To the Dean of
The Medical Faculty
of the University of Edinburgh,
Sir,

Herewith please find my thesis, which I submit to the judgement of the faculty for the obtaining of the degree of M.B.

I hereby certify that the enclosed thesis has been entirely written by me, and that I have been engaged in the practice of my profession as a physician and surgeon for more than four years, two of which I passed in India, and two in the service of the Pacific Steam Navigation Company, and that I am prepared to produce evidence of the necessary certificates of having passed all the examinations necessary to proceed to graduation as an M.B.

I have the honor to be, Sir,
Your obedient servant,
(William Rowlands,
M.B. & C. c. e. m."
Second Class Honours 1879)

of
Eheuergen,
Near Carnarvon,
Wales.
An Essay upon
The Nature of Asthma

Submitted to the judgement of the Medical Faculty of the University of Edinburgh,
as a graduation Thesis, for the degree of Doctor of Medicine,
in the year 1884.

by
William Rowlands, M.B.
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The Nature of Asthma.

1. Introductory Remarks.

Much has been written of Asthma, many have been the attempts by many eminent men to account for the phenomena of this disease, where Leclercq, Balin, Trouseau, Hyde Salter, Hope, DePierre, Williams too, have laboured, each with characteristic zeal and ability, little is left for elucidation. At the same time, in reading what has been written on this subject, one cannot fail to be struck with the diversity of opinion which exists, more especially in regard to the Pathology of Asthma. It is the purpose of the writer of the following paper to examine the various theories propounded by different writers at various times, and finally, to propose a theory of the production of some asthmatic paroxysms, a theory suggested by the necessity of finding some means of explaining the markedly different theories held by writers, men as Hyde Salter and Berkhart, as well as by analogy existing between Asthma and other diseases.

2. History of the Inquiries into the Pathology of Asthma.

Dr Berkhart in his work "On Asthma", Chapter 2 (page 131) presents his readers with a most interesting Chapter on the History of Asthma, and to this author it is proper that the very able Dr. Berkhart must at the very outset acknowledge
his indebtedness for many facts he may use in the present chapter, and also for suggestions as to other valuable sources of information.

There is not any particular reason to believe that Asthma is a modern disease. Hippocrates, Galen and Celsus are quoted by writers on the subject as having described it, and although it was easy for them to describe diseases, which we nowadays are enabled to refer to some other organs than the respiratory, yet they make no instances of Asthma, yet any instances of the disease so called by us, observed by them, they would also have so described. The discovery of the stethoscope enabled Laennec and his disciples to explain many of the cases of Asthma, and to refer them to definite morbid organic causes, but it did not enable them to account for the intermittency or periodicity of the disease.

The only persistent post mortem condition in Asthmatics was Empysema. Laennec was inclined to conclude that Asthma was a species of Empysema with Pharyngeal Catarrh, and also to grant, though not without some hesitation, the existence of a neuro-muscular element to account for its "paroxysmal" character. It is this paroxysmal intermittency of the symptom which has been the battle-ground since the days of Laennec. In his 'Science and Practice of Medicine' (page 784) Dr. Calkins cannot go further in his definition of Asthma than this, without entering upon debatable matters. "A disease which culminates in paroxysmal attacks of difficult breathing of varying duration." After this we shall
find on the one hand a number of writers who affirm
the existence of a neuro-muscular element in asthma
for the 'paroxysm,' and on the other, others totally
deny its necessity and its activity.
Andrew (quoted by Reckart), having seen a case of violent
dyspnea which ended in the death of the patient, preventing
the insertion of a man of solid nerves blocking the oriæ
of a large bronchus, remarks that had it not been
for the careful examination made, the case would have
been looked upon as one of nervous asthma, - a disease
whose existence he would grant only very reluctantly.
Leo's looked upon paroxysmal dyspnea as one of the
early symptoms of Empysema. Sépière, Timoney,
Williams, Troup, and most writers maintain the
existence of a neuro-muscular element; others
such as Harke and Villercam consider a
'septal or hypertonia' as the cause of the
attacks; Weber and Haller consider the disease
'a remotor nervosis'; while Beers and Hirsch
consider a cataleptic state of the lungs post-
mortem as a sufficient explanation of a
paroxysm.
Hyde Salter enters at length in the first
chapter of his standard work into a great
many of the most celebrated theories of asthma
held at different times. The somnambulistic
dyspnea of such diseases as Chlorosis or Scrofula,
or their more permanent or semi-chronic form,
difficulty of breathing, differs from the dyspnea
of asthma in character, but the diagnosis of
the disease can always be made out with
facility after a short period of observation.
Dr. Bose's theory that asthma is an extraordinarly
effort to get rid of some peculiar and irritant matter from the air tubes is not tenable, because the respiratory result - interchange of air or forcible expiratory, are denied. Against those who maintain that Asthma is the plugging of a lung with bronchitic secretions, it is enough to quote Prof. Fairburn (Ched. Clin. Rev. Vol. x) as pointing out the absence of dyspnoeza of any noted in cases of ordinary Bronchitis where there are much larger accumulations of mucus. Certain specific humoral disturbances may cause dyspnoea either by the alteration of the blood particles, or by exciting the condition which may give rise to dyspnoea, either in or without the lungs, but Salter points out that he would not find it. But too difficult to explain all cases of Asthma upon a chromical theory and without the presence of muscular fibres. It would assume, that "Bronchial Asthma may depend on a plus or minus state of the contractility of the muscular fibres of the bronchial tubes; in the former case it is spasmodic, in the latter paralytic" (quoted by Salter). The only proves these muscles, hence, should consist of ataxia, but how their paralysis, leaving a pernicious tube, can to any great extent restrict it; it is, as Salter points out, difficult to understand.

The Prevalent Theory and its Criticism

by Berlebach

The great ability and careful reasoning of Salter convinced most people that the theory of Asthma upheld by him was the correct one. His theories
is that asthma is essentially a nervous disease, depending upon spastic contraction of the organic muscles of the bronchial tubes. The reasons for this conclusion Salter derives from the following considerations: 1. The causes of asthma; 2. its remedies; 3. its associated and precursor symptoms; 4. its periodicity; 5. the absence of organic change; 6. the circumstance that the phenomenon of the disease is muscular. (Hyde Salter, pp. 24-25). Berkebile (loc. cit., p. 117) looks upon asthma as "only one link in a chain of quasi-independent affection, which commences with inflammatory changes of the pulmonary tissue and terminates with Empysema or Bronchiectasis." In a previous portion of the book he discusses Salter's thesis (pp. 49-109), and it is proposed to follow this criticism, examining its value and fairness.

1. As to whether asthma is a nervous disease:

Berkebile points out, quoting Walsh, (a) that the mere existence of certain abnormal physical signs does not warrant the assumption that cutaneous change exists, and conversely (b) that their total absence does not prove the absence to be in a perfect state of organic soundness. He says there are certain physical signs, e.g. "the cutaneous phlegmata," to which Salter devotes great attention, or an undue obesity, while in taking a comprehensive view of the disease, we find among its antecedents, history of being affected in 90 per cent of the cases, and post natal and ante natal evidence of Emphysema in most asthmatics. Waldeyrn has quoted as having found by manometric measurements a relative
diminution of expiratory force in those plebs of Asthma, implying this pathological condition to be therefore antecedent to the attacks. Saltzer relies but very slightly upon such an argument as the absence of the physical signs. He even mentions everything specified above by Berkast—except the last fact— as being concurrent phenomena or antecedent history. He found the value of this argument upon the absolute absence of physical signs in some—and even—only a few cases. He states that Asthma attacks persons with no history of antecedent lung disease and in whom no signs of lung mischief can be detected. As to Wachsmuth's observation, it is desirable to know whether his patients more subject with a history of previous lung disease, and (2) something about the severity and frequency of the attacks—before we accept the above conclusion.

2. As to Freedom of Respiration between the attacks:

"Freedom of respiration is explained" according to Berkast, with a diseased state of the lungs because "in health quiet respiration but a third of the lung surface is in duty," and (2) the system accommodates itself to the deficiency of oxygen, when there is a deficiency. Freedom of respiration, however, is only consistent with a slight amount of disease, or not none at all.

3. As to Post Mortem Examinations.

A. The Negative Results:—The difficulty about Asthma is really no more than that of inability to account for the passyeyes (and not for any permanent depression) by the post mortem appearances. Berkast points out that some of the "negative results" on record—would nowadays be simply the explanations of Aemulions, Pneumay
In some cases, this is very likely, but it cannot be assumed by a modern critic that such errors have been common, especially of late, while it must be admitted that competent Pathologists, in numbers, still consider the disease to be a nervous and even a spasmodic one. Uncomplicated cases of Asthma are sufficiently rare and Paresis are rarely fatal. The presence of Carbonic Acid in excess in the blood seems to relieve the paroxysm, whatever be its cause, before it is fatal. Berthold[165] quotes a case from Richerel's— a case described as "Bronchitiis and Asthma", in which the first sudden results explained away the apparent nervous element. These results were— "stains in the second division of the pulmonary artery, and corresponding thrombi in the right auricle"; also, "bronchic bronchitiis, dilated Bronchi, anterior Cardiac, fatty livers etc." Now the history of the case was briefly this:— "Admitted into Hospital for severe Bronchitiis which soon became complicated with violent Asthmatic seizures presenting the usual symptoms." He was improved from the Cardiac and dyspnoea to such an extent as to be able to follow his occupation, still a slight dyspnoea remained. Soon after he had another similar attack, in which "the lungs gave a full and sonorous percussion note and there were a few numerous rales at the base. The Cardiac impulse was almost imperceptible, the area of the heart not enlarged and the sounds were not altered." Steinbruck and Frechmann caused improvement, but soon in another protracted attack the patient died. Such a case may or may not be fully explained by the above post mortem result. One might still ask, was there not a spasmodic ineradical, an ordinary fontanelle — occurring in
the "clinical" exacerbation of the dyspnoea? or, did not the bronchi, or injure the blood vessels as to render them more easily dilatable? A duration prolonged dyspnoea is not regarded as asthma. Explanation of the post-mortem exacerbation is what is required— not explanation of a prolonged dyspnoea.

B. The Positive results:— It is examined, then, by the adherents of the prevalent theory that the post-mortem results do not account for all the phenomena of an asthmatic seizure. Pathological conditions post-mortem in the vast majority of cases are not cedent. Whether derangement of function causes derangement of texture or not, it is true that in asthma there is a derangement of function causing great distress, while it is impossible to diagnose the "derangement of texture" that accounts for it, unless after the persistence of the disease. The so-called "asthmatic physique" is a result of prolonged asthma, and it is the manifestation of the loss in the asthmatic patient. Asthma, dyspnoea, cough, and the asthmatic may be caused by a common antecedent error, or there dyspnoea might even be caused by the asthmatic, assuming a spasmodic, as Gainsden's "Compensation" theory of the production, but their occurrence post mortem affords no argument for or against a nerve element in the paraesthesia. It is the absence of diagnosable dyspnoea, or, in early cases, in severe early cases, which would seem to point to the existence of a nerve element.

As to the causes of the paraesthesia. The explanation of a disease is no very strong argument for its herm
nature. Still asthma is capricious in its causes and in the mode of its attacks, and it is hardly explained away by the assumption of dust and infection in rooms; for these same conditions will not always bring on an attack. The lack of oxygen or the stress of the physical combustion of the forces of light in a room will not explain attacks of asthma. I have known patients to get relief in a crowded theatre or a church. "Cold and wet" are well known irritants, and the theories of Buckle as to Penicillium or in the air are very interesting and explain many cases, but when we find that "prædisposition in certain individuals" (Berkart p. 78), must be assumed to account for the effects of certain agents, we seem to approach nearer some "mysterium" or not a "nervis" influence. It may be pointed out also that certain asthmatics can always experiment on themselves and produce an attack by certain means. A patient of the writer's can always do so by eating of any crustacean, his asthma being accompanied by an attack of urticaria, but far away under the influence of anaesthetics, and it may be considered in this connection that these cure Asthma by some other means than helping the oxygenation and decarboxilation of the blood.

5. As to Treatment. - The fact that Narcotics are the most beneficial remedies in Asthma led Salter to say that this indicated the nervous nature of the disease. Berkart points out that they give also the most relief in Pneumonia, Measles, &c., and asks if they point out the same thing in them. In these diseases, it must be noted it is the pain they relieve, a nervous element; certainly in Asthma, they relieve the dyspnea. If again, it be objected, that after the
relief afforded by chloral, the presumed spasm may persist; but that the respiratory wants of the body have been relieved, still, the relief is permanent; the influence of the drug soon passes away. If there was a spasm, it soon may. Anyhow, the state quo was restored.

6. As to Periodicity. — The periodicity of asthma, although not of a very definite kind, must be regarded as evidence, pecunias, of a nervous element. The “clogging of the bronchi with mucus” (Beck, etc.) explains dyspnoea, but not the nightly occurrence of it; nor, as is often seen, how the dyspnoea comes on during the first two hours sleep, to be relieved, and then to afford of a sleep of several hours, quite free. The night dyspnoea will come on even if the patient keep awake, though it may not be quite so bad.

7. As to the associated and precursory symptoms. — The analogy between asthma and well-known nervous disorders in respect to the above symptoms is dwelt upon by Salter. Its value as evidence of the nervous nature of the disease may not be less great. Still, “Copious urine” is nearly as characteristic of asthma as it is of hysteria; “high spirit” may lead people to recuse and bring on asthma (Beck, etc.), but the are well-known Epileptics amiss also; and so may “high spirit” be the result of a low nervous depression as well as indicative of anear of respirations.

8. As to Symptoms. — Beck (p. 87) quotes a case related by one of Salter’s patients, to the effect that “the attack ceases on the expiration of mucus” and points that such would be evidence of the phlegm being carried the dyspnoea by their very presence in the tubes, and not as Salter maintains that they were imprisoned by the spasm. The mind of
these papers has always found the relief to precede appearance considerably, and thus the pellet could hardly have been the immediate cause of the asthmatic. Granting the presence of mucus before the attack begins, still it may exist without the presence or so long on the attacks.

Berka introduces attention in a table (p. 20) the difference between the physical signs of attacks of Asthma as recorded by different observers, and concludes that the cases are "a prominent collection of instances of paroxysmal distress," and having shown that three cases of Asthma quoted from Salt at Berlin, were not cases of "primary nervous origin," he concludes that the paroxysms were produced in various ways and under various conditions. Recorded cases of Asthma present, as he notes, much the same physical signs, and when we consider the disease of a patient and how difficult this renders a thorough physical examination, it is a cause for no wonder that true discrepancies exist in the records, while it is also probable that true cases of other diseases, difficult to diagnose and not made out post mortem, have been recorded rapidly as Asthma. It is the fact, however, that the majority of those who have recorded have been biased in favor of the prevalent theory.

In this connection, Salt at bases his argument upon the fact that "the phenomena of the disease are muscular," as also in Epilepsy, Salt at Berlin, while "the essence of the disease is nervous" (Salt at p. 30). It is difficult to conclude otherwise than that the array of witnesses produced by Salt at Berlin as so strong as conclusive a prove as it is possible to obtain of the nervous nature of Asthma, while to his criticism Berka-
seems to make out only that asthma is a "quasi-idiopathic disease," often related to various pulmonary and other conditions, and often ending or accompanying bronchitis and emphysema. This might perhaps, he granted by Salt, but he would strongly maintain that the "quasi-independence" was of a physiologic nature.

B. Is Asthma a Renal Disease?

While proceeding to show asthma to be impossible, Berk, (p. 101 et seq.), quotes Hulme's conclusion as to the presence of the muscular fibers even in the smallest tubes, and Paul Reich to the effect that they are not actively engaged in the respiratory mechanism, but that their function is to resist traction as is that of the muscular fibers in the vascular walls to resist dilatation. In this connection one is tempted to point out that the muscular tissue in the vascular walls can contract even to the obliteration of the lumen of a small artery.

The experiments of Polkinhorne and Williams are referred to by Salt, (p. 38) as the positive proof by direct experiment of what he has been endeavoring to prove by arguments from clinical observations — viz., of asthma. The experiments of Williams, and with them those of Robert, are quoted by Berk, (p. 103) to disprove the same influence, muscular because there was no resorption of the stimulus of the vagus when the lungs were inflated, which is their condition within the thorax normally and their condition in exaggeration in emphysema. Still the degree of necessary collapse for the stimulus to be effective is not given, while there may also be a difference in the effect according to whether the cause of the dilatation of
The lungs be external or internal to the bronchial tubes. Berkart further affirms that the "clinical features of the asthmatic paroxysm afford abundant evidence against the theory," calling attention first of all to the "unlikelihood that muscles could remain almost contracted for days and weeks together" — a thing it is quite unnecessary to suppose in order to account for a paroxysm lasting two days and one night; it is simply supposed that some fibers are contracting and many ready to contract at the call of the nervous stimulus.

(a) Among the physical signs we find "inspiration is relatively easy, while respiration is laboured and ineffective." Why do the bronchial muscles, if of any service, assist the latter?
(b) If the spasm oppose inspiration, it would have to oppose the powerful forces of inspiration.
(c) If it be equally opposed to both inspiration and expiration, why does the less powerful succeed?

Schedeler (p. 17) and Berkart (pp. 105-106) both go into the above questions. Schedeler answers the last two points by stating that "he believes expiration to be actually, though not potentially, weaker than inspiration, — that it has the power in reserve, but does not make use of it.

Inspiration is normally muscular; expiration is not; and it seems that the muscular apparatus of expiration is less easily set in motion than that of inspiration."

(d) "Spasm of the bronchii would produce collapse of the lungs so that the intercostal spaces would be drawn in and the diaphragm would be raised. But the organ is during the paroxysm dilated to
its utmost limits in all directions. To this objection, the adherents of the Gaspau theory would probably reply that the amount of collapse would depend on the size of the vesicles affected by the Gaspau, while the presence of Emphysema, together with the extraordinary inspiratory efforts, and the process of producing the "compensatory Emphysema" of Gaspau, would account for the great distortion.

(c). The respiratory mucous is said to be insusceptible during the attacks, "because the conditions of its production do not exist; sufficient air is not admitted to produce it." But if the bronchi were so completely contracted as alleged, life could not be sustained for any length of time. (Stolk p. 106). Such is supposed to be an answer to Saltier's allegation. But Gaspau of such large lumina would cause intense hypostasis. Gaspau says: "When collapse is sudden and extensive, it is -- a frequent cause of death." (Aikins: Vol 4, p. 708). But the conditions supposed by Saltier necessarily assume the extension of air cells, and a feeble interchange of air, even to insufficient respiration.

f. Strangely enough, Gaspau finds his rash taking one of Saltier's paradoxes of Espasm to advantage. "The great mobility of the pleuræ is incompatible with the assumption of a mucousial Espasm." But the change of seat of the Espasm, when we remember that Inspiration and Espiration are alternately trying to overcome or to allow it, is easily conceived of. Saltier, differing from Pratelle and William, assert that Espiration favours Espasm. An Asthmatic can certainly always "wheeze" the characteristic Asthmatic wheeze during Espiration, and although loud, breathing and speaking cause the
chelchi to disappear, yet these acts are not mere postural
spirations, but also include forcible expiratory effort against
a closed larynx with the corresponding backward impulse.
Besides, mucous accumulations are allowed to account for
some of the chelchi; especially, those which confuse
rhemus (Salter p. 36).
(9). "But in the vast majority of instances the bronchial muscles
are so greatly impaired in nutrition as to be incapable even
of contracting": This is (Berkhart p. 107). In the cases in
accompanied by hemoptysis and emphysema, the pathological
changes primarily consist in an abundant infiltration of
the bronchial walls with white blood corpuscles, which are
either converted into connective tissue or undergo fatty
degeneration. Thus the muscular fibres are paralyzed by
the degenerative changes around them." Dilatation of the
lungs is the result. (Berkhart loc). This is the
strongest part of the argument against spasm.
If the lungs be so dilated and the muscles so weakened
that a spasm is impossible — then the case is at
an end. Records of 'post mortem' examination
as to the state of the muscular elements in asthma,
the muscles have been unable to find. Berkhart Notes
(p. 67) that muscular hypertrophy takes place in
Bron Influenza of the lungs, and in that form
of parenchymatous pneumonia described by
Bull as 'Muscular Cirrhosis.' (p. 156). It is not
difficult to conceive cases in which the dilatation
of the lungs has gone so far or the weakness of
the muscles, as not to allow of some degree
of spasm.
Such is the prevalent theory of asthma, and
such are some of the latest criticisms upon
it.
The Nature of Asthma.

As Salter maintains, the cause of Asthma, its remedies, its symptoms, the absence of organic changes &c. lead one to the conclusion that Asthma is a nervous disease. He has also proved not only the possibility, but also the probability of the existence of 'Spasm', which, he maintains, alone explains:

1. The sudden access and departure of the disease.
2. The presence of perfect health in other respects.
3. The absence of apparent lung disease.
4. The character of the sounds.

5. The nervous element recognised in the disease, "for," he says, "only by the production of the muscular contraction of the walls, can nervous stimuli affect the condition of the Bronchial tubes" (Salter, p. 37 et seq).

In establishing his theory he does not seem to take sufficient account of the mucous membrane of the lungs in these cases more or less complicated with Catarrh; but the majority of the cases of Asthma. Moreover, 'Spasm' is not the only condition that will explain the condition he enumerates above, nor is it the only way in which nervous stimuli can affect the condition of the Bronchial tubes, for they can do so by means of the Parasympathetic System.

Obstruction of the Bronchi by Hyperaemia and Edema, by Bronchitis and Stenosis, Berkhoff regards as sufficient to account for Asthma (p. 134). He objects to any evidence of a 'nerve irritation' of the disease, and has been endeavored to show, unsuccessfully, there is hyperaemia and edema in most cases, but it is very often that of a 'nervous paralysis' - a nervous hyperaemia, more comparable to that of 'blushing' than to inflammation.

All the evidence that Salter produces to prove the
The nature of asthma is applicable to a vasomotor explanation as it is to the "spasm." Let us then consider the conditions to, which would point out the vasomotor explanation as being an element in the disease:—

1. The transient post-prandial dyspnœa of many asthmatics may be due to spasm, to vasomotor disturbance, or to dilatation of the bronchi. It is seldom due to the last cause; probably, for, an asthmatic may suffer from very great flatulence, two times or so after a meal, but have no dyspnœa then; and of the two former causes, there is generally no wheezing present; i.e. the chief evidence for spasm is absent, while we have present all the conditions likely to cause dilatation of the sensitive vessel, as we often see occurs in the flow of the check of meat individuals after a meal.

2. Some severe attacks of asthma, caused by certain indigestibles, such as Crab, Hotter, Quinces, may be devoid of wheezing; while nearly all attacks are preceded by a period of "appassion" without wheezing.

3. The difficulty in Inspiration. Saltzer holds the greater actual force of Inspiration, but its lesser potentiality--as regards Inspiration in Asthma. "That there is the inspiratory power in reserve, and that it is adequate to the instantaneous completion of the inspiratory act, is proved by the sudden jerk that expulsion the remainder of the inspired air" (Saltzer, p. 179). Why they should resort their power so as to cause a painful jerk it is difficult to see, for the assistance given is trivial, and an asthmatic may rather it were not made. They are undoubtedly very powerful, and are called into action during defaecation to aid even painfully and for a prolonged time in parturition.
It would seem that the cause of their want of success in asthma, even from the beginning of the attack, more or less apparent, is the "hyperemia" of the lungs. That air leaves the chest leaves early at the beginning of the attack; the last painful inspiration is an attempt to expel the blood - it makes room for the urgently needed air, while the "sudden jerk" will be found to be due to the fact that the diaphragm begins its descent forcibly and suddenly, before expiration has really ceased, i.e., the effect of its muscles.

4. In those who are liable to asthma after eating Commelina, urticaea is commonly associated with it. Are not both conditions due to vasomotor disturbances? Shefel (Winter cough, p. 39-41) has observed redness of the buccal and facial mucous membranes. May not the more delicate mucous membranes blush easily so we see the delicate part of the skin easily do.

5. The inspiratory character of the symptom indicates, an analogy between it and the character of the saliva when the sympathetic and not the secretory nerve of the gland is stimulated.

6. The intimate relations of Asthma and Hay-Fevers. In the latter we have the musculan element to deal with, while the lumination of the nose may become such as to present breathing through it. Many people are subject to both forms of Asthma. In one Asthmatic, I have noticed that the state of the nasal mucous membrane is such, that, when it lies in one side, the lower nasal becomes more superior. May there not be a somewhat similar delitiated state of the whole respiratory tract?

In view, all the arguments for the Nervous Nature
of the disease are as applicable to the Vasmotor Disturbance theory of its production as they are to the Spasm Theory. This theory also explains all the phenomena of the disease, as well as the Spasm Theory, for the Hypersensibility of an inward surface accounts for the ' wheezing' and its mobility. At the same time by accepting this theory, one is not called upon to give up the Spasm theory, for it seems quite possible that both the Spasm and the Hypersensibility are present, but also, that both are primarily of the same origin.

It may be pointed out in this connexion, that, as in the liver and kidneys, a Vasmotor Disturbance produces a different or a persisting Hypersensibility. So also, in the lungs, we have the same result in the muscular gland.

The Aetiology of Asthma.

Firstly, it will be necessary to examine into the condition which gives rise to the Asthmatic state, and secondly, into those which give rise to a paroxysm.

1. The condition which gives rise to Asthma.

1. The hereditary transmission of the disease or of a tendency to it. Such a transmission is especially noticeable in serious diseases, e.g. insanity, epilepsy, hysteria,新生儿性christomère - 1. The transmission of serious diseases. Saltzer found distinct traces of inheritance in 38% out of 217 cases, without noticing the frequent collateral development of this disease. Dr. Ebeling in his "Müller's Asphyxia" found 29% out of 58 cases of Müller's asphyxia that the parents were Asthmatic.

Müller's Epilepsy in his Practice of Medicine (Vol. i, 219).
Dr. Aitken says: "Hereditary predisposition plays an
unmistakable part in the history of Epilepsy; and there are
few diseases in which heredity is a more important
etiologic condition." The fact, then, that heredity is
constantly present in Epilepsy, simply, but also as inhered from
circumcision, by which
choe, paralysis, and infantile paralysis, Schneberg found
28% in 300 cases; 31% by T. Reynolds in a few number
of cases; 36% in 1280 cases by T. Gowers. The assumption
of heredity in connection with Asthma is, by this comparison,
seen to be well founded.

2. Diseases which have injured the circulation or the
nutrition of the lungs, e.g. Tumors, whooping cough,
bronchitis, etc.

In the large collection of cases found at the end of Salt’s
volume, nothing strikes one more forcibly than the frequency
with which such diseases were the original cause of the
attack. (Berkrust, p. 113). In examining these tables,
finds that in the 183 cases in which the original
cause is stated, 132 were due to Cattle, cattle
Pneumonia, whooping cough, measles and typhoid fever.
In 10 cases only was it apparently spontaneous; 8 are
attributed to climatic influences, 6 to hard work and
aridity, 5 to the outbreaks and disappearance of
Sevesa, and 11 to such causes as Snake bite.

3. The inheritance of Diathesis, e.g. Gout, Rheumatism, but
especially of the "bronchial" diathesis. Inman
(S. F. Soc. Trans. vol. 1, 641 p.) describes Asthma as a
diathetic character. "Indeed," he says, "nothing is more
common than to find hepatica, rheumatic, gouty,
or hemorrhoidal affections transpose themselves into
Asthma." Dr. Aitken (C. C.) quotes Bridgman to the
effect that "when women are the subject of Asthma,
gout prevails in their families in a larger proportion.
than in men.

In Salter's tables, one is surprised to
find how few are the Asthmatics who suffer from Gout and
Rheumatism—9 from the former and 3 from the latter. Of those
who had a family history of gout—6 were females. Only
one case is related as exhibiting a relation between Herpes
and Asthma. The case is also recorded of a distinct
alternation between Asthma and Rheumatism.

Out of the 226 cases, 86 are stated to suffer from undoubted
Rheumatic disorders, e.g., hypostria, neuralgia, "elephantiasis,"
irritability, and excitability.

4. Lesions of other organs—e.g., Heart disease, Bright's
disease, Gastro-intestinal cancer etc.

One would expect, when the respiratory organs suffer as they do in
Asthma, that the Heart would suffer also, and it is surprising
to find no more than 8 cases of cardiovascular lesions among
Salter's large array of cases. Notably, however, the
presence of valvular lesions will produce real Asthma
by causing sudden variations in the quantity of blood in
the Pulmonary vessels, leading to their over-dilatation or
atia—ordinary contraction.

Ratcliff (p. 83) mentions a case of Asthma in which blood
found the urine loaded with cast. In the British
Medical Journal—1878—vol. 1. p. 511—Dr. Shean of
Cardiff calls attention to a case of bladder's Asthma, in
which a man, 35 years of age, who had been suffering
from swelling in the legs for a short time previously
was suddenly attacked with Asthma, and Dr.
Sanctuary of Salisbury (p. 956) and Dr. Pennywood of
Leicester (p. 1664) in the same journal narrate
cases somewhat similar.

5. The influence of age upon the development of Asthma.

a. The time of life most prolific of Asthma is the
time of measles, whooping-cough, infantile diarrhœa;
this is also the time of greatest susceptibility of the
system, proven as evident in Croup, in which the

b. The period of adolescence furnishes comparatively few cases since the diseases of childhood, so apt to lay the foundation of it, are over, while the wear and tear and hardships of life and the deterioration of the body produced by them and by time have not commenced.

c. Then the task assumes and hardship and time begin to tell and show an increasing asthmic rate up to middle life.

d. The diminishing numbers thereafter indicates the diminishing probability of a person having the asthmatic tendency postponing exposure to an asthmatic cause to the date a death — whereas the tendency to inflammations of the respiratory organs increases up to the end of life. Salter — (p113) gives us the first three definitions and the following table — as their basis:

The number of cases in which the disease commenced

<table>
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<tr>
<th>Under 20</th>
<th>71</th>
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<tr>
<td>20 - 30</td>
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<td>30 - 40</td>
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<td>40 - 50</td>
<td>12</td>
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<td>50 - 60</td>
<td>6</td>
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<tr>
<td>70 - 80</td>
<td>4</td>
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<td>80 - 90</td>
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6. The influence of sex: — males are more frequently asthmatics than women. Salter found the proportion 2:1.

The following are the explanations offered:

1. The greater exposure of males to the causes producing it — Salter finds that in that time when both sexes are likely to be exposed to cold, etc., equally, i.e. between the ages of 10 and 20, the females preponderate as 14:9 in 28 cases.

2. Berekh (p128) quotes Edward Smith that the number of males who survive the diseases of infancy that are known to be the causes of asthma is greater than females.

7. The influences of Climate Occupation: — Salter, in his tables, finds seven out of nine of the males to be "gentlemen" and more than three fourths of the females "ladies." and he offers the following explanations —
The rich are more likely to consult a medical man - (6).

The children of the rich have a better chance of recovery from the diseases of infancy (the post-eczema of Asthma), because of early, proper nourishment etc. (Salter p. 402).

These more practice lies among the poor. Few that Asthma is by no means an uncommon disease among them, while Salter recognises the difficulty of forming reliable statistics in this connection, owing to the remarks above (a).

It would be interesting to know if Asthma is common in places where Cataractal Pneumonia is common, and among people who are exposed in their occupations to irritant dust - e.g., miners and gunners, or exposed to cold - e.g., coachmen and sailors.

8. The Influence of Climate. Very little is known of this subject.旅行家 says that Asthma is common in warm countries; the present writer has made inquiries in several warm places, but cannot get a confirmation of the statement. Is it not much more common in moist climates, hot or cold? It is my experience, though not numerically to be verified - that cases of Asthma were much less common in Edinburgh than they were in a Liverpool Hospital. They are certainly less common on the dry East Coast of South America than on the

Humid West Coast. (Hook, p. 144) They have, indeed, even in the West, when there is 20 to 30 per cent of cases among theBoobies. (Anon's only p. 174).

The Primary Causes of Asthma. - These are supposed to be infinitely numerous and as varied. They probably all act primarily on the bronchi, tiefen and through it on the thoracic lungs and muscles of the respiratory tubes. Anyhow, therefore, that is capable of producing vasomotor paralysis or spasm, whether by direct contact with the pulmonary mucous membrane or reflexly, or by acting on the walls of the vessels.
themselves, or through air from the brain — or anything capable of producing a spasm of the bronchial muscles, are capable of causing an Attack of Asthma, and once the disease is established it is apt to become a "habit" of body.

1. Causes which act directly on the Respiration Membrane — Among these are irritant gases, as the result of combustion, of fires, etc.; dust; certain odours; and emanations, such as those from dogs and cats mentioned by Salters, or from violets mentioned by Linnæus. Gillies states that cotton dust is capable of producing asthma and non-pulmonary hypostasis in some people. Sharp, damp air, and sudden atmospheric and climatic changes, the latter must also be put down to this category. Also the presence of Culprits.

2. Causes acting reflexly on the Pulmonary Membrane —

(a) Irritation of gastric intestinal organs from the presence of indigestible or of toxic articles, which are peculiarly offensive to some people, e.g. tobacco, cheese.

(b) Exposure of the skin to cold and wet; e.g. of the face to a cold wind — will produce hyperaemia in some Asthmatics. There is no external influence which so surely produces congestion of the non-pulmonary mucous membrane as wet and cold to the sides of the feet. (Jobell, Winter Medic. p. 175, 184.)

(c) Visceral diseases. E.g. Ulcerative disease.

3. Causes acting on the walls of the Lungs:

1. Too much or too little blood in them — as in some cases of Heart Disease.

2. Offending state of the blood in Bright's Disease, after poisons and in other diasthetic conditions, e.g. joint and Rheumatism.

4. Causes acting by the Mind:

   (a) Emotional — e.g. Fright.
5. Irritation of the Vagus, by pressure upon it of Lunulae, Cancerae, Glandulas, et alernatae etc.

The above mentioned causes must be supposed to act on a person in the "Astmatic condition" to produce an paroxysm.

The Effects of Asthma.
This disease varies greatly in its intensity in different persons, may even in the same individual; its attacks vary in

1. The Astmatic physique has been previously referred to; in case, this physique is hardly perceptible, while in others it is so legible as to be distinguishable at a distance (Salter p. 189).

A "round-backed, high-shouldered, and stooping" the body is bent forwards, the head is drawn back and buried as if were between the elevated shoulders. There is also "rigidity" of the chest, the hanging or swaying of the arms which are bent at the elbows; the thinness of the body, the conspicuousness of the superficial veins, especially of the bands. Sometimes the complexion is cyanotic; the face has generally an anxious expression, often indicating a greater age than

the reality; if not dizzy, is pale and thin. The mouth is open and the jaws hanging forward. The eyes are tired, waxy, and prominent. The voice is often feeble and slightly hoarse and rough; his sentence short, for he speaks as if using the last breath in his lungs; such are the elements of Salter's description, and although many of the characteristics above enumerated are necessary consequences of Asthma, e.g. Empysema, Salter says that he has seen the "physique" strongly marked in some.
cases where the lungs were organically sound. When asthma attacks ricketsy children, the yielding of the chest will give rise to a "flattening of the thoracic process", whether the asthmatic stop be due to the "Erector Spinae" foregoing its function as an Erector and becoming a mere "Inspirator" is doubtful. The explanation is perhaps tooingenious, even for cases in which no
spinal dislance is present. There is, on the other hand, no evidence of the uncommons of Rickets as a diathesis
away Asthmatic, as must be supposed to meet
Berkastel's view of the uncommons of curvature. The
curvature is really seldom found except in the Oste
and emphysematous, or in those who have suffered from
do very severe attacks and frequently. The explanation
may be that the same malnutrition as is evidenced
in the absence of fat all over the body, and in the
flatness of the muscles, may affect the bones
and ligaments, which give way to the habit of
sleeping so indulged in by Asthmatics, in which
the Erector Spinae, like all other muscles, is weak.

2. Effects on the Heart and Circulation.

Pulmonary asthma shows a greater amount of work
on the heart, especially the right side; dilatation and
compensation hypertrophy must be the resultant
result, and this is said to be so, and to last
for a time, until ultimately the heart loses its
force and dilatation of the veins, of the body,
and heart falters to die, said its result.

Rigby's Ambyopnea, it is generally difficult to
make out the dilatation or hypertrophy, dying life,
and few pulmo cases are recorded (Dr
Peacock. Monthly Journal of Medical Science 118, p. 408.)

The affer heat descends to the Scroticular Cordis
and remain there, even to the slightest exertion of the diaphragm, even during inspiration.

The number of cardiac lesions mentioned by Salter is in his very large table are unexpectedly few; about 12 only recorded. The heart, during the paroxysms, seems not to lose the power of regaining the relative proportions between the cavities and orifices and valves.

The debility of the circulation of asthmatics is its most marked feature, as evidenced in the enlarged veins, although the absence of subcutaneous fat serves to account to some extent for their prominence. Cyanosis may also in some cases be the result of these enlarged veins, while in other cases, where we have no rædency, it may be the result of influences acting in a similar manner upon the skin as upon the lungs.


Even to those to whom Asthma is a mere symptom of some obscure lung disease, or at least, but a quasi-independent disease, it is such a condition as aggravates even the condition giving rise to itself. Empysema is one of the most frequent concomitants and results of Asthma. The best example of Empysema seen post-mortem by Salter was in a case of Chronic Asthma (p. 165). He also mentions Empysema with Asthma in which Borelli said never existed (p. 167).

Is Empysema due to possible expansion of the air passages during inspiration? To their compensatory dilatation as rendered necessary by a collapse of a neighboring portion of lung? To the degeneration of the tissue and consequent lessened resistance of walls to any respiratory effort? Or to their possible expansion during inspiration? whichever theory is accepted, the condition of Asthma are
such as to admit of the adoption of, we have often present—
generally, and even with, or without, spasm to give rise
to collapse, and violent, respiratory efforts, while we
have also a bad nutrition of the pulmonary in common
with all other tissues.

Chronic Bronchitis, though perhaps not a result of Asthma,
is very frequently present along with it, and serves as a
help to it to produce Emphysema and other conditions.
Emphysema was present in 66 out of 226 cases, while
Bronchitis was present in 27. (Walter's table).

With such facilities present in Asthma for the development
of Emphysema, it is surprising to find mention of such
cases as these. - A man who has suffered for 44 years
with the physical signs of ill health; a woman who
has suffered for 37 years, and no Emphysema developed; a
man who has suffered for 24 years and has a perfect clear
Bronchiectasis, is another well-known condition which results
from Asthma. - Salter saw a marked specimen of it (p. 157)
and attributes it to the presence also of Bronchitis. Salter
(Syd. for. Ed. of this Work, p. 157 et seq.) relates a case
of Asthma complicated with Emphysema and
Bronchiectasis in a marked degree. The bronchiectasis
was mostly in one lung, and was probably caused by
the contraction of parts of newly-formed connective
tissue, while the Emphysema so marked in the other
lung was probably compensatory.

Salter mentions the presence of "endothelial thickening
and constrictiveness of the circular fibres of the
bronchi" (p. 157). He mentions the hypothesis of
the muscular fibres - but adds, to-day, better, this
has been seen microscopically. There seems to be no
one who has taken the trouble to record such a fact, if
it has been noticed.
The anatomical lesions mentioned by Besirach are those of inflammation of all the bronchial tissues, resulting in the narrowing of the lumen of the tubes. An exudation of serum and white blood corpuscles is poured into the lumen of the tubes, and press upon them, causing degeneration of the muscular fibres and of the elastic fibres; there is hyperplasia of the strands of the lung, obliteration of the capillaries, and air-vessels with the impairment or destruction of the function and of the nutrition of the secretory apparatus. The pulmonary vessels dilate and form free communications between the arteries and veins, while "villous elevations form on the surface of the bronchial mucous membrane which are vascular papillae consisting of tortuous vessels surrounded by connective tissue." (Besirach, "The British Medical Journal," p. 512.)

Brustone (under Brustone) says that the consequence of the inflammation of the submucous tissues may lead by mere irritation to stimulation of the muscular fibres to increased action or to their atrophy and degeneration. This irritation sets the tone of the mucous membrane and the possibility of its leading into collapse. This pathology gives us, in the main, the condition necessary to produce a paroxysm of asthma—an uneven surface, easily rendered thinner, and containing muscular fibres which vary in many not contract according to whether they are active or atrophied and degenerated.

The relation of asthma to gastric intestinal disturbance is also well-marked, but as it is exceedingly doubtful whether the one be the cause of the other or whether the condition of both mucous membranes be due to some primary nervous cause, it is perhaps wiser not to go into the subject.
The Clinical History of Asthma.

A patient subject to Asthma will, as has been shewn, in all probability have a history of hereditary tendency, either from the inheritance of Asthma, or of the Gout, Rheumatic or Nervous diseases. He will generally also have a history of some previous disease, e.g., Measles, Croupal Pneumonia, Hooping Cough, or which inflicted serious injuries on the Pulmonary lining.

His disease will consist of paroxysms, more or less severe, the intervals between these generally depending upon the development of the consequences of the presence of the circumstances of Asthma, such as Employment or Strenuous labor, together with liability to the exciting causes.

The phenomena are generally said to be ushered in by peculiar symptoms. These are enumerated: ‘Drowsiness, wakefulness, mental activity, and buoyancy of spirit’. Salt refers a case in which ‘Opisthotonos’ always marked the patient of an approaching attack; often, fainting, flatulence, or other signs of oppression. Nothing of the kind is, according to Salt, very characteristic of Asthmatic Approaches, especially of subjects of Hay Asthma.

These symptoms, generally speaking, are vague, and admit of different explanations; some of them are fairly characteristic, others, e.g., Shivering of the body, it has not fallen to my lot to be able to verify.

In 19 out of 20 cases, the paroxysm comes on soon after midnight, awakening the patient. Three cases are mentioned by Salt, in which the patient first awakes and the attack comes on subsequently. The horizontal position of the body, favouring the influx of the blood towards the heart, and therefore into the right lungs; the greater facility with which the causes of defective action during sleep, as is evidenced by the insufficiency of children to, owing probably to the diminution of inhibition, and also, the fact that all the functions...
of the body are periodically lowered at that time of the night, as is evidenced in the lowerers of the pulse and temperature—
all these may perhaps supply the explanation of its occurrence.

Among the early symptoms of the attack, "profuse diuresis," is said to be prominent; the diuresis of a "pale lip-in-the-bone" urine. Is not this due to vasomotor paralysis of the vessels in the kidneys? De Rieger observed in a case, immediately after the fit, a deficiency of urea and of chloride of sodium.

The difficulty of breathing which oppresses the patient, and observers would have seen to have increased gradually up to the time of awakening. Wheezing, audible at some distance, is present, and under some medical means he had recourse to, the dyspnoea will continue to increase until the patient will have to call for assistance all the muscles of inspiration and expiration, so that his head is fixed, the two Stethoscopes standing out prominently, the chest hardly moving from its fully dilated position, except when the movements of the diaphragm is drawing in the sides; while in adolhæin, any position that is supposed to increase the respiratory power is distinctly adopted. This phenomena may or may not be accompanied by a cough. Inspiration is full and forcible; expiration is slow and prolonged. All movements are distressing.

The expression of the face is anxious, the mouth open, gasping for breath; the eyes often fixed and staring; often tragic. The face pale or even cyanosed.

There is a sense of constriction of the chest.

The temperature of the body is said to fall; the
Skin is pale and shrivels, even when creased with respiration.

The breath beats feebly and rapidly, and the apex beat is felt in the sternocleidus.

The number of respirations in the minute are either normal or less than normal, but expiration becomes much longer than inspiration, while the pause is short. Before the prolonged expiration is over, the diaphragm suddenly commences its descent, and causes the jerk at the end of expiration.

Consultation shows the respiratory movements to be either very indistinct or even absent, while ominous and debilitate phenomena are abundant, and the wheezing even audible at a distance. The sounds are continuously changing their site, and may be heard all over the chest.

The development of the attack towards its point of greatest intensity may be sudden or gradual, and its duration from a few minutes to some days. Saltzer relates a case lasting two days and two nights.

Every demand upon the muscular system or upon the respiratory space greatly apprises the appetite, and food and all movement is abstained from.

Saltzer (p. 83) states that the illness disappears coincidentally with the appearance of expectoration, but the writer has always found the relief to precede expectoration, sometimes by a considerable interval, while its quantity may be very scarce even after a severe attack. Sometimes, however, and in such cases, expectoration is profuse, though a difference should always be made between the 'spitting and hacking,' during breathing for the relief of the paroxysm, and the subsequent...
expectoration, which is composed of water, salts, mucus
corporcles, cells of various kinds, and sometimes blood, in
rampy quantity. It comes up with hardly an effort,
in small round pellets, or long head like strings, long,
and of a green or transparent colour, — corresponding
close to the expectoration of Laennec's pneumostatic
 clientes. The colour changes as the secretion becomes older.
After the attack is over and relief is obtained, the patient
happiness would be complete, were it not that experience
has taught him that he may expect a
series of paroxysms to follow; once the habit is set in,
the fatigue of the paroxysm passes, the patient is returning
in his ordinary health.

The Diagnosis of Asthma.

Asthma must be diagnosed by the character of the
breathing, as described in the last chapter, but
especially by the prolonged difficult and painful
effortation — the history of previous attacks and
intervals of apparent rest may, in some cases,
facilitate the diagnosis.

Pure unaccomplished Asthma is rare, but its existence
cannot be denied by the upholders of any
inverse theory of its production.
The diseases which Asthma commonly complicates,
like dyspnoea and Chronic Rheumatism, and
other, which it complicates more rarely, such
as Bright's or Heart Disease, are easily diagnosed,
and should always be sought for, as their presence
might explain the Asthma, although these
may disappear in such cases of quite a
more Asthmatic character.
Angina Pectoris is diagnosed from Asthma by the characteristic pain. Affections of the larynx or of the diaphragm causing any dyspnoea excitation Asthma, would, in all probability, cause some change in phonation or in the manner of breathing, that would call attention to these points. Embolism of the Pulmonary artery might cause a sudden dyspnoea, but the angina induced would stimulate an inflammatory reaction. Hemorrhage dyspnoea, and the respiration would be more like that of acute pneumonia in Pulmonary than that of Asthma. Such cases are, however, obscure. The previous history of a 'source' of embolism might help the diagnosis.

Progressus in Asthma.
The progressus in Asthma is favorable as regards life, unfavorable as regards the discontinuance of the attacks. Treatment greatly ameliorates the condition, even when much emphysema is present. Complicating Heart disease, it is an unfavorable element in the progressus of life; while complicating Emphysema or Bronchitis, the progressus of Asthma is really that of these diseases, mainly unfavorable except when the patient can live in a climate where there are conditions favorable to their amelioration, or to the non-production of progressus.

Salter maintains that "the young are likely to "grow out of the attacks" but an old age subject is likely to get worse, because the 'nervelessness' of youth will probably be lessened, while in the older, the disease is nearly invariably connected with some organic lesion."
The Treatment of Asthma.

It is convenient to divide this part of the subject into the treatment of the paroxysm and the treatment of the condition.

The treatment of the paroxysm, owing to the distress caused by the dyspnoea, as well as because of the injurious effect its prolongation has upon the lungs, the heart, and the circulation generally, calls for active measures.

Chloroform stands at the head of the list of remedies used for this purpose, and its greatest efficacy is seen in the severest cases. It can be given with impunity; even in cases where asphyxia seems imminent, and if the attack be not caused by bronchitis, the relief is complete and permanent.

In cases in which bronchitis is the cause, the relief will not be permanent, but the paroxysm will be apt to return. The same principles will apply to Ether, but Ether is more disagreeable to breathe, while it is also apt to apparatus any bronchitis which may be present, and thereby do some harm. To return in his Practice of Medicine relates an interesting case of relief by Ether.

It is somewhat against these remedies that they cannot be administered to the patient or to his friends, and also that a prolonged use of Ether produces a condition very similar to Delirium Tremens.

Ploratine, to of a grain dose, hypodermically, has been greatly recommended by J. Berkurst. (British Medical Journal. June 19. 1881). This acts rapidly, the circulation greatly, and excites great influence upon the glands both of the skin and of the respiratory mucous membrane. Berkurst claims that it has a remedial tendency upon the asthmatic condition. The relief of the paroxysm by it is swift and complete.
but the writer has not seen permanent beneficial effect, whereas it has a weakening influence upon the system generally.

Atrigenia (too: pr. hyperacene) - I have seen pain relief, probably by causing the contraction of the dilated pulmonary vessels. Atrigenia (Therapeutic) seems up its action as stimulating the respiratory centre and the parasympathetic motor centre.

The "Atrigenia" purify us also with other means of relieving the paroxysms in the leaves of the various species of Datura. Of these, I have found the Datura alata to be the most efficacious, the leaves are generally cut up and smoked. It is a common error to suppose that it is necessary to inhale the smoke and to let it enter the lungs, but a very observant of a few cases, equal, one to say that "there ordinary smoking" of the leaves serves the purpose equally well. The action is probably the same as that of atropia.

Irrational in inhalation, have been highly recommended, and they are undoubtedly of great efficacy in some cases. According to Hobell (Medic. Calf p. 20) they give relief best in those cases in which the transpiration of the human membrane is most marked, while Saltair (p. 263) thinks they give most relief in those cases in which the complications are fewest. It is difficult to see how these irritative fumes can relieve a case in which bronchitis is present, though they do, as Hobell suggests, act by "reperistalising and causing the resorption of the flamed and tubed condition." Like Atropa, they may relieve such a condition for a time, but the irritative undoubtedly approaches the Bronchitis. It is my experience, they give relief in the flamed cases,
and may they rest by exciting violent aspiration (cough) help the emptying of the turbid vessels as well as clear the air-passage? According to Hahn (cited by Berkast p. 258) the fumes consist of Nitrous Oxide and an Acidic compound, while Eulenburg says they consist of Cyanogen, Guanil, of Potassium and Ammonia. The effect is certainly mainly that of ‘irritating fumes’. Pronoxious (1 c) recommends the inhalation of Arsenical cigarettes; he also mentions the topical application of Ammonia to the pharynx, as well as its inhalation, as means of relief, but he calls attention to the undesirable result which they sometimes produce.

Representants are referred to by Salter as among the most valuable of the remedies. Tobacco smoking, the administration of Plaster of Paris and Upecamunda give relief in a more effectual manner. He insists that that they should be given early, before any considerable degree of pulmonary congestion can have appeared. Practical smoking of Tobacco renders it of no efficacy as a remedy. Berkast explains their activity saying that they reduce arterial pressure and therefore increase exudation and favor the detachment of foreign bodies; even this process would require some time, but as the relief is said to be immediate, we would suggest as Salter, the relief of spasm, or else, that the lessening of the blood pressure causes the arteries to contract, so as to allow the Membranal Membrane to shrivel.

Stimulants are shown to be after useless, and have generally been reserved to before the aid of a
medical man has been called in. Whisky, brandy, and gin are often praised, but especially the former. Their action is thus explained by Walter: - They... act inversely to sleep - which (1) produces insensibility to respiratory anæsthesia, and (2) startle reflex action. I should rather say that the inhibitory activity of the brain is lowered during sleep. Stimulants often relieve an attack produced in the day time, as by some irritable drink, and probably act by increasing the force and number of the heart's contractions, and increasing the temporarily the activity of the vasomotor centres. How they could relieve epilepsy it is difficult to conceive. Similarly to the action of stimulants we must suppose that of hot coffee, tea, or that of ammonium, all three, to be.

Nitrates of Ammon and a local solution of Nitro-glycerine have, in some cases, been found very efficacious, especially in cases of Bright's disease complicated with asthma. (Dr. Sheron of Cardiff's case, cited, quoted). The most characteristic effect of this drug is its influence on the vascular system. It relates the whole arterial pressure, owing to "dilatation of the arterioles." It may act either on the vasomotor centre, or even on the nerve trunks or arterioles. (Reipke). May we not suppose that there may be an Asthma due to vasomotor irritation and vasomotor paresis, each admitting of different means of relief?

Other modiﬁes innervation greatly, and several interesting cases are recorded in which Asthmatic paroxysms by the occurrence of any sudden cause of emotion, have been relieved.
2. The Treatment of the Asthmatic Condition.

A paroxysm of Asthma having once appeared, its recurrence must be looked for; the habitus of the disease being one of its characteristics. Then the habit once has set in, one of the most efficient ways of removing it, is a change of Atmospheric Conditions, - i.e., from a moist into a dry air and vice versa.

Those diseases which are known to cause Asthma should call for the greatest care in the superintendence of the period of their convalescence. Good nutrition and the avoidance of premature exposure to cold and wet should specially be cared for.

In treating an Asthmatic there are two distinct periods to recognize, viz., the period immediately preceding an attack, and the ordinary state of the health. During the paroxysm, the lungs, the heart, the liver and, in fact, the whole circulation have suffered, and remedies directed to the relief of Congestion, of a specific nature, are indicated.

1. There is usually present some congestion and tenderness of the Lungs. A cholagogue purgative relieves this, and the administration of a saline purgative, will be found to fulfill all the necessary conditions.

2. When Bronchitis, Congestion or Ectasia of the Lungs, so commonly present, should be immediately treated by Antipyrines or Contra-purgatives, accompanied by internal remedies, as indicated by the quality or quantity of the Secretion. Chloride of Ammonia is a most valuable remedy, diminishing the viscosity of the mucous secretion greatly. When the Bronchitis is slight or chronic, Tincture of Belladonna is still better. One of the best measures for relieving
The pulmonary circulation is a course of weak character. For the Asthmatic state, a tonic treatment will be found most suitable; such tonics as are known to affect the circulation, principally being the most efficient. Digitalis restores the tone of the heart, and benevolently is nearly always called for; and in addition, Creon or Arsenic may also be given, and have been given with great benefit; they seem to help nutrition greatly. May not Arsenic have an effect on the tender vessels of the lungs somewhat similar to that it may have on the vessels in Disease? Asthmatics are generally Dyspeptic and great attention must be paid to diet, its quantity and quality. Salt is requisite a Dyspeptic Asthma, for the cure of which he proceeds as in the treatment of Dyspepsia. Especially does he point out the necessity for Asthmatics to avoid meals, except at such times that their digestion be completed before bed-time, i.e. before such time as the undigested food may act as an effec.tive motor stimulant. Is not the vascular condition in the lungs of Asthmatics comparable to that of the brain of those individuals who suffer from night-mares? It is agreed that all alcoholic beverages, especially Malt liquors are injurious to Asthmatics.

The Dietetic condition of a person suffering from Asthma requires considerable similarity to that which it calls for in all other diseases. Scrofuscan (A Asthma) recommends a treatment combining Belladonna, Tar peptine and Arsenic. He gave each drop successively for ten days. This is trusted to Sulphur, but each Asthmatic will call for special
The climatic treatment of Asthma is of great importance and interest, but is a very difficult study. Trivial changes of residence, e.g. from one street to another, have not been known to exercise great influence. Such may be explained, perhaps, by the presence of some peculiarity in the place, e.g., the presence of lower soot, bad ventilation, the presence of pollen powder etc. A sea voyage removes a patient from all such influences and ensures conditions favourable to convalescence generally; yet I have seen two cases, during long voyages through various climates, rest at all benefitted.

When a patient is asthmatic in the locality, it would seem that the air of the place is peculiarly unfavourable to his erroneous mucous membranes. Warm climates are generally beneficial, since bronchitis, perhaps the commonest accident of Asthma, is less likely to occur under such conditions. In warm moist atmospheres, e.g. that of Calcutta, Asthma is quite as common as it is in the Western parts of Britain, where I believe it will be found commonest with us. On the other hand, in the high altitudes of South America, especially on the Western aspect of the Cordilleras, it is very rare, and Asthmatics from the lowlands and Coast towns go there for the cure of their disease. Here the air is cool and very dry. Perhaps the best rule that can be formulated for our guidance in this connection is this—That those who are asthmatic in a moist atmosphere should
seek a dry one, and vice versa. The relative humidity of the atmosphere seems to have much more to do with the causation of Asthma than its temperature. Most of the Asthmatics I have known have been benefited by a 'dry climate'.

For the poorer class of patients, conditions nearly resembling beneficial climates must be sought for. Respirators afford a fairly efficient protection against cold moist air. Ventilation of rooms, exercise, the use of cold and warm baths, and all means tending to improve the general health, will greatly assist the treatment of Asthma.

Finally, all complications, e.g. Dilatation of the Heart, Collapse of the Lungs, Emphysema, etc., call for ordinary treatment.
<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Age</th>
<th>Sex</th>
<th>Duration</th>
<th>Episode</th>
<th>Cause</th>
<th>Note</th>
<th>Treatment</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A.</td>
<td>60</td>
<td>Male</td>
<td>2 years</td>
<td>12 times</td>
<td>Cataract</td>
<td>Poor condition of the Eye</td>
<td>Cold, Cataract</td>
<td>Cataract removed, sight recovered</td>
</tr>
<tr>
<td>2</td>
<td>B.</td>
<td>50</td>
<td>Male</td>
<td>1 year</td>
<td>60 times</td>
<td>Cataract</td>
<td>Poor condition of the Eye</td>
<td>Cold, Cataract</td>
<td>Cataract removed, sight recovered</td>
</tr>
<tr>
<td>3</td>
<td>C.</td>
<td>40</td>
<td>Male</td>
<td>2 years</td>
<td>50 times</td>
<td>Cataract</td>
<td>Poor condition of the Eye</td>
<td>Cold, Cataract</td>
<td>Cataract removed, sight recovered</td>
</tr>
</tbody>
</table>

**Note:**
- Cold, Cataract: The patient is subject to frequent episodes of cataract, which are treated with cold compresses and eye drops.
- Cataract removed: The cataract is surgically removed, restoring the patient's vision.
- Sight recovered: The patient's vision improves significantly after the surgery.

**Treatment:**
- Cold compresses and eye drops are used to manage the episodes of cataract.
- Surgery is performed to remove the cataract, resulting in improved vision.

**Outcome:**
- The patient's vision improves significantly after the surgery.
- The patient is able to lead a normal life with improved vision.
<table>
<thead>
<tr>
<th>Number</th>
<th>Name &amp; Co.</th>
<th>Residence</th>
<th>Age at Appearance</th>
<th>Length of Disease</th>
<th>Cause of Mortality</th>
<th>Paroxysms at Night</th>
<th>Means of Recovery</th>
<th>Associated Circumstances</th>
<th>Remedies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>J. G.</td>
<td>male</td>
<td>31 years</td>
<td>10 months</td>
<td>Slight chills</td>
<td>Subject to</td>
<td>Slight chills</td>
<td>Subject to</td>
<td>Nitre paper relieved partly.</td>
</tr>
<tr>
<td>2</td>
<td>P. M.</td>
<td>female</td>
<td>31 years</td>
<td>10 months</td>
<td>Slight chills</td>
<td>Subject to</td>
<td>Slight chills</td>
<td>Subject to</td>
<td>Nitre paper relieved partly.</td>
</tr>
<tr>
<td>3</td>
<td>E. M.</td>
<td>male</td>
<td>28 years</td>
<td>10 months</td>
<td>Slight chills</td>
<td>Subject to</td>
<td>Slight chills</td>
<td>Subject to</td>
<td>Nitre paper relieved partly.</td>
</tr>
<tr>
<td>4</td>
<td>J. M.</td>
<td>male</td>
<td>28 years</td>
<td>10 months</td>
<td>Slight chills</td>
<td>Subject to</td>
<td>Slight chills</td>
<td>Subject to</td>
<td>Nitre paper relieved partly.</td>
</tr>
<tr>
<td>5</td>
<td>E. M.</td>
<td>male</td>
<td>28 years</td>
<td>10 months</td>
<td>Slight chills</td>
<td>Subject to</td>
<td>Slight chills</td>
<td>Subject to</td>
<td>Nitre paper relieved partly.</td>
</tr>
<tr>
<td>6</td>
<td>J. M.</td>
<td>male</td>
<td>28 years</td>
<td>10 months</td>
<td>Slight chills</td>
<td>Subject to</td>
<td>Slight chills</td>
<td>Subject to</td>
<td>Nitre paper relieved partly.</td>
</tr>
<tr>
<td>7</td>
<td>J. M.</td>
<td>male</td>
<td>28 years</td>
<td>10 months</td>
<td>Slight chills</td>
<td>Subject to</td>
<td>Slight chills</td>
<td>Subject to</td>
<td>Nitre paper relieved partly.</td>
</tr>
<tr>
<td>8</td>
<td>J. M.</td>
<td>male</td>
<td>28 years</td>
<td>10 months</td>
<td>Slight chills</td>
<td>Subject to</td>
<td>Slight chills</td>
<td>Subject to</td>
<td>Nitre paper relieved partly.</td>
</tr>
</tbody>
</table>
I do not claim to base any of the arguments for the theory or modification of a theory of launtes that I propose upon the few number of cases it has fallen to my lot to observe. I have carefully read Salter's cases, and have based my table upon his, and I do not find that there is any incompatibility between Salter's Thesis and the modification of it which I now submit, although with much diffidence, to the judgement of the Medical Faculty of the University of Edinburgh, hoping it may meet with their approval, and prove to them that the writer has not ceased to labour and to think, however erroneously or erroneously he may do both.

William Rowlands, M.D. 18.
at Rio Janeiro.
March 22nd 1884.