camphor-water.

It happens not unfrequently that in these cases of complicated asthma there are, at night, attacks of spasm of the lungs—these must be met by those remedies already mentioned, such as ether, datura tatula, and medicated inhalations. Caffeine, or its citrate, in doses of two or three grains in hot coffee, is also a most valuable means of checking incipient asthma. Sedatives at night do not interfere with other remedies during the day, but it is well not to be in a hurry to resort to them, for it is not uncommon to find such medicines as caffeine or nux vomica overcome spasm and give the patient a better night's rest than anything else that has ever been tried in the way of antispasmodic or sedative. Nux vomica and strychnine prevent the air-cells becoming over-distended, and so keep off one cause of reflex bronchial spasm. Grindelia robusta, the Californian

remedy for asthma, may be given in the form of the liquid extract. Dose, ten to thirty drops in milk. Taken thus, it sometimes acts very speedily in relieving the spasm.

Another medicine often of very great service is the Euphorbia pilulifera, or Queensland remedy. At first I found difficulty in obtaining the dried plant, and was indebted to Mr. Martindale for my first supply. Now the medicine can be readily obtained, and a wineglassful of the decoction, with ten drops of spirit of chloroform added, is often of very marked service, both in bronchitic and spasmodic asthma.

Warm steaming inhalations are quite out of fashion now in the treatment of asthma. They relax the throat and make the gums soft and spongy. In tonsillitis and laryngitis only are such remedies of temporary service.

The inhalation of compressed air has been found useful in asthma with emphysematous lungs and a cold sluggish state of the circulation. Expectoration is promoted, and thus a passive state of bronchial congestion is relieved. The condensed atmosphere, by carrying a proportionately larger amount of oxygen into the chest, may relieve the distress due to the imperfect aeration of the blood in the lungs; the craving and hunger of the system for more oxygen being appeased by filling the lungs with a condensed atmosphere.

The fact that a condensed atmosphere keeps up the necessary supply of oxygen longer than one of ordinary tension was observed years ago by Brunel when engaged in making the Thames Tunnel. This great engineer having occasion, at times, to descend under water in a diving bell, and now and then, in order to examine specially certain points in the works, quitting the bell for the water itself, found that he could remain under

water without serious distress for a length of time that excited the alarm of his companions in the bell; this power was attributed to the fact of the lungs being inflated with the atmosphere of the bell, which was denser and richer in oxygen than that at the water's surface. In simple anæmia, the inhalation of condensed air has often proved wonderfully efficacious in improving the condition of the blood. The same effect results also from the inhalation of oxygen gas by anæmic persons. In fetid bronchitis and phthisis inhaled oxygen is a good antiseptic.

Another remedial agent in emphysematous asthma, that has had its warm advocates, is electricity; and here, as in a host of other affections, this agent has been tried in the most empirical way, and on the vague hypothesis that asthma, being a nervous disease, is sure to be relieved by any power that acts in any way on the nerves, especially if these be tending to a paralytic state. I have little to offer from my own experience of the use of electricity in asthma, but to the experience of my friend Dr. Althaus I am indebted for the following remarks on the use of galvanism in asthma:

'In true spasmodic asthma not complicated with emphysema or other structural lesions, but purely nervous in its origin, the continuous galvanic current directed to the pneumogastric nerve in the neck, near the carotid artery, appears to be an excellent remedy, which, as yet, has not been fully tried.

'The induced current applied to the same nerve is without effect; any form of electricity applied to the chest-wall is also ineffectual.'

Dr. Burney Yeo has seen benefit from the use of the induced current, one pole being applied to each side of the neck (*Lancet*, November, 1880).

This current causes sensation in throat and palate, and perhaps contraction of the pupils.

Long and strong applications irritate the nerve and excite an asthmatic attack.

In cases of emphysematous asthma, with general debility and absence of inflammation, a dry bracing climate is of the greatest possible service when there is a good deal of cough and expectoration, with weak heart and languor of system. In cases of great irritability and spasm of the chest, one that is mild and warm is to be preferred. At first the patient may complain of increase of cough when, after long confinement indoors, and breathing a close atmosphere, his air-tubes are first subjected to a pure and stimulating air, but in most cases after an unwholesome phlegm has been discharged from the lungs, the breathing and general health will improve very decidedly.

The food should be light and nutritious, and the less alcohol the better; but if a stimulant must be taken, then claret, sherry, or *weak* brandy-and-water will agree best with the majority of cases. Casual attacks of flatulence and acidity are best met by the use of Belloc's charcoal lozenges, or by sucking a pastille of the Vichy salt, both of which remedies, from their convenient form, can be carried about easily by the patient.

CHAPTER VIII.

Bronchitis as a cause of asthma and emphysema—Bronchitic asthma, or the dyspnœa of chronic bronchitis—Sudden dyspnœa from obstructed bronchus—Dilated bronchial tubes—Treatment of bronchitic asthma—Curative power of climate—Importance of subduing inflammation—Use of mercury and other remedies—Illustrative cases.

BRONCHITIS, in varying degrees of severity, often occurs unattended with bronchial spasm or asthma, and severe asthmatic attacks may come and go without the coexistence of any bronchitis. Often, however, asthma takes its origin from inflammatory bronchitis,* and these are the cases which, if neglected in their early stages, lead to a very persistent form of asthma with structural change of lung tissue. Emphysema constantly results from this form of complicated asthma. In the cases of strong robust persons exposed to wet and cold, it is of the large-lunged inflammatory kind; in others it takes the form of small-lunged emphysema, with narrow, wasted thorax. This condition, known as senile emphysema, may follow upon the first as the patient grows old in years.

The object of the present chapter is to offer a few observations on the asthmatic complications of chronic and sub-acute bronchitis.

* Dr. C. T. Williams in Quain's 'Medical Dictionary,' p. 90, attributes 80 per cent. of cases of asthma to bronchitis.

In these cases we have inflammatory action, *plus* spasmodic exacerbations, due to irritation of certain nerves. We see examples of these accessions of severe and dangerous spasm constantly in cases of laryngitis and croup; there is a true inflammatory process going on sufficiently dangerous in itself, and from time to time attacks of spasm in the breathing occur that add greatly to the immediate danger of the patient.

An individual who from any cause has become the victim of chronic bronchitis is well known to be liable to attacks of severe breath difficulty in the event of his taking a fresh cold, or in consequence of any sudden change in the weather. The attacks vary in degree, but their symptoms are those of asthma, and I have always put these cases down as cases of *bronchitic asthma*. They may be of a gouty or rheumatic origin, and there may be more or less emphysema of the lungs present; but the most distinctive mark is the origin of the asthma in bronchitis, or other inflammatory affection of the chest, the result commonly of cold.

The breathing is always more or less difficult, and alterations of temperature, or of degree of humidity in the air, powerfully, and at once, affect the patient. At night there is often great distress, with palpitation of the heart and inability to lie down in bed; or else the patient, after lying for a short time, suddenly has to start up in a fit of severe dyspnœa and spasm. Expectoration may be scanty or copious, with at times streaks of blood, and the sputum itself may vary greatly, being at one time frothy and almost clear; at another time, within a few hours, it may be thick and yellow. These sudden variations seem to me oftenest noticed in cases of bronchitis complicated with rheumatism.

Sometimes the cough is violent and paroxysmal, and

after a burst of coughing there follows a regular fit of asthma, the lungs are emptied of air by the cough, and remain for a time in a state of spasmodic contraction.

It should be remembered that it will sometimes happen that a patient (probably one rather advanced in years) ill with chronic bronchitis may be seized, without warning, with a sudden attack of extreme dyspnœa that brings him even to the verge of suffocation.

These seizures, in the sudden manner of their invasion and the equally sudden manner in which they pass off, resemble attacks of spasmodic asthma supervening upon chronic bronchitis. They are not, however, attacks purely spasmodic in their nature, but they are in many instances due to collapse of a portion of lung from plugging up of the air-tube which leads to this portion of collapsed lung.

The obstruction is caused usually by a lump of thickened mucus, like those firm round lumps of mucus that are sometimes expectorated by persons ill with chronic bronchitis, and which I have had brought to me in bottles by patients who were somewhat alarmed at the size and firmness of the balls of mucus which they had coughed up. This ball of mucus, forming in an air-tube, acts the part of a valve, permitting the egress of air in expiration, but preventing its entry into the lung by inspiration. Thus at last the portion of lung is perfectly emptied of air, and it collapses into one of those condensed masses that were called instances of lobular pneumonia till Dr. Gairdner explained their true nature and mode of production.

In this form of dyspnœa there will be great and marked difficulty in the act of inspiration, while that of

expiration is comparatively easy. When the attack is perfectly developed, it will be found that over the collapsed portion of the lung there is complete dulness on percussion, and no respiratory sound can be heard, when before probably bronchial râles were quite distinct.

These attacks may last from one to twenty-four hours, and as they pass away the breath sound will be observed to return and the percussion dulness to subside at the affected part of the lung.

The fibrinous casts of the bronchi expectorated in what is known as chronic plastic bronchitis, are familiar to most observers. When placed in spirit these casts spread out and look like the roots of a plant. Among an interesting collection of these casts placed by Dr. Peacock in the Museum of the Victoria Park Hospital, is one rather large fibrinous ramification coughed up by an asthmatic gentleman who is said to have afterwards died of phthisis. The probability is that these fibrinous masses, blocking up portions of the lung, may eventually give rise to breaking down and softening of the pulmonary tissue, just as fibrinous deposits from the blood have been shown to do by Andrew Clark and Niemeyer ; and thus the patient dies with all the symptoms of softening and excavation of the lung. Stokes considered these plastic exudations indicative of a tendency to tubercle of the lung (p. 57).

Some of the best examples of fibrinous expectoration that I have seen have been in cases of asthma with atrophic emphysema of the lungs, the nutritive tendency of the system being towards fibrin rather than pus formation. These are the cases where after awhile one gets dulness at one apex from fibroid condensation of

lung, and at times there follow hæmoptysis and all the symptoms of gradually advancing phthisis.

There is another pathological state sometimes met with in cases of bronchitic asthma, and that is dilatation of the bronchial tubes. The presence of dilated bronchial tubes in the chest of a grown-up person is likely to be a permanent evil, and will maintain the tendency to bronchitis and dyspnœa.

Inflammatory action in and around the air-tubes after long continuance leads to exudation of contractile lymph, which, if on the tissue external to the tube, draws upon and dilates the tube, while at the same time it renders the lung tissue less expansile. When the inspiratory efforts become powerful and strong, the tubes are distended more and more, they cannot contract as they are wont to do in health, they yield and stretch under the strain put upon them, secretion stagnates in them in increasing quantity, their coats become weak and degenerate, and dyspnœa increases and remains abiding. The discharge every morning of very fetid expectoration, at times reddish in colour and full of putrefactive germs, is very significant of a dilated bronchus.

The physical signs of enlarged bronchial tubes are pretty well known, and it is in the infra-mammary and basic regions, usually on the right side, where these should be especially sought; here we may find want of expansion, dulness on percussion, occasionally a true 'crack-pot' note, with hollow bronchial breathing and very prolonged expiration. I have in rare instances of old chronic bronchitis, following on neglected pneumonia, observed true amphoric breathing over the bases of the lungs, apparently due to globular dilatation of the bronchial tubes. This condition was exceedingly well marked in the case of a man under Sir Risdon Bennett,

in Victoria Park Hospital, some years ago. This man had been ill some years previously with pneumonia, and he was sent up from the country to the hospital on account of the bronchitis and asthma which clung to him; he was somewhat benefited by treatment, but with so much structural change it was impossible to look for more than relief to the more urgent symptoms.

Increasing experience has taught me that, provided there be no great structural change, we may look for satisfactory results from treatment in these cases of bronchitic asthma.

There is no remedy so radically curative as climate. I have seen many cases of chronic bronchitis with much irritation of the chest, scanty secretion, and tendency to spasmodic difficulty in the breathing, improve speedily, progressively, and permanently at such places as Hastings, Ventnor, and Bournemouth. My own observation and experience of climates for bronchitic asthma is limited mainly to these places, as I find them to succeed so well; but there are other well-known resorts possessing a similar mild sedative air, such as Torquay, Sidmouth, and Penzance, which may do well for the bronchitic invalid, though they are not good for one who is far gone in pulmonary consumption. At first there may be an increase of cough for a time under the influence of a pure air, which relaxes the bronchial spasm, and as this relaxation takes place, a copious discharge of retained phlegm may be thrown off by the cough.

Cases with highly-developed emphysema, languor of system, and profuse secretion, must avoid all places that are of a sedative and relaxing nature, and seek some of the dry bracing places, like Harrogate, Malvern, or the South of France. High elevations, however good they

may be for some cases of consumption, should be entirely avoided by the emphysematous asthmatic.

The point wherein the medicinal treatment of bronchitic asthma in a measure differs from that of asthma with only passive congestive bronchitis is that we have a smouldering kind of low inflammatory action as the root of the mischief; and as we often have to deal with thickenings and exudations of inflammatory origin, it is here that some of the absorbent remedies, such as mercury, the iodides, and the alkalies, come in most happily before we resort to the more tonic class of medicines.

The clearing off of inflammation and its products is most important in the curative treatment of bronchitic asthma, and for this purpose the various preparations of mercury are most valuable. I may say that I have never in any case given mercury so as to at all affect the mouth. The indications for its employment will be gathered from a perusal of the subjoined cases.

Some amount of fever, with increase of pulse and temperature and scanty, high-coloured urine, lead us to expect good from the employment of mercury.

The following are selected from the notes of a large number of cases of bronchitic asthma; they will serve to illustrate those points in the treatment of the complaint to which attention has been already drawn:

Cough and nocturnal dyspnœa; slight benefit from cod-liver oil and iodide of iron, cured by mercurials.

Case XIV.—Robert R., æt. 16 years, came under treatment October 10. He is a pale, light-haired youth, and his complaint is of cough and much thick yellow expectoration consequent on neglected cold. He has never raised any blood, the tongue is clean, tonsils very

large, chest resonant, but some few crepitating sounds are heard in upper part of left lung. Pulse 120.

Till October 26 he was treated with cod-liver oil and iodide of iron, and at first he improved on these medicines; but on October 26 he seemed to have taken some fresh cold, for the cough was very severe at night, and after the fits of cough he had asthmatic wheezing, often so loud as to be audible in the next room. Pulse 120, bronchitic sounds to limited extent in left lung; he does not himself consider that he has improved on the treatment thus far.

For the next fortnight he took every night a pill of pulv. scillæ et pil. hydrarg., of each two grains; he continued his cod-liver oil, and took some nitrate of potash and vin. ipecac. with mucilage, three times daily.

November 8.—Rests much better, expectoration less, not near so much cough, breath easy, tongue clean, pulse still keeps up. To take pil. conii co., five grains, in place of pil. hydrarg.

November 23.—He had some iodide of ammonium in a mixture, and on December 14 he was discharged free from cough, and only complaining of dyspnœa on exertion.

The point of interest in this case was the absence of all real improvement till the youth got the small doses of mercury. I suspected strongly that the left lung was about to become tubercular, but have had no reason to believe that it ever did become so.

That violent paroxysmal asthma in young people is, at times, a sign of commencing miliary tubercles in the lungs is a point on which we have certain evidence from recorded cases and postmortem examinations.

Dyspnœa due solely to chronic bronchitis, and soon removed by mercurials.

Case XV.—Henry W., æt. 45 years, seen October 7, 1867. For some months has had severe cough night

and day, with thick expectoration. At night much difficulty in the breathing and profuse sweating. Pulse 80; face pale. Chest resonant; respiration generally feeble, with some sonorous and sibilant rhonchus.

℞ Pil. hydrarg. } āā, gr. ii. pil. om. nocte.
Pulv. scillæ }

℞ Vin. ipecac., ℥ viii.
Tr. opii, ℥ iv.
Potass nitrat., gr. v.
Mist. acac., ℥i., m. t. d. s.

He had no other medicine, and on October 28 he was let go, describing himself as quite well, able to sleep quietly at night, and free from cough.

Case XVI.—Mrs. R., æt. about 40, seen September, 1872. For the last two months has had violent cough with frothy expectoration. At night the difficulty of breathing is extreme, and she has to be propped up in bed with pillows.

No emaciation; pulse 100; face pale; rather anxious-looking; eyes somewhat suffused; tongue furred behind.

Appetite not good; is very careful and abstemious in her manner of living.

She has already taken much medicine, but the severe attacks of spasmodic dyspnœa at night grow worse.

The chest is resonant; its movement is up and down rather than a true expansion. Sonorous râles are heard over both lungs, with very prolonged expiration.

Sedative inhalations were ordered, and a mixture of hypophosphite of soda with carbonate of ammonia.

Slight improvement took place in the course of the next two weeks.

September 22.—I saw her in consequence of a fresh cold, and found the dyspnœa extreme. Pulse 100; moist râles over both lungs. A pill was ordered as follows, to be taken every night:

℞ Pil. hydrarg., gr. ii.
Pulv. ipecac., gr. i.
Ext. conii, gr. ii. M.

And a mixture of carbonate of ammonia with iodide of potassium.

In eight days' time the report sent was, 'Progressing rapidly towards recovery,' and she did recover of this attack, though the chest remained very susceptible to any change of temperature. Death took place eventually from apoplexy.

Chronic bronchitis with severe asthmatic paroxysms; cured by mercurials.

Case XVII. — Harriet J., seen October 27, æt. 35 years, has from childhood suffered with severe cough and expectoration; now she has to sit up every night from ten to four in the greatest distress from breath difficulty. She has lost flesh, looks pale and worn. Pulse 136. Tongue clean. Expectoration frothy.

Chest fairly resonant. Respiration coarse, mixed with sonorous and sibilant râles; expiration prolonged.

℞ Pil. hydrarg. } āā gr. ii. pil om. nocte.
Pulv. scillæ }
Ipecac. mixture three times daily.

After seven days of these medicines she was able to lie down with ease. Pulse 96. 'Not near so much spit.' Urine clearer and not so turbid.

November 10.—To take iodide of potassium and bark.

November 24.—She declares herself free from all breath trouble at night, cough almost gone, slight yellow expectoration. Pulse 88. Appetite good. Let go cured.

Quick pulse, feverishness at night, and high-coloured urine, with paroxysmal cough and scanty frothy expectoration, were indications for mercury, and the iodide of potassium mixture followed on the mercurial course with first-rate result.

In cases of spasmodic and bronchitic asthma occurring in young children, I believe it to be of much importance to recognise, and as far as possible cure, whatever

inflammatory condition there may be going on in the chest, care being taken to distinguish between this and any reflex pulmonary spasm which, in a young infant, may be due to dentition or other source of nervous perturbation. Next, it is of vital importance that the child should be placed in a suitable climate, and be properly cared for in the way of clothing and diet, and careful avoidance of any chill to the surface of the body. In bathing the child, it is well to remember this. When these conditions are properly fulfilled, we may reasonably hope to see the disease subside, or become much mitigated in severity by the lapse of time. Without attention to these matters, the child will most certainly grow into disease rather than out of it.

I have now under observation patients who, when young, suffered much from spasmodic asthma with retracted epigastrium and inspiratory dyspnœa, relieved usually by antispasmodic inhalations. These are now grown up, and though not regular invalids are very subject to bronchitis of obstinate character, with more or less respiratory spasm during the attacks. A few appear to get quite clear of the disease as they grow up.

CHAPTER IX.

A short account of the effects of asthma on the heart and blood vessels—Enlargement of the right side of the heart—Symptoms and signs—Cardiac dyspnœa—Means to be employed for relief—Medicines—Digitalis—Salines—Tonics—Blood-letting at times necessary to relieve the right side of the heart—Salutary effect of a dry climate—Effect of compressed air on the circulation.

ALLUSION has been already made to the smallness of the pulse during a bad paroxysm of asthma, as a sign that there is a stoppage of the circulation through the lungs, causing but a scanty supply of blood to enter the left ventricle and arterial system.

Two circulations are constantly going on in the lungs—the one of air, the other of blood, and one cannot be checked or arrested without the other participating in such stoppage. In asthma, the aerial circulation being in arrest, the blood circulation suffers in consequence. In heart disease, the blood circulation through the lungs being impeded, the aerial circulation suffers in consequence, and we get cardiac asthma as the result.

Frequent stoppage of the flow of blood through the lungs, with venous engorgement and stasis, after awhile produces dilatation of the right side of the heart, and this is the most common cardiac effect of protracted attacks of dyspnœa and asthma. When the heart becomes affected, the form of dyspnœa undergoes some

modification. Without being periodic, as asthma often is, it is irregularly and suddenly paroxysmal, and during these fits there is a look of alarm about the patient, with much gasping and panting. The paroxysm is short, but leaves a good deal of permanent dyspnœa behind, with more or less passive bronchitis and tendency to pulmonic congestion. Examination of the chest may show the heart's impulse diffused and readily felt at the epigastrium ; the area of dulness is increased to the right, and by degrees the left ventricle also becomes dilated ; there is want of tone in the first sound of the heart, the jugular veins are full and prominent, the complexion dusky and more or less livid, signs of congestion of lungs, liver, and stomach appear, the feet swell, the bowels are costive, the urine turbid, and the nights are especially disturbed.

Such are the signs of an engorged right heart and venous system ; and when they appear in the case of one who is asthmatic they are of evil augury, as showing that the organic complications of the asthma extend beyond the lungs themselves to the heart and circulatory apparatus. The general plan of treatment should be to relieve congestion, and then to try and strengthen the weak and failing structures.

An excellent medicine, in these cases, is found in the infusion and tincture of digitalis. For years I have used these preparations with most satisfactory results, and never yet saw any danger arise from the asserted cumulative action of the drug, though I have heard of mishaps when the digitalis has been persevered with in full dose for a long time. When albumen is found in the urine, digitalis must be employed carefully, and its use suspended from time to time to permit of free elimination by the kidneys. If this rule be not followed,

sudden heart failure may occur with clotting of blood in the heart.

From two to four drachms of the infusion, or five to twenty drops of the tincture in camphor-water, is my usual form, save when I use the pill of powdered digitalis* one grain, and powdered squill two grains.

Nux vomica and strychnia are very serviceable in cases where the heart is weak, and when digitalis fails and ceases to do good, I have found great advantage from the administration of strychnia or nux vomica. Arsenic is of little use in these cases.

Various saline combinations, sometimes with a diuretic, sometimes with a laxative intent, come in very serviceably to relieve venous congestion, and can be arranged to the judgment of the physician. As soon as there seems to be relief to the more urgent and oppressive symptoms, it is well to get in some iron or bark. The iron may be given in a small dose of one grain of the sulphate or ten drops of the tincture, with sulphate of magnesia, in peppermint-water. The bark may be best given with iodide of potassium and aromatic spirit of ammonia.

It will now and then—when the right heart is much engorged and the oppression in breathing very great—be necessary to draw a little blood. From six to eight ounces taken from the arm relieves occasionally, as nothing else will. Stimulants, so commonly and often so profusely given, merely seem to help the left ventricle to pump the venous system all the more full of blood, while a little relief by the detraction of blood does wonders to restore the balance of the circulation. If venesection be objected to, a few leeches over the lower part of the sternum will often give ease to the breathing.

* The powder loses efficacy if it has been kept over one year.

In 1890 I had an old woman in the hospital with much congestive bronchitis, headache, and very feeble heart. For several weeks she took one-hundredth of a drop of nitro-glycerine (trinitrin) with great benefit. Various ordinary medicines had been previously given, but after three weeks of the trinitrin she left very much improved.

The heart being in so large a measure influenced by the action of the lungs, we must not forget the importance of a perfectly dry, warm climate, and to the efficacy of this as a means of prolonging life I can fully testify, and that, too, when the organic heart mischief was unmistakable.

Speaking of the inhalation of a suitable atmosphere brings me again to mention the condensed-air chamber, for it is in cases of dyspnœa, with venous plethora and congestion, where the condensed air claims to be especially curative.

The physiological effect of the compressed-air bath on the circulation consists in its altering the distribution of the blood, so that while the quantity contained in the veins and auricles of the heart is diminished, that in the ventricles and arteries is increased, and thus the balance of the circulation is restored. Practically it is found that cases of dyspnœa, with old standing emphysema and bronchitis, over-fulness of the venous system, and emptiness and diminished tension of the arterial system, are occasionally relieved by the action of the compressed air.

Dr. Vevinot, in his experiments with compressed air at Nice, noted great retardation of pulse and respiration, the former falling, in one instance, as low as eighteen in the minute; the secretion of the skin and aerian mucous membrane was at the same time checked, while that of the kidneys was enormously increased.

Gradually to increase and diminish the pressure in the bath is most essential, for without care on this point it may happen that a patient who may have felt much relief while in the air-chamber, will experience a most trying reaction, in the way of dyspnœa, after his return into an ordinary atmosphere. In the case of a patient of mine this reaction proved so severe that the bath had to be given up entirely : though, while confined within it, the patient would fall into such a perfect and tranquil sleep as he had not had for many years.

Various contrivances have been invented for extraction of stagnant air from the lungs by a process of suction ; or, as in Waldenburg's spirometer, by expiring into a chamber containing a rarefied atmosphere. I have never seen any satisfactory results from these methods. The only fair way to try the compressed-air treatment is in a chamber built for the purpose, such as the one now in use at the Brompton Consumption Hospital.

CHAPTER X.

Asthma in connection with gout and rheumatoid arthritis—Treatment by diet and medicine.

THE remarkable way in which gout may manifest itself, sometimes in the form of great nervous perturbations in the system, at other times of sudden local congestions, makes it easy to understand the intimate relation that there is between asthma and gout. Gout may disturb the circulation by its irritant action on the nerves which control the bloodvessels and circulation. Thus is caused that pulsation of the abdominal aorta that often alarms the gouty dyspeptic, and makes him fear that he has got abdominal aneurysm.

Dr. Matthew Baillie has recorded the case of a gentleman who suffered from palpitation of the heart for six months without obtaining any relief from medicine; but a fit of the gout coming on in his foot, the palpitation suddenly and entirely left him.

Scudamore says, in his treatise on gout: 'I have seen sympathetic affection of the diaphragm, in one case, amount to so great a degree of spasmodic asthma, attacking the patient at first twice and afterwards once in the twenty-four hours, so that each paroxysm was dreaded with horror from fear of suffocation. These attacks lasted three hours, and certainly and speedily followed any error in the quantity or quality of the dinner meal.'

The way in which gout in the blood may induce dangerous fulness and congestion in the vessels is shown by the history of those who have tried to cure acute gout in the foot by means of cold applications. Alarming and sometimes fatal congestive apoplexy has been the result.

It is well known how the various mucous membranes of the body are apt to become the seat of gouty irritation and inflammation, and Dr. J. W. Moore has found crystals of lithic acid, the *materies morbi* of gout, in the mucus coughed up in gouty bronchitis. Sometimes the urethra, and often the intestine, suffers in this way, and it is interesting to compare the symptoms produced by gouty affection of the alimentary canal and of the bronchi. Gouty people are often roused at night by violent colic in bowels or cramp in the stomach, while the subject of gouty bronchitis and asthma is in the same way disturbed by paroxysms of nocturnal dyspnœa and cramp in the bronchi.

The muscular coat of the bowel gets into much the same condition that the bronchial muscle gets into in cases of catarrhal asthma. In each case the mucous membrane is irritated, and the circular muscular fibres lying beneath the mucous membrane are also irritated by contiguity of tissue, and are either thrown into spasmodic action or else are paralyzed and refuse any action. Inflammation round an intestinal ulcer has been known to cause all the symptoms of intestinal stoppage by paralyzing the muscular coat of the bowel. Expectorant medicines fail to relieve the bronchial spasm and irritation, and purgatives notoriously fail in bringing about healthy action in the bowels. Suitable diet and regimen, and the judicious employment of such antispasmodics as belladonna, and sometimes opium, seldom fail to give

more or less relief to both bowels and bronchi. I have seen opium and belladonna act as admirable laxatives in cases where the bowel had regularly struck work under the influence of strong cathartics, responding merely by scanty water evacuations. The soothing effect of a proper climate in promoting rhythmical action of the bronchial muscle with free expectoration is often observed.

Chronic pharyngeal catarrh, with mucus about throat and fauces, and at times buzzing noises in the ears, from catarrhal obstruction of the Eustachian tubes, are common symptoms in gouty asthma and bronchitis.

Gouty bronchitis is always obstinate, and is seldom cured without great attention to diet. I have been much impressed at observing the excellent results that have followed upon a very simple plan of diet in the cases of fairly strong persons who were in the habit of living freely, and who in the winter suffered more or less from symptoms of gout and bronchitis.

Restlessness, heat, and itching of skin, with frequent desire to pass water, and perhaps diarrhœa, are all signs that nutrition is out of order. Acid eructations, tasting of food taken many hours previously, and heart-burn, will show that the stomach digestion is imperfect. By prolonging the intervals between the meals, reducing the quantity of food taken, and simplifying its quality, much good may be done. If the tongue be angry-looking and red, then light farinaceous food and very sparing allowance of meat will be the general line of diet to be followed. When the tongue is large, flabby and indented at the edges, care must be taken not to oppress the stomach by a mass of food, but to give small amount of nutritious aliments; and here meat in small quantity will probably be found more suitable than

saccharine or farinaceous food. Overfeeding is the bane of these cases.

Much drink should not be taken with the food, but after the meal digestion is promoted by a small quantity of plain or aerated water sipped at intervals. Undue acidity of the food is mitigated, and healthy movement of the muscular coat of the stomach promoted, by the gentle stimulus of the cold water. If the heartburn and acidity are severe, a tumblerful of hot water at bedtime is good. Aerated waters, taken with the food, distend the stomach, oppress the breathing, and become fertile causes of flatulent dyspepsia and weak stomach; and plain water taken in immoderate quantity with sweet food is very likely to set up acetous fermentation in the stomach and cause gastric catarrh.

A glass or two of good Manzanilla sherry, light Moselle, or half a wineglassful of whisky or brandy, with water, but no sugar, will agree with many. Some will do better without any stimulant whatever, but I expect Sydenham was right when he said: 'If you drink wine you will have the gout, and if you do not drink wine the gout will have you.' Red wines seem to be rarely suitable for the gouty.

Nasal and pharyngeal catarrh, with constant expectoration of stringy mucus, is a well-known symptom in gouty bronchitis and asthma. The throat looks swollen, and turgid veins are seen upon its surface with mucous streaks and patches. As is the throat so are the larger bronchi, and as the one improves under treatment so does the other. Allusion has already been made, at page 37, to the disappearance of chronic bronchitis after local treatment of rhinitis. After careful regulation of the diet and abandonment of tobacco, sugar, and alcohol in its stronger forms, much good can be done by spray-

ing the throat with an alkaline solution, morning and evening. Liquor calcis I have found most serviceable. Sprayed into the throat, it soothes irritation and dissolves thick mucus. In cases of fibrinous bronchitis this spray is strongly recommended. The solution of lime must be carefully poured off from any sediment, and kept in small bottles quite full and well corked.

In some cases solution of soda or borax, five grains to one ounce of distilled water, may be sprayed into the throat.

The medical treatment of these gouty cases has been already indicated. The first thing is to overcome the tendency to acidity that exists in the system, and it will generally be found that alkalies with or without iodide of potassium or sodium are best calculated to effect this purpose.

When gastric acidity predominates, the old-fashioned white mixture of carbonate and sulphate of magnesia appears superior to other alkaline combinations. The magnesia is an excellent gastric and internal sedative as well as an antacid; and in cases where there is much acidity of stomach, resulting from too heavy meals of farinaceous food, magnesia will be found to agree better than potash or soda. A very useful medicine I have found for many cases of undoubted asthmatic gout is a combination of tincture of colchicum, tincture of quinine, citrate of potash, and mint-water. Thus:

℞ Tr. sem. colchici or vin. colchici, ♏ v.-x.
Tr. quininæ, ♏ xxx.-lx.
Potass. citratis, gr. x.
Aq. menth. pip., ℥ i.
M. Ft. hst. t. d. s.

Attacks of spasmodic asthma must be met by anti-spasmodics and two or three grain doses of citrate of

caffeine. This last is especially useful when the heart is feeble and when we desire to avoid the use of fuming inhalations.

The relations of asthma to rheumatoid arthritis, sometimes called rheumatic gout, are not very clear. I have known a genuine asthmatic get rid of asthma, and then find himself gradually invaded in his joints by stiffness, cracklings on movement, and some thickening. The fact is interesting if, as Dr. Buzzard has suggested, rheumatoid arthritis is due to disorder or disease of certain centres of nutrition in the medulla oblongata. Furthermore, I have often been struck by seeing the beneficial effect of small doses of arseniate of sodium in relieving the joint symptoms in rheumatoid arthritis; and that this same medicine is one of very great value in curing persistent asthma is now a recognised fact in therapeutics.

Seeing how very often, in gouty people more especially, the inflamed and irritable condition of the throat and pharynx keeps up the tendency to bronchial spasm in the lungs, it is well to caution such patients against the too frequent use of the various fume inhalations by powders and cigarettes. These means are undoubtedly good as palliatives, but their frequent use tends to heat and dry the throat, and so add much to the permanent discomfort of the gouty asthmatic.

CHAPTER XI.

Treatment of summer catarrh and hay asthma — Inhalation — Chlorine gas—Sprays—Snuffs—Cocaine—Tannin—Teucrium — Asarabacca—Treatment of hay asthma generally.

THE best way to escape this troublesome affection is to fly from its cause and seek refuge in a sea-voyage or a sojourn at some seaside resort, where there is but little flowering vegetation. For while, as Dr. Pirrie has shown, solar heat may have much to do with the general congestion of hay or solar fever, yet it is, as stated at p. 45, to the pollen of flowers inhaled that the severe catarrh, which usually precedes the asthma, is undoubtedly due.

Local treatment of the mucous membrane of the throat and nasal passages is an important curative measure at the onset of the attack, and the best applications are those of antiseptic power, which destroy all vital spores. Chlorine gas, evolved slowly from a mixture of water, chloride of lime, and vinegar, is soothing and antiseptic. The gas may also be set free from a mixture of oxide of manganese and dilute hydrochloric acid. When thus prepared, it must be inhaled cautiously, for if too strong the chlorine will produce symptoms exactly like asthma. I have tried iodine as an inhalant, but it does not seem so efficacious or agreeable as chlorine gas properly diluted. When the nose is very irritable, then painting its interior with a long brush dipped in a 10 per cent. solution of

hydrochlorate of cocaine is useful. Menthol dissolved in paroleine, twenty grains to the ounce, is another good application in cases of hay asthma with congested mucous membrane. The addition of ten to twenty drops of liquid extract of opium is at times advantageous.

Tabloids of the hydrochlorate of cocaine, one-sixth of a grain, are recommended by Ringer and Murrell for insertion into the nostrils to relieve irritation.

Sprays of carbolic acid, in proportion at first of a drop of the acid to one ounce of water, are beneficial when there is much mucous discharge. Sulphurous acid diluted with spirit and used as a spray is also very destructive of vegetable spores, such as the pollen of grass.

In the earlier editions of 'Notes on Asthma' I made mention of solution of sulphate of quinine as a local application, and am disposed now to speak most highly of it. A solution of the quinine, in proportion of one grain to two ounces of water, may be used by the nasal douche or injected by a syringe into the nostrils. It is soothing and destructive of those lower forms of life germs which Helmholtz has shown to exist in the nasal mucus. The addition of a few drops of the chlorine-water of the B.P. assists the solution of the quinine and increases its antiseptic power.

When the discharge continues troublesome and offensive, the aqua creasoti of the U.S. Pharmacopœia, one of creasote in one hundred of water, may be used, or a weak lotion of potassium permanganate.

All solutions used with the douche or syringe should at first be weak, for the nasal mucous membrane is very sensitive. It is easy to increase their strength gradually.

Those who have been liable for some time to summer catarrh are very apt to get chronic rhinitis with thickening and turgescence of the turbinate bones of the nose,

which is such a troublesome complication in cases of asthma. This condition, when fully developed, must be dealt with surgically, as it may be necessary to destroy the vascular tissue by galvanic or other form of cautery. The operation sometimes gives much relief. The removal of enlarged tonsils, adenoid growths, and bony spiculæ is, of course, important to promote a radical cure.

With a view to preventing as much as possible the development of this overgrowth of tissue, I have thought certain snuffs of service.

The snuff may be taken in a pinch between finger and thumb, or may be blown into the nose by means of a glass tube, which, if properly bent, the patient himself can manage.

The compound menthol snuff, when fresh, I have found useful. As prepared by Burroughs and Wellcome, it contains menthol, ammon. chloride, cocaine, camphor, and lycopodium.

A snuff I have for some time used can be made by triturating three to five grains of iodide of sulphur with 120 grains of pulv. glycyrrhizæ.

Barrère of Toulouse years ago invented an iodized camphor snuff, made by shaking together powdered camphor with one-hundredth of iodine till the two bodies have combined into a brown, very pungent powder.

Powdered tannin with an equal quantity of sugar of milk is a good astringent, and dissolves readily in the nasal mucus. The use of tannin in curing some forms of nasal polypus was shown some time ago by Mr. Bryant.

In consequence of the favourable report I had from a patient on the effect of a snuff containing powdered teucrium, or cat thyme, I got some of this plant from Butler, in Covent Garden, and had it ground into a snuff at Apothecaries' Hall, with tannin, sugar of milk, and

lavender flowers. The snuff thus prepared has seemed to me useful in reducing fulness and turgescence of the Schneiderian membrane in the nose, thus tending to prevent the development of nasal polypi. I observe in the *Chemist and Druggist*, March 11, 1893, teucrin or wood-sage recommended as useful when applied to polypoid growths. In the *British Medical Journal*, May 19, 1894, Dr. Dutt, of Whitby, speaks favourably of a tincture of teucrium as an application to nasal polypi. As a stimulating errhine or snuff, teucrium is mentioned as long ago as 1794 (see Waring's 'Bibliotheca Therapeutica,' vol. ii., p. 725).

The small gray leaves of the teucrium have an agreeable aromatic smell; they contain but a trace of tannin, for the tincture will mix with perchloride of iron with very slight change of colour.

Teucrium is a labiate plant, and the variety known as T. marum, cat thyme, or Syrian herb mastich, is indigenous in the South of Europe.

In 1858 Dr. Lucanus claimed great power for syrup of teucrium in the cure of spasmodic cough, and at one time teucrium entered into the composition of the pulvis asari compositus, or asarabacca powder, used as a stimulating errhine. In nasal obstruction I have used the compound asarabacca powder, but the long-continued irritation that follows upon its employment is an objection.

To relieve the throat irritation so annoying in summer catarrh, the sulphur lozenges of the B.P. are worth a trial, as are also the tabloids of sulphur and guaiacum, and the half-grain quinine tabloids.

Strong astringent applications deep into the throat of solution of perchloride of iron or of tannin should, if used, not be long continued, as I believe their effect is to

cause dry atrophic pharyngitis, and impair the power and compass of the voice.

With regard to the asthmatic complications of summer catarrh, if these persist after judicious local treatment of the throat and nostrils, they must be met on the lines of treatment for an attack of asthma already given.

That valuable medicine, caffeine, or its citrate, first brought to my notice in 1878, by Dr. Fowler of Wakefield, and mentioned by me in the Lettsomian lectures of the following year, displays its power well in relieving hay-asthma. The dose is from one to five grains in coffee or in water, or it may be given in the granular effervescing form: rarely does it fail to give some relief.

The persevering use of a small dose of arsenic after food, such as one minim of Fowler's solution, helps to overcome the tendency to asthma, and such tonics as nux vomica, quinine, and sometimes, in pale bloodless persons, iron, have all been more or less commended for their prophylactic powers.

To maintain the mucous membrane of the throat and nose in as healthy a condition as possible is the greatest safeguard against summer catarrh, hence anything that causes acidity of stomach or that induces mucous catarrh in the throat must be avoided.

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THE END.

Baillière, Tindall & Cox, 20 and 21, King William Street, Strand.

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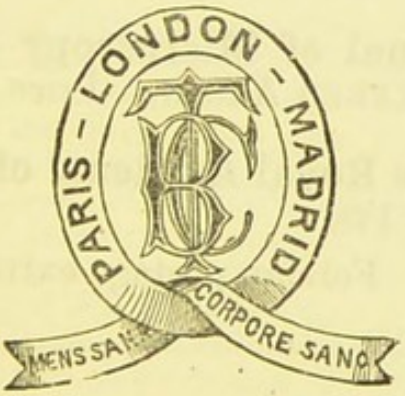

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